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# Comment les start-ups gèrent-elles les incertitudes du développement de l'écosystème d'innovation? : Le cas d'une start-up proposant un service de transport à destination des employés d'entreprises, utilisant des véhicules électriques, à Bangalore, en Inde

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## ► To cite this version:

Haruki Sawamura. Comment les start-ups gèrent-elles les incertitudes du développement de l'écosystème d'innovation? : Le cas d'une start-up proposant un service de transport à destination des employés d'entreprises, utilisant des véhicules électriques, à Bangalore, en Inde. Business administration. Institut Polytechnique de Paris, 2021. English. NNT : 2021IPPAX047 . tel-03643896

**HAL Id: tel-03643896**

**<https://theses.hal.science/tel-03643896>**

Submitted on 17 Apr 2022

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INSTITUT  
POLYTECHNIQUE  
DE PARIS

NNT : 2021IPPAX047

Thèse de doctorat



# How do start-ups manage uncertainties of innovation ecosystem development?

## The case of a start-up using Electric Vehicles for Corporate Employee Transport Service in Bangalore, India

Thèse de doctorat de l'Institut Polytechnique de Paris  
préparée à l'École polytechnique

École doctorale n°626 Institut Polytechnique de Paris (ED IP Paris)  
Spécialité de doctorat : Science de gestion

Thèse présentée et soutenue à Palaiseau, le 16 juillet 2021, par

**Haruki Sawamura**

### Composition du Jury :

Françoise Chevalier Professeur associé à HEC Paris	Présidente
Rigas Arvanitis Directeur de recherche au Ceped-Université Paris et IRD (UMR 196)	Rapporteur
Didier Chabaud Professeur à IAE Paris-Sorbonne	Rapporteur
Sébastien Lechevalier Directeur d'études à l'EHESS (Chine Corée Japon UMR 8173)	Examineur
Hervé Dumez Directeur de recherche au CNRS École polytechnique (i3-CRG UMR 9217)	Directeur de thèse
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COMMENT LES START-UPS GÈRENT-ELLES LES INCERTITUDES DU  
DÉVELOPPEMENT DE L'ÉCOSYSTÈME D'INNOVATION ?

*Le cas d'une start-up proposant un service de transport à destination des  
employés d'entreprise, utilisant des véhicules électriques, à Bangalore, en Inde*

Thèse présentée pour l'accèsion au grade de docteur de  
l'École polytechnique, spécialité sciences de gestion.



Présentée et soutenue publiquement  
au 16 juillet 2021

Institut Interdisciplinaire de l'Innovation (i3)  
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HOW DO START-UPS MANAGE UNCERTAINTIES OF  
INNOVATION ECOSYSTEM DEVELOPMENT?

*Case of a Start-up Using Electric Vehicles for  
Corporate Employee Transport Service in Bangalore, India*

Thesis submitted for the degree of Doctor of Philosophy in management science,  
École polytechnique



Haruki SAWAMURA

Defended with a public presentation on 16th July 2021

Interdisciplinary Institute of Innovation (i3)  
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<b>Mr. Sébastien LECHEVALIER</b>	EHESS	Examiner
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<b>Mr. Hervé DUMEZ</b>	CNRS École polytechnique	Supervisor
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スタートアップ企業の経営者は  
イノベーションエコシステムの不確実性にどのように対処するのか？

インド、バンガロール都市部にて  
電気自動車を用いて企業向けモビリティサービスを展開するスタートアップのケース

博士号（経営科学）取得論文

École polytechnique



澤村 治基

当博士論文は令和3年（西暦2021年）7月16日に行われた  
博士論文公開審査会（口頭試問）において合格と認められたものである。

イノベーション学際研究所 (i3)  
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## 概要

競争優位の源泉の一つとしてビジネスモデルイノベーション（BMI）が注目を集めている。新しいビジネスモデルのバリューネットワークを構築しようとする企業にとって、サプライサイドの技術・製品および基幹インフラの存在は必要不可欠である。しかしそれらのイノベーションエコシステムは、（企業とその経営者にとって）外部的な（コントロールの及ぶにくい）要素に依存して発展してゆく。イノベーションエコシステムの発展が不確実なとき、BMIを達成しようと意図する企業は様々な困難に直面する。本研究はBMIのPre-stage(前段)に注目する。BMIの「前段」とはBMIの達成に必要な不可欠な技術あるいは製品が未だ存在しないフェーズと定義される。経営者はこの「前段」状況にどのように対処するのだろうか？

本研究はバンガロールのスタートアップ企業をケースとして分析する。ケース企業はインドにおいて電気自動車(EV)を用いてモビリティサービスを提供した最初の企業である。ケース企業はEVを用いて企業向けに(B2Bサービスとして)従業員の通勤を担うタクシーのサービス(CETサービス)を提供している。ケース企業の経営者はCETサービス以外のモビリティサービスを他社に先駆けて展開し先行者優位を構築することを戦略的に意図している。しかしながら、そのようなモビリティサービスを提供するために必要なEVの車種が存在しない状況に置かれている。すなわち「前段」状況にある。これは当地のEVのイノベーションエコシステムが発展途上であることに起因する。

本博士論文では、成功するBMIプロセスの解明には「前段」に対する理解を深めることが重要であると指摘する。その一つの理由として、「前段」において組織に必要な能力が、「前段」を抜けBMIを実行する段階に必要な組織能力と異なることを指摘する。BMIの実行段階に必要な組織能力としてはDynamic Capabilitiesが重要であると先行研究で指摘されているが、「前段」にあるケース企業が直面していた課題の解決にはDynamic Capabilitiesとして定義されているものとは異なる組織能力が必要であった。



pour les sciences



“Panta rhei” – Ancient Greek





## Acknowledgements

*A great journey, that keeps rolling.*

I hereby express my gratitude to the people who helped the realisation of this research and the completion of the thesis. Names are listed without honorifics. The position is, if mentioned, as of the year that I obtained their supports.

First of all, I express my gratitude to Hervé DUMEZ for the realisation of the research from the very beginning with an encouraging word, **Commune Naufragium Dulce**. The initiation, advancement and completion of the thesis cannot be done without his academic inputs or practical supports backed by his experiences and intelligence. Though the author is not sure if the author could have mastered, Hervé gave the author a lot of valuable advices on the theorisation part and methodology part. The author would like to seek the future professional carrier by continuously re-learning what he gave me as advices and consultations. I am pleased to have had an opportunity to conduct my research under his supervision. After years since the inauguration of this research, I am happy that we as a team completed this highly challenging international project through numbers of practical difficulties:

**Fluctuat Nec Mergitur.**

Equally, to Joël RUET for the realisation of the research as the best supervisor with brilliant research guiding skill that enabled me to deal with many difficulties both on the field and in writing. The author highly appreciates his international research experiences and his wide-ranging knowledge and network that he keeps developing through his professional activities. This thesis would not have seen the light of the day without his liberal and tolerant personality that firstly accepted me as his PhD student, secondly guided me throughout the research activity and thirdly kept encouraging me to complete the writing of the thesis in such a dynamic environment in terms of financing, designing, executing and converging. Two specific memories to be mentioned here: one about the visit to Temple Nizamuddin Dargah in Delhi after work and the other about his word on professionalism and communication. Thank you for guiding me till the end and I hope I will be able to formulate another collaborative research with him back in my home country.

To all the members of jury: Rigas Arvanitis, Didier Chabaud, Françoise Chavalier and Sébastien, Lechevalier to be the first readers of my thesis and their valuable feedbacks. They help me tighten the writing of the thesis at the final stage for the completion.

Many thanks to the team of Institut de la Mobilité Durable (IMD Renault-ParisTech) for the financial and practical supports of the research. The author had opportunities to present the research in front of industrial actors through the activities of IMD and the feedbacks obtained enrich the thesis.

Many thanks to the team of i3-CRG,  
and to the team of École polytechnique for administrative supports.

I express my gratitude to Jean Grebert who supported my research activity as a research leader of IMD. He led two research projects, NextVolt and NextVolt2, that I participated to the former as an exchange student from University of Tokyo and the latter as a research assistant at École polytechnique. These two research projects led us to develop this doctoral

research project under the framework of NextVolt2. I appreciate his intellectual inputs during the research both during field surveys in Bangalore, Delhi and Kolkata and during the writing in Paris.

I express my gratitude to Akil Amiraly for his continuous dedication on NextVolt project that I was a part of. It was his entrepreneurial mentality that enabled to break through challenges in initiating research projects of NextVolt and finally opens up the way for this PhD research. We came to meet each other thanks to the international exchange scheme between École polytechnique and University of Tokyo. Our research design started in remote while he was in Paris and I was in Tokyo. We met in real for the first time in Bangalore at the campus of Indian Institute of Science (IISc) where all my intellectual exploration started that led me to write this acknowledgement after finishing my PhD defense.

I express my gratitude to Romain Beaume, ancient director of Institut de la Mobilité Durable, who enabled the realization of NextVolt project: an important pre-step toward this PhD research. He also gave me practical advices in execution of PhD research and life in Paris as an ancient doctor student at CRG where he did his thesis with international field surveys including surveys in Japanese cities.

I express my gratitude to Michèle Breton, the secretary of i3-CRG. Since the first internship project in 2014 till the very end of my thesis, she continuously helped me dealing with administrative processes. Even beyond administrative documentation, she gave me various advices related to the research activities and to doctoral student life at École polytechnique.

I would like to express my gratitude to the following people for the helps that I benefitted for the realisation of field surveys in India:

Ashwin Mahesh  
(Co-founder of Lithium Urban Technologies)

Sanjay Krishna  
(CEO and co-founder of Lithium Urban Technologies)

Dominique Lucas  
(Head of product planning and market intelligence, Renault India)

I also express my great gratitude to the team of Sustainable Mobility Institute, Renault France, Renault Foundation, Renault India and Renault-Nissan Technology Business Centre India: especially to Claire Martin, Dominique Levent and Ali.

I also express my great gratitude to the team of Lithium Urban Technologies: Praveen, Vivek, Shubo Ray, Nandini, Richard, Arvin, Anish, Manoj, Pratana, Ashish, Afsha, Prathima, Archana Patil, Aishwarya, and Balaji.

I also express my great gratitude to the professors and researchers for providing valuable advices and consultations, and for the discussions that helped me to write the thesis: Ichiro Sakata (University of Tokyo), Yukio Kohriyama (École polytechnique), Masaru Yarime (Hong Kong University of Science and Technology), Hidetada Higashi (University of Yamanashi Gakuin) and Soichiro Minami (Policy Research Institute for Land, Infrastructure, Transport and Tourism).

I also express my great gratitude to the team of Fondation France-Japon of École des Hautes Etudes en Sciences Sociales (FFJ-EHESS) for direct and indirect supports to my research activities especially to:

Sébastien Lechevalier, Alexandre Faure, Jodie, Yukiko Itoh, Dora, Fabian and Celine.

I would like to express my gratitude to my friends and colleagues at Management Research Centre of École polytechnique (i3-CRG, École polytechnique) for valuable discussions, for advices on the thesis and for proofreading:

Ariadna Anisimova, Mattias Mano, Mathias Guerineau, Julien Kleszczowski, Bo Chen, Taye Brook, Sanda Renou, Camille Toussaint and Alba Fernández.

I also express my appreciation to the facilities that ensure my smooth research activities: to Cité International Universitaire de Paris, Maison du Japon and Maison de l'Inde for providing me accommodation in Paris, and to Bibliothèque National de la France (the National Library of France), Bibliothèque de Mines ParisTech, Bibliothèque de Télécome Paris, Bibliothèque Sainte-Geneviève, Bibliothèque de l'École polytechnique, Bibliothèque de l'Institut National des Langues et Civilisations Orientales (INALCO), Bibliothèque de l'École des Hautes Études en Sciences Sociales (EHESS), Indian Institute of Management – Ahmedabad Library, Indian Institute of Management – Bangalore library, University of Tokyo Library and Waseda University Central Library.

Moreover, I would like to express my gratitude to the practitioner in India for providing valuable local data and information and for the discussions that helped me to write the thesis: Dhivik (CEO of GoGreenBOV), Amit Dubey (Kinetic Energy), Maharshi Benni (Ather), Abhijit Malankar (Technische Universität Berlin)

Moreover, I would like express my gratitude to the practitioner that I encountered during the research and gave me valuable insights on business development especially on the development of start-ups and corporate ventures:

Keiichi Toyoda and Hiroyuki Arai.

In addition, I would like to express my special thanks to my friends in India for providing precious local data and information, for providing me contacts information of important local informants and for stimulus discussions that inspired me during the field surveys:

Viney G. (BESCOM), Sachino Taki (JETRO India), Satoshi Nagata, Yuka Nakada, Ravi Shankar, Veena Nanda and Namu Tamang (Regus).

In addition, I would like to express my special thanks to my friends in France for the discussions that motivated me to advance the research and that clarified the writing structure in its process and for the proofreading:

Shingo Akimoto (Université Paris II), Mona C. (Université Paris I), Kazuki Hao (University of Kyoto), Toshifumi Unno (Nissan France, alumni of École polytechnique) and Kaoru Nakada.

Same way, special thanks to Akshay, David Sun, H. S. Y. of École polytechnique, and Inès Herbaut (ESSEC business school), Nicolas (Institut National des Langues et Civilisations Orientales, INALCO), Yujia (INALCO), Lise Mathieu, Sofiane, Janua and Daniel Perez (Imperial College London).

In addition, I would like to express my special thanks to my friends in below in Japan for the valuable discussions and insights on various business-related topics that inspired me to

advance the research and that clarified the writing structure in its process or for every other support in various ways.

Yuya Soneoka, Hiroki Matsuura, Ken Hayashima and Yuichi Yoshizawa: alumni of Technology Management for Innovation (TMI), Department of Engineering in University of Tokyo.

Wataru Tamura (master in Public Policy of Edinburgh University), Kyohei Ono, Narumi Okada (Yahoo Japan), Shun Kohara (PwC consulting), Ryoya Monda, Mami Maejima, Arei, Satomi Hayashi, Masaharu Nakatani, Yuki Kubota, Shun Miyauchi: alumni of Faculty of Advanced Science and Engineering and other faculties, University of Waseda.

Ken Akatsuka, Miho Akiyama, Yuki Fujita, Masaru Ito, Saki Kanaya, Sakura Kawai, Keiichi Kuronaga, Tomohiro Mori, Saki Nabeta, Yoshie Sasaki, Narumi Shimura, Taiki Shino, Ryohei and Aya Takeda, Koki Tohara, Jin Tsuchiya, Yuma Mikumo: alumni of High school of University of Tsukuba.

Furthermore, I shall express my special thanks to my friends all over the world for helping me to complete the thesis in various ways especially to: Tomomichi Amano (assistant professor of business administration in Harvard Business School), Nobuko Temma (ancient Japanese teacher at École polytechnique), Sara S. Casado, Pablo Báez Guersi, Adrian, Shigenobu Yokota, Trabucchi Stefano, Sarah Samira, Xenia Yenzhu Lei, Tsukimi Yamaji and Maura Iannicca.

At last, but not least, I would like to end the acknowledgement by expressing my sincere gratitude to my family for their infinitive support indispensable for the completion of the research and the writing of the thesis: my sister Rie (Sawamura) Miwa, my brother Takaharu Sawamura and to my parents:

Yoko (Otsuka) Sawamura and Harumichi Sawamura.

With the unconditional support of above-mentioned people, the thesis has been completed.

**Thank you**, sincerely.

## Préface

Cette thèse questionne comment les start-ups gèrent les incertitudes du développement de l'écosystème d'innovation. Ce travail s'inscrit dans la problématique de l'Innovation de Modèle Économique (IME, Business Model Innovation en anglais), et couvre les notions d'écosystème d'innovation et de gestion du changement organisationnel. Son apport principal réside dans l'analyse de l'étape préparatoire d'une IME, ainsi que de sa pertinence vis-à-vis des écosystèmes d'innovation et de la gestion organisationnelle, qui préfigure le développement d'entreprise. Cette analyse s'appuie sur l'étude du cas d'une entreprise offrant un service de mobilité avec véhicules électriques pour les salariés, en déployant une méthode de recherche qualitative. La recherche est réalisée au sein du laboratoire i3-Centre de Recherche en Gestion de l'École polytechnique, sous la direction de M. Hervé DUMEZ, directeur, et de M. Joël RUET, codirecteur. Cette thèse a été réalisée dans le cadre de l'IMD, Institut de la Mobilité Durable Renault-ParisTech. La réalisation des enquêtes de terrain en Inde a été soutenue pratiquement par Lithium Urban Technologies Private Limited et Renault Inde.

## Preface

The thesis explores Business Model Innovation (BMI), with a particular focus on innovation ecosystems and organizational change management. The main contribution of the thesis lies in analysing a preparative stage of a BMI, and its relevance to innovation ecosystems and organizational management that prefigures the development of the company. This analysis is rooted in empirical evidence drawn from a detailed case study and supported by a comprehensive research method. The research was carried out at the Management Research Centre of the École polytechnique, which constitutes an active component of the Interdisciplinary Institute for Innovation under the supervision of Hervé DUMEZ (director of research) and of Joël RUET (co-director). The research was carried out within the framework of IMD, Institut de la Mobilité Durable Renault-ParisTech. Field surveys were undertaken in India between 2016 and 2018 and supported by Lithium Urban Technologies Private Limited and Renault India.



## Résumé en français

« Abstrait »

*L'Innovation des Modèles Économiques (IME) (Business Model Innovation en anglais) est un levier indispensable à disposition des entreprises pour développer leur avantage concurrentiel. L'approvisionnement en amont (upstream supply en anglais) des technologies et des produits, et le développement des infrastructures clés sont les éléments indispensables à une entreprise pour développer un nouveau modèle économique. Cependant, le développement de l'écosystème d'innovation de l'approvisionnement et des infrastructures repose rarement entre les mains de l'organisation. Cette dernière fait face à différentes contraintes pour développer l'IME, d'autant plus quand le développement d'un écosystème innovant est incertain. La thèse se concentre sur la phase de « pre-stage » d'une IME, c'est-à-dire quand la technologie et le produit nécessaires pour développer une IME ne sont pas encore disponibles. Comment les directions gèrent cette phase « pre-stage » ?*

*Ce travail de recherche se base sur l'étude de cas d'une start-up de la ville de Bangalore en Inde. Elle est la première entreprise indienne à utiliser des véhicules électriques pour proposer un service de transports à des salariés d'entreprises. Dès la phase de « pre-stage », l'entreprise envisage d'élargir son offre commerciale, au-delà de celle de transports de salariés, afin d'anticiper l'arrivée de nouveaux concurrents et de se créer un avantage compétitif de premier entrant. Cependant, le modèle de véhicule électrique nécessaire à ce développement n'existe pas encore, étant donné que l'écosystème d'innovation de ce produit est en construction. La thèse défend l'idée qu'il est indispensable de s'appuyer sur cette phase de « pre-stage » afin de mieux comprendre le processus nécessaire à une bonne IME. En effet, les capacités organisationnelles requises durant cette phase de « pre-stage » diffèrent grandement de la phase « post-pre-stage », impactant le développement d'une IME.*

*Cette thèse a été réalisée dans le cadre de l'IMD, Institut de la Mobilité Durable Renault-ParisTech. Cette thèse a obtenu le soutien pratique de l'entreprise de l'étude de cas – Lithium Urban Technologies – pour la réalisation des terrains.*

**Mots clés : Business model innovation, Écosystème de l'innovation, Service de la mobilité, Start-up, Véhicule électrique, Inde**



## « Résumé »

Dans la société actuelle, la population humaine est la plus nombreuse de l'histoire et devrait dépasser les neuf milliards d'êtres humains vers 2040. L'évolution vers une société durable est un enjeu important, et la décarbonisation en est l'un des défis majeurs. Les véhicules électriques fonctionnent sans carburants d'origine fossile : on s'attend à ce que leur impact environnemental soit réduit de façon significative. Par exemple, en Inde, la proportion de sources d'énergie renouvelables ne cesse d'augmenter par rapport à celle des énergies non-renouvelables. (Il convient de noter que la consommation totale d'énergie augmente également ici : l'idéal est de réduire la consommation totale en augmentant la proportion de sources d'énergie renouvelables.)

Dans cette recherche, nous avons étudié le développement commercial d'une entreprise qui opère un service de mobilité avec des véhicules électriques. Au début de l'enquête, l'entreprise en était aux premiers stades de déploiement du service.

La société commence à proposer son service à partir de 2015. Dès la fin 2019, elle opère une flotte de 1,111 véhicules électriques. Cela représente 9.1 % des véhicules électriques vendus en Inde entre 2015 et 2019. Comprendre le développement commercial de cette entreprise est essentiel pour comprendre le développement local de l'écosystème industriel des véhicules électriques et des services de mobilité électrique. Les équipementiers (OEM, Original Equipment Manufacturer en anglais) qui développent et produisent des véhicules électriques (qu'ils soient nationaux ou étrangers) sont également attentifs au développement commercial de l'entreprise.

Cette recherche porte sur le Modèle Économique (ME) et IME dans le secteur automobile et se base sur l'étude de cas d'une start-up. L'auteur espère que les résultats de cette recherche permettront également de mieux comprendre la diffusion des technologies et des produits tels que des véhicules en autres sources d'énergie d'origine renouvelable (hydrogène, par exemple) vers la réalisation d'une société durable.

Dans le contexte de recherche en gestion, le ME et le IME, qui ont émergé avec le développement des Technologie de l'information et de communication (TIC) dans les années 1990, sont traités comme des sujets principaux de recherche. À notre connaissance, il existe peu d'études sur l'IME basées sur des données empiriques.

Nous démontrons que le ME est un domaine de recherche proche de la théorie de la stratégie d'entreprise, de la gestion de l'innovation, de la gestion de la technologie, de la théorie des

organisations et de l'entrepreneuriat. L'IME est essentiel pour créer un avantage concurrentiel d'une entreprise.

Cavalcante (2014) a présenté et défini le concept de « pre-stage » de Changement de Modèle Économique (CME.) (La distinction entre CME et l'IME est expliquée dans la thèse. La différence principale, selon l'auteur, est l'existence de l'amélioration d'une performance financière ou du développement d'avantage concurrentiel. CME est, selon l'auteur, un concept plus global que le concept IME : IME fait partie de CME.) Il s'agit de la phase où la technologie requise pour réaliser une IME n'est pas encore disponible. Cette thèse propose d'étendre le concept de « pre-stage », en supposant qu'il puisse être appliqué aux produits et non pas uniquement à la technologie. De plus, pour montrer que cette extension est utile, nous montrons avec un cas concret que les capacités organisationnelles du « pre-stage » sont différentes de celles du « post-pre-stage ».

Cette thèse est composée de sept chapitres.

Le premier chapitre présente le contexte local et les principaux défis de l'entreprise étudiée. Le deuxième chapitre revient sur la littérature scientifique du ME, de l'écosystème, et l'organisation. L'auteur présente la définition des concepts importants. Le chapitre 3 définit les questions de recherche et présente les méthodes de recherche. Le chapitre 4 décrit le développement commercial de l'entreprise d'un point de vue d'ensemble dans l'ordre chronologique, et décrit également la stratégie de l'entreprise. Le chapitre 5 décrit analytiquement le ME, la structure organisationnelle et l'environnement externe de l'entreprise. Le chapitre 6 analyse l'écart entre la stratégie et la réalité de l'entreprise. Le chapitre 7, enfin, récapitule des observations importantes, développe des axes de discussions, présente des contributions académiques et des recommandations pratiques et présente les limites de la recherche et les futurs programmes de recherche potentiels.

En somme, nous tentons, au travers de ce travail de thèse, de mieux comprendre « comment les start-up gèrent-elles les incertitudes du développement de l'écosystème de l'innovation ? ».

Les questions de recherche suivantes seront abordées : « quel type de vision stratégique formule la direction ? », « quels sont les défis auxquels l'entreprise fait face ? » et « de quelles capacités organisationnelles l'entreprise a-t-elle besoin ? ». À travers cela, nous discuterons de l'IME, de l'écosystème de l'innovation et de la théorie du changement organisationnel de manière intégrée. En particulier, ce cas fournit des suggestions sur les défis rencontrés et les

capacités organisationnelles nécessaires dans la phase « pre-stage » du CME lorsque l'entreprise tente de provoquer l'IME avec des produits qui en sont aux premiers stades de la diffusion.

Nous détaillons chaque chapitre dans la suite de cette introduction.

**Le chapitre 1** décrit les contextes locaux de la recherche de 2015 (début de la recherche) jusqu'en 2017. Cette période correspond au moment où la direction formule la vision initiale de l'entreprise et les intentions stratégiques pour le développement de l'offre à venir. Les spécificités du marché des véhicules électriques et les caractéristiques du développement récent des villes indiennes sont connues. En 2015, le gouvernement indien lance une politique de développement du marché des véhicules électriques – Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) - avec un budget de 7,64 milliards de Roupies indienne, correspondant à 105 millions d'euros, ayant pour ambition de vendre de 6 à 7 millions de véhicule électrique avant 2020.

Les villes indiennes ont, en général, deux spécificités en ce qui concerne la diffusion des véhicules électriques. Premièrement, les infrastructures sociales tels que l'infrastructure routière et électrique sont sous-développées. Il y a donc beaucoup d'espace pour de nouveaux designs et constructions contrairement aux villes développées. Deuxièmement, beaucoup de villes indiennes connaissent une croissance économique rapide. Le mode de vie des citoyens change en conséquence.

Le premier chapitre présente ensuite l'entreprise de l'étude de cas – Lithium Urban Technologies - et la vision initiale de sa direction. La recherche se base sur l'étude de cas d'une start-up de Bangalore, en Inde. Cette entreprise fondée en octobre 2015 opère un service de transports à des salariés d'entreprises en utilisant véhicules électriques. Elle est la première entreprise d'Inde à utiliser des véhicules électriques pour proposer un service de transports, en remplacement des services de transports déjà existants.

La direction se demande alors : « comment l'entreprise peut-elle rester pionnière dans un environnement commercial en évolution dynamique ? ». L'auteur interprète cette question de la manière suivante : « quelles actions doivent être entreprises par le précurseur (first-mover en anglais) pour développer l'avantage concurrentiel ».

Pour mieux comprendre le contexte des activités commerciales de cette entreprise, la situation locale des réseaux d'électricité et de transport, ainsi qu'une initiative gouvernementale - Smart City 100 initiative – sont exposés.

Le chapitre 1 est complété par des éléments d'information sur la diffusion des véhicules électriques.

Puis, l'auteur donne quatre éléments moteurs de la croissance du marché des véhicules électriques : approche ascendante par fournisseur de service de la mobilité électrique, phénomène ascendant par la croissance du marché des véhicules électriques légers comme des 2 roues et 3 roues, approche ascendante par la stimulation de l'offre (supply-push en anglais) et phénomène descendant (top-down en anglais) par les projets de ville intelligente (smart city en anglais) et de réseau intelligent (smart grid en anglais).

**Le chapitre 2** est consacré à la revue de littérature. L'auteur traite trois champs de littératures : i) Business Model (Modèle Économique) et Business Model Innovation (Innovation de Modèle Économique), ii) Business Ecosystem (Écosystème d'entreprise) et Innovation Ecosystem (Écosystème d'innovation), et iii) gestion de changement organisationnelle. Ces trois champs académiques sont explorés afin de mieux cadrer l'étude de cas et mieux formuler les questions de recherche.

La première section de revue littérature porte sur les concepts de Business Model et Business Model Innovation. Nous utiliserons ici le mot français Modèle Économique (ME) comme traduction du mot Business Model en anglais. La section décrit les sujets suivants afin d'avoir une compréhension globale du ME : l'histoire du ME, sa définition, les connexions avec les champs académiques pertinents, les sujets principaux de recherche et les limites. Ce sont des sujets également couverts dans les deux autres sections qui permettent d'avoir une compréhension globale de l'écosystème d'innovation et de l'écosystème d'entreprise, et de la gestion du changement organisationnel.

Le modèle économique est un domaine académique qui a émergé dans les années 1990 avec le boom de l'Internet (aussi connu comme un dot-com bubble en anglais). Quatre composants essentiels des modèles économiques sont identifiés et présentés : la proposition de valeur, le réseau de valeur, le modèle de revenus et la capacité de leadership. La première section présente une histoire du développement du concept et sa relation avec d'autres disciplines académiques telles que la stratégie d'entreprise, la gestion de la technologie, la théorie organisationnelle, la gestion de l'innovation et l'entrepreneuriat. Le principal focus théorique de la thèse est l'Innovation de Modèle Économique (IME), qui peut être considérée comme une intersection d'étude de modèle économique et d'étude de gestion de l'innovation. La dernière sous-section présente une lacune de recherche fondamentale soulignée par Bucherer, Eisert et Gassmann (2012) déclarant que bien que la littérature offre

un grand nombre d'exemples d'innovation de modèle d'entreprise, des études de cas approfondies basées sur des cas récents et des données primaires sont rares (p. 186). La thèse vise à combler cette lacune en donnant une étude de cas approfondie sur l'innovation de modèle économique basée sur un cas récent et des données brutes. En particulier, le « pre-stage » d'un Changement de Modèle Économique (CME) suggéré par Cavalcante (2014) comme une phase critique pour un CME est expliquée. La principale contribution de la thèse se développe sur ce concept.

La deuxième section passe en revue l'écosystème d'innovation et l'écosystème d'entreprise. Nous utiliserons ici le mot français écosystème d'innovation comme traduction du mot Innovation Ecosystem en anglais et le mot français écosystème d'entreprise comme traduction du mot Business Ecosystem en anglais. La thèse adapte la définition d'un écosystème par Jacobides et al. (2018) : un écosystème est défini comme un ensemble d'acteurs présentant des degrés divers de complémentarités multilatérales, non génériques, qui ne sont pas entièrement contrôlés hiérarchiquement (Jacobides et al., 2018). La distinction entre un écosystème d'innovation et un écosystème d'entreprise est précisée : le premier est un concept centré sur la proposition de valeur tandis que le second est un concept centré sur l'entreprise. L'écosystème commercial peut être assimilé en tant que composante d'un modèle d'entreprise - réseau de valeur. Les écosystèmes commerciaux peuvent être considérés comme une extension du concept de réseau de valeur. À la fin de la deuxième section, une limite est identifiée : la gouvernance et la régulation des écosystèmes (Jacobides et al., 2018). Alors que les modèles tel que la Resource Based View (RBV) concernent principalement les ressources possédées, on peut se demander comment cette perspective devrait changer lorsque les ressources existent non pas au niveau de l'entreprise, mais au niveau de l'écosystème (Jacobides et al., 2018). Et, reliant la RBV, les Capacités Dynamiques (Teece, 2007) et les écosystèmes, quels types de ressources et de capacités pourraient être utiles pour les entreprises dans ce contexte dynamique (Helfat et Campo-Rembado, 2015) ? Ces limites sont également abordées par la thèse.

La troisième section porte sur la gestion du changement organisationnel. La section passe en revue la théorie organisationnelle de base en se concentrant sur l'aspect de la gestion du changement et présente les intersections avec l'innovation des modèles économique et les écosystèmes d'innovation. Deux concepts clés qui aident à combler les limites susmentionnées sont identifiés : la conception organisationnelle et la capacité dynamique. Greenwood et Miller (2010) définissent la conception organisationnelle comme la façon d'organiser les personnes et les ressources afin d'accomplir collectivement les objectifs

souhaités. Ici, dans la thèse, un « objectif souhaité » est considérée comme la réalisation d'une IME. Concernant les Capacités Dynamiques, Teece (2007) affirme que la compréhension et la mise en œuvre des processus et des structures qui sous-tendent les capacités dynamiques sont spécifiques à l'entreprise et nécessitent une connaissance approfondie de l'entreprise et de l'écosystème dans lequel elle coopère et entre en concurrence. Il souligne que les connaissances sur l'entreprise et sur l'écosystème sont nécessaires pour approfondir la compréhension de la capacité dynamique. Étant donné que la thèse traite de l'innovation du modèle économique d'une entreprise et de sa pertinence pour l'écosystème de l'innovation, la capacité dynamique est une capacité organisationnelle qui doit être prise en considération lors de la recherche et de la discussion.

Pour résumer les points importants de la thèse, les trois courants de littératures peuvent être résumés comme suit.

Le Modèle Économique (ME), selon Amit & Zott (2001), décrit la conception du contenu transactionnel, de la structure et de la gouvernance afin de créer de la valeur par l'exploitation d'opportunités d'affaires (Amit & Zott, 2011) tandis que la définition du concept ne fait pas consensus parmi chercheurs (Björkdahl & Holmén, 2013; Foss & Saebi, 2017; Rasmussen, 2015). La littérature sur le ME suggère que la proposition de valeur, le réseau de valeur, le flux de revenus / coûts et le leadership sont quatre caractéristiques essentielles d'un modèle économique. Le réseau de valeur équivaut à un écosystème d'entreprise (Chesbrough, 2007) par définition. Jacobides, Cennamo, et Gawer (2018) suggèrent trois taxonomies d'écosystème : écosystème d'entreprise (Business Ecosystem), écosystème d'innovation (Innovation Ecosystem) et écosystème de plate-forme (Platform Ecosystem). La différence entre écosystème d'entreprise et écosystème d'innovation est expliqué comme suit : écosystème d'innovation est un concept orienté produit ou service tandis que le concept d'écosystème d'entreprise est orienté entreprise. L'écosystème d'innovation pertinente impacte le modèle économique de l'entreprise. L'Innovation des Modèles Économiques (IME) est définie par Björkdahl & Holmén (2013, p. 215) comme une nouvelle logique intégrée de création de valeur et de capture de valeur, qui peut comprendre une nouvelle combinaison de produits ou services nouveaux et anciens, de la position sur le marché, des processus et d'autres types de changements afin d'évoluer, de concurrencer et de se différencier avec succès sur leur marché. Certain.e.s scientifiques suggèrent que l'IME peut être une source d'avantage concurrentiel (par exemple, Verma & Bashir, 2017). Dans cette thèse, l'auteur distingue un simple Changement de Modèle Économique (CME : Business Model Change en anglais) et l'Innovation de Modèle Économique (IME) par le fait

que l'IME peut améliorer la performance d'activités commerciales de l'entreprise, y compris la performance financière et le développement d'avantage concurrentiel. Pour mieux comprendre les sources d'avantage concurrentiel, cinq forces concurrentielles de Porter, Resource-Based View de Barney et Avantage Concurrentiel du Premier Entrant (ACPE) sont étudiés. L'avantage concurrentiel du premier entrant est défini comme un cas particulier d'un avantage concurrentiel résultant du moment où l'acteur entre sur le marché (Kerin et al., 1992, p. 39). Dans un contexte où le développement de l'écosystème d'innovation reste incertain, les Capacités Dynamiques d'organisation peuvent être une source importante de compétences. L'identification d'opportunité de marché est une activité entrepreneuriale et, une observation attentive sur les Lead Users et une relation étroite avec ces Lead Users serait utile pour diversifier le service : Relationship Marketing. Afin d'exploiter l'opportunité de marché identifiée en utilisant les ressources internes et externes existantes, le design [la conception] organisationnel (Organisational Design en anglais) et la préparation au changement organisationnel (Organisational Change Readiness en anglais) doivent être des éléments clés à prendre en compte. Pour promouvoir le CME ou l'IME, Teece suggère que les Capacités Dynamiques sont des capacités organisationnelles incontournables.

En plus que ce qui a été évoqué ci-dessus, Cavalcante (2014) définit la phase où la technologie requise pour CME n'est pas encore disponible comme une phase de « pre-stage » de CME. En relation avec l'incertitude (Courtney, Kirkland, & Viguerie, 1997) dans le développement d'écosystèmes pertinents et avec le développement de ACPE, ce concept de « pre-stage » peut également être appliqué à l'indisponibilité de produits.

**Le chapitre 3** traite des questions de recherche et de la méthodologie. Sur la base de la revue de la littérature prenant également en compte le cas et le contexte de la recherche, trois questions de recherche sont formulées.

Sur la prise en compte de l'incertitude des écosystèmes d'innovation pertinents,

1. Comment les top managers formulent-ils la vision d'une start-up ?
2. Quels sont les défis à relever pour développer des avantages concurrentiels tout en envisageant d'atteindre un Business Model Innovation ?
3. Quelles capacités organisationnelles devraient être développées pour préparer un changement de modèle économique alors que le produit requis pour le changement de modèle économique n'est pas encore disponible ?

En abordant ces questions, la thèse tente de contribuer à combler les limites identifiées au chapitre 2 et d'apporter sa contribution à la littérature existante.

La recherche est menée sur la base d'une approche de recherche qualitative et « compréhensive (en anglais) » qui se caractérise comme une « dynamique unique » (Dumez, 2016). Cette recherche combine différentes méthodologies et sources de données pour aborder la question de recherche : analyse de documents, études de cas et observation participante. La recherche se base principalement sur une étude de cas. La plupart des données sont qualitatives, mais certaines données quantitatives ont également été utilisées en plus d'analyser et de comprendre le cas. Les données essentielles sur lesquelles se fonde la recherche proviennent des entretiens et des observations réalisés sur le terrain par l'auteur. Les questions de recherche, ainsi que les trois axes de la revue de la littérature, ont évolué au cours de la recherche, en fonction de l'accumulation de données de terrain sur le développement commercial de l'entreprise et sur les changements de son environnement commercial.

Le chapitre 3 détaille également le calendrier de l'exécution des quatre enquêtes de terrain menées entre 2016 et 2018. Chaque enquête a un objectif différent et a été menée dans plusieurs villes de l'Inde.

**Le chapitre 4** décrit le développement commercial de l'entreprise - Lithium Urban Technologies - qui fournit un Service de Transport à destination des Employés d'Entreprise (STEE) dans les villes indiennes. L'entreprise a lancé son premier projet pilote en avril 2015 à Bangalore, après avoir été officiellement enregistrée en tant qu'entreprise en octobre 2014. L'auteur divise le développement commercial de l'entreprise en quatre phases : initiation, implantation, développement et exploration, et développement et réplication afin de faciliter la compréhension du dynamisme de son développement commercial. Sur la base d'observations sur le terrain et d'entretiens, le chapitre présente des informations qui permettent de comprendre, par exemple, pourquoi l'entreprise a commencé ses activités à Bangalore, et quelles propositions de valeur elle offre.

La société a commencé ses opérations à Bangalore - ville reconnue comme la Silicon Valley de l'Inde. Son climat modeste et le fait que l'anglais soit largement parlé dans la ville attirent des entreprises internationales à installer leurs campus d'externalisation. Bangalore est la cinquième plus grande ville d'Inde, et la population et l'économie ne cessent de croître. L'élément le plus critique est que les transports publics locaux ne répondent pas à la demande des citoyens locaux en matière de transport domicile-travail. Pour ces raisons, la



société a lancé la première opération de service STEE à Bangalore. La société emploie des véhicules électriques et une application mobile afin de proposer des propositions de valeur en contournant les points faibles des véhicules électriques par rapport aux véhicules en moteur à combustion interne, une courte autonomie par charge par exemple, et en profitant des coûts de fonctionnements stables des véhicules électriques.

Après avoir décrit chronologiquement son développement commercial, le chapitre présente la vision de l'entreprise et ses défis reconnus pour atteindre la vision. Les dirigeants de l'entreprise tentent de développer un avantage concurrentiel de premier entrant tout en envisageant de changer le modèle économique de l'entreprise. Les enjeux identifiés sont résumés dans une liste de « contraintes et mesures d'atténuation (constraints and mitigation actions en anglais) » dressée par les directions avec différentes labellisations. La liste a servi d'outil managérial pour clarifier les enjeux de la réalisation de ses trois intentions stratégiques : mise en place d'un avantage concurrentiel de premier arrivé, diversification du service, et formulation de la marque et création d'un club client.

Comme mentionné, ce chapitre présente également une liste de « contraintes et mesures d'atténuation » élaborée par les gestionnaires. En examinant la liste, l'auteur a constaté que la (non) disponibilité des produits - les véhicules électriques - est une contrainte majeure pour le développement commercial de l'entreprise, en particulier pour la diversification des services. Les défis identifiés et la liste seront analysés dans le chapitre 6 afin d'identifier les lacunes organisationnelles dans la réalisation des intentions stratégiques de l'entreprise.

**Le chapitre 5** explique l'environnement commercial de l'entreprise. Comprendre son environnement permet d'analyser trois intentions stratégiques et dans quelle mesure l'entreprise a réalisé (ou non) ces intentions stratégiques au chapitre 6.

Le chapitre passe d'abord en revue la structure organisationnelle de l'entreprise. La société se divise en trois groupes : les équipes de bureau qui travaillent au siège à Whitefield, Bangalore ; les équipes de site qui travaillent sur le site de chaque client ; et les chauffeurs. Les équipes de bureau sont composées d'équipes opérationnelles, d'analyse et de technologies, de maintenance des véhicules et de formation des conducteurs, de facturation et de compte, de ressources humaines et d'équipes de gestion.

Deuxièmement, le chapitre présente de manière analytique le modèle économique du service STEE de l'entreprise. Les quatre composants critiques du modèle économique identifiés dans la revue de la littérature sont utilisés comme cadre analytique : propositions de valeur, réseau

de valeur, structure des coûts et des revenus, et leadership. L'auteur souligne que la société du cas n'a pas de nouveauté spécifique dans les trois derniers composants. La nouveauté du modèle économique de l'entreprise englobe uniquement la proposition de valeur.

Le chapitre examine ensuite l'environnement commercial pour le développement potentiel du service STEE : l'expansion du marché. L'auteur décrit la situation (potentielle) du marché de la concurrence directe et des services de substitution. Ensuite, la situation (potentielle) du marché d'un service d'optimisation d'itinéraire basé sur les Technologies de l'Information et de la Communication (TIC) est également décrite. L'auteur souligne que, alors qu'il n'y avait pas de concurrents directs à la fin de 2018, il existe de nouveaux entrants potentiels dans le secteur des services de gestion de flotte basés sur les TIC et dans le secteur des services STEE basés sur les ICE. L'auteur souligne que même dans l'accumulation de données d'utilisation de la flotte, la société n'a pas nécessairement un avantage par rapport à d'autres concurrents (potentiels).

Le chapitre examine enfin l'environnement du marché pour le développement potentiel d'autres services de mobilité électrique (autres services que STEE) et des services liés à la mobilité électrique tels que les infrastructures électriques et les infrastructures de services. Autrement dit, nous nous intéressons à la diversification des services. Bien qu'il existe des tendances à l'émergence de nouveaux services de mobilité en zones urbaines, la disponibilité (compte tenu du facteur de forme et du prix) des véhicules électriques empêche l'entreprise de développer de nouveaux services.

Le chapitre donne une perspective analytique sur le développement commercial de l'entreprise. Bien que la société applique des produits basés sur la technologie nouvellement développée à un usage commercial, la technologie de pointe elle-même n'est pas considérée comme une force du développement des services STEE de la société. La (non-) disponibilité du véhicule est une contrainte critique pour le développement de nouveaux services de l'entreprise. Néanmoins, la société reste une entreprise de premier plan (unique) parmi les fournisseurs de services STEE mobilisant des véhicules électriques en tant que flottes.

Sur la base de la compréhension du modèle économique de l'entreprise et de l'environnement commercial de l'entreprise, le chapitre suivant (chapitre 6) analyse les écarts entre la vision des dirigeants et les réalisations commerciales de l'entreprise depuis sa création en 2015.

**Le chapitre 6** analyse les écarts entre la vision de l'entreprise - les intentions stratégiques et la liste des contraintes et actions d'atténuation - et la réalité. La première section analyse les intentions stratégiques déclarées de l'entreprise du point de vue de l'avantage concurrentiel de premier entrant (First-Movers' Advantage en anglais) défini comme « un cas particulier d'avantage concurrentiel résultant du moment de l'entrée sur le marché » (Kerin et al., 1992, p. 39), et du point de vue de l'IME défini par l'auteur comme « une modification ou un ajout d'activités commerciales qui modifie le réseau de valeur afin d'améliorer la performance de l'entreprise. La première analyse conclut qu'aucune de leurs intentions n'a été pleinement réalisée. L'auteur amène ensuite l'attention sur la « liste des contraintes et des actions d'atténuation » formulée par le PDG et le co-fondateur, qui est analysée dans la seconde analyse. Cette dernière analyse souligne que les gestionnaires doivent classer les contraintes avec différentes étiquettes afin de mieux formuler les actions d'atténuation correspondantes. Une classification importante consiste à distinguer les contraintes de l'écosystème qui existent au niveau de « l'écosystème de l'innovation » - « les accords de collaboration par lesquels les entreprises combinent leurs offres individuelles en une solution cohérente et orientée client (Adner, 2006, p. 2) » et les contraintes commerciales qui existent au niveau de son écosystème d'affaires - « le réseau de valeur d'une entreprise pour fournir des services / produits » selon l'auteur. L'auteur affirme qu'il est important de distinguer les contraintes de l'écosystème et les contraintes de l'entreprise car la solution des contraintes de l'écosystème peut profiter à tous les acteurs de l'écosystème de l'innovation, y compris les concurrents, alors que la solution des contraintes de l'entreprise ne profite en principe qu'à l'entreprise. L'auteur souligne également que l'aspect organisationnel est moins évoqué dans la « liste des contraintes et des mesures d'atténuation » qui correspond à une étude menée par Rasmussen (2015), selon laquelle les entreprises mettent l'accent sur l'adéquation stratégique dans les discussions avant de conduire le CME, tout en négligeant les considérations relatives à l'adéquation organisationnelle (p. 38). La troisième section analyse ensuite les lacunes organisationnelles de l'entreprise. L'accent mis sur les changements organisationnels au cours du processus d'innovation de modèle économique (IME) est un point important de la récente étude de modèle d'entreprise (Rasmussen, 2015).

À la fin de l'analyse, l'auteur souligne d'importants problèmes organisationnels identifiés tout au long des observations de terrain et des analyses à travers lesquelles l'auteur conclut que l'entreprise a besoin de développer certaines capacités afin d'atteindre les intentions stratégiques déclarées de l'entreprise. L'auteur souligne que le développement des capacités

est une condition préalable importante pour que l'entreprise transforme son modèle commercial afin de devenir une « plate-forme de services de mobilité électronique ».

**Le chapitre 7** est la partie conclusion.

À travers l'étude de cas qualitative, l'auteur a exploré les réponses aux questions suivantes. Dans une situation de développement incertain des écosystèmes d'innovation pertinents,

- comment les top managers formulent-ils la vision d'une start-up ?
- quels sont les défis pour développer des avantages concurrentiels tout en envisageant d'atteindre l'innovation de modèle économique ?
- quelles capacités organisationnelles devraient être développées pour se préparer au changement de modèle économique alors que le produit requis pour le changement de modèle économique reste indisponible ?

La première question de recherche est « dans une situation de développement incertain d'écosystèmes d'innovation pertinents, comment les top managers formulent-ils la vision d'une start-up ? » L'auteur observe que les managers développent leur vision avec trois niveaux différents d'abstraction. Sur la première couche, au niveau le plus abstrait, les managers ont une idée globale de modèle économique que l'entreprise cherche à développer. L'idée du modèle économique reste abstraite (« devenir une plateforme de services d'e-mobilité ») et l'idée n'a pas changé de manière significative au cours de trois années d'observation. La deuxième couche est moins abstraite ; les managers développent trois intentions stratégiques où le développement de l'avantage concurrentiel (plus précisément, le développement de l'avantage du premier arrivé) est central. La troisième couche est une liste de « contraintes et mesures d'atténuation ». Cette liste est constituée avec les « contraintes » identifiées à la tentative à réaliser le modèle économique et de trois intentions stratégiques, et avec les « mesures d'atténuation » formulées par la direction pour réduire les impacts négatifs des contraintes sur le développement de l'entreprise.

La deuxième question de recherche est « dans une situation de développement incertain d'écosystèmes d'innovation pertinents, quels sont les défis à relever pour développer un avantage concurrentiel tout en envisageant de changer son modèle économique ? » L'auteur a observé l'entreprise alors qu'elle envisageait de changer de modèle économique en combinant diversification des services et expansion géographique. Selon l'auteur, l'entreprise

envisage de réaliser l'innovation de modèle économique comme elle tente de développer un avantage concurrentiel de ce changement de modèle d'entreprise (CME).

L'entreprise est confrontée à différents défis dans le développement de nouveaux services et l'utilisation de nouveaux produits. Tout d'abord, l'auteur souligne que l'entreprise se trouve dans une phase spécifique d'un CME – le « pre-stage » - lorsque la technologie ou le produit nécessaire à l'exécution du CME envisagé n'est pas encore disponible. L'auteur souligne qu'au cours de ce pre-stage, les capacités organisationnelles requises diffèrent de celles de la « post-pre-stage », lorsque la technologie ou le produit deviennent disponibles. En analysant une liste de « contrainte et mesures d'atténuation » formulée par les managers, l'auteur souligne que les enjeux sont majoritairement composés de défis d'écosystème d'entreprise et de défis d'écosystème d'innovation. En examinant plus spécifiquement les détails de la liste, l'auteur a observé que la question de la disponibilité des produits a plus de gravité que les autres problèmes. Ceci confirme l'importance opérationnelle ainsi que la validité théorique du concept de « pre-stage » (Cavalcante, 2014) étendu à la (non) disponibilité des produits. Par l'observation longitudinale, l'auteur affirme que le « pre-stage » d'un CME peut durer sur une longue période - plus de trois ans pour la société du cas. Au cours du « pre-stage », les apprentissages et les expérimentations sur CME sont limités par rapport à la situation « post-pre-stage » : comme il n'y a pas de technologie disponible ou de produit requis pour le CME envisagé, l'entreprise ne peut pas vérifier la validité de la ME envisagée, et les apprentissages restent fondés sur les connaissances. Par exemple, la spécification et le prix possibles de la technologie et du produit pourraient entrer dans cette tendance. Ainsi, l'entreprise ne peut pas acquérir des apprentissages basés sur les processus, tels que des processus d'utilisation optimaux de la technologie et du produit.

En plus de cela, l'auteur a observé les manques de la liste initiale sur les aspects organisationnels. Cette observation confirme empiriquement l'hypothèse de Rasmussen (2015) : une ambiguïté subsiste sur le (s) lien (s) causal (s) entre le contexte organisationnel et le CME (p. 38). L'un des problèmes pourrait être que les entreprises mettent l'accent sur l'adéquation stratégique dans les discussions avant de mener le CME, tout en négligeant les considérations relatives à l'adéquation organisationnelle (Rasmussen, 2015, p. 38). Cette ignorance sur l'adéquation organisationnelle conduit à une discussion sur le développement de la capacité de leadership de l'écosystème que l'auteur propose, dans la partie suivante, comme étant importante tout au long du « pre-stage » et du « post-pre-stage ».

En plus d'observer l'importance des apprentissages dans le développement d'un écosystème d'innovation à travers des expérimentations utilisant des produits similaires (= projets pilotes) et des négociations avec les fabricants d'équipement d'origine (FEOs), le cas a démontré l'importance de convaincre les parties prenantes - telles que les investisseurs, les fournisseurs (FEOs), les clients et les employés – à adopter le système afin de commencer à s'engager dans l'exploration du CME potentiel. Les projets pilotes, par exemple, étaient un moyen de communiquer avec les fournisseurs (OEMs) potentiels du produit et avec les clients potentiels, tandis que les projets pilotes au cours de la phase préliminaire n'étaient PAS utilisés pour tester la validité d'un futur ME.

La troisième question de recherche est « dans une situation de développement incertain d'écosystèmes d'innovation pertinents, quelles capacités organisationnelles devraient être développées pour préparer un changement de modèle économique alors que le produit requis pour le changement de modèle économique reste indisponible ? » En raison de la longueur de « pre-stage », l'auteur insiste sur l'importance des capacités organisationnelles requises pendant le « pre-stage », qui sont différentes de celles requises dans le « post-pre-stage », telles que les Capacités Dynamiques. Afin de démarrer un nouveau service, des modifications des capacités organisationnelles opérationnelles, ainsi que des ressources et des capitaux supplémentaires, sont nécessaires. Cependant, une entreprise a besoin d'un autre type de capacités pour sortir de la situation « pre-stage » et passer à la phase « post-pre-stage ». Au sein du réseau de valeur (c'est-à-dire de l'écosystème d'entreprise), une entreprise a besoin d'être en capacité de convaincre ses parties prenantes - telles que les investisseurs, les fournisseurs (OEMs), les clients et les employés. Au-delà de son écosystème d'entreprise, l'entreprise a besoin de capacités spécifiques, telles que la capacité à s'informer sur le développement des écosystèmes d'innovation et la capacité à inciter d'autres acteurs à s'investir dans les développements de l'écosystème d'innovation favorables à l'entreprise. Cette dernière capacité correspond au leadership de l'écosystème, c'est-à-dire à la capacité d'impliquer et de promouvoir différents acteurs de l'écosystème.

L'auteur, comme résultat de la thèse, suggère que les capacités suivantes jouent un rôle important au cours du « pre-stage » : 1) intelligence (apprentissages) sur le développement de l'écosystème d'innovation pertinent et sur les performances possibles de produits presque disponibles à travers des projets pilotes (expérimentations) utilisant un produit similaire (ou alternatif), 2) gestion des parties prenantes au sein de son réseau de valeur pour obtenir leur coopération, y compris des soutiens financiers continus et 3) leadership de l'écosystème avec

compétence de négociation pour encourager les fabricants à commencer à fabriquer les produits dans des conditions favorables.

Nous détaillons chaque contribution théorique par la suite.

Les études de cas approfondies sur l'innovation de modèle économique basées sur des cas récents et des données empiriques sont rares (Bucherer et al., 2012) et l'approche de l'innovation de modèle économique en tenant compte de contextes spécifiques est très utile pour d'abord comprendre le phénomène dans sa situation particulière (Schneider et Spieth, 2013). Cette recherche contribue à combler cette lacune en prenant le cas d'un fournisseur de services de mobilité dans une ville en développement qui a commencé à utiliser un nouveau type de produit (i.e. véhicule électrique). La recherche illustre la formulation d'une nouvelle vision par les dirigeants, ainsi que les actions commerciales entreprises par l'entreprise pour réaliser l'innovation de modèle économique dans un contexte où même l'écosystème d'innovation des véhicules électriques et celle des services de mobilité électrique est encore en développement.

Alors que la recherche sur le CME en relation avec le développement de la capacité dynamique et de la design organisationnelle constitue un axe de recherche important dans les littératures récentes (Teece, 2018), Cavalcante (2014) a été le premier à souligner l'importance du « pre-stage » de CME. Le principal résultat de son étude est la découverte d'une « pre-stage » de changement potentiel de modèle économique, caractérisée par des processus d'expérimentation et d'apprentissage qui peuvent ensuite conduire à un changement réel de modèle économique (Cavalcante, 2014, p. 2). Cavalcante (2014) définit le « pre-stage » comme la phase au cours de laquelle la technologie requise pour promouvoir le changement de modèle économique n'est pas encore disponible.

Certaines études se concentrent sur la phase précoce du CME, basées sur des études de cas empiriques (Brea-Solís, Casadesus-Masanell, & Grifell-Tatjé, 2015; Chesbrough & Rosenbloom, 2002; Evans & Johnson, 2013; Karlsson, Hoveskog, Halila, & Mattsson, 2017; Snihur & Zott, 2020) mais sans un accent particulier sur le « pre-stage » qui doit être distinguée du stade précoce par la disponibilité de la technologie requise. En décembre 2020, Cavalcante (2014) est cité par 39 articles. L'auteur a vérifié 27 de ces articles, et aucun d'entre eux n'offre une focalisation empirique sur le « pre-stage ». La thèse élargit le concept du « pre-stage » à l'indisponibilité des produits. Basée sur la conceptualisation d'une « pre-stage » par Cavalcante (2014), la thèse définit le « pre-stage » comme la période pendant laquelle la

technologie ou le produit pour effectuer un changement envisagé de ME n'est pas encore disponible.

L'auteur propose que la recherche sur la pré-étape du CME est essentielle, car les luttes des managers au cours de cette phase approfondissent la compréhension de « la préparation au CME ». Cela devrait attirer l'attention des chercheurs et des praticiens autant que les sujets comme le processus du CME et la capacité requise pour effectuer le CME. Cependant, il n'y a guère d'études de cas empiriques qui se concentrent sur le « pre-stage » du CME après la définition de le « pre-stage » par Cavalcante (2014). Cela peut s'expliquer en partie par le fait que la focalisation sur la pré-étape nécessite l'identification d'une société de cas qui vise à atteindre un CME afin de mener une étude longitudinale empirique.

Cavalcante (2014) suggère qu'au cours du « pre-stage », tout un ensemble d'activités peut avoir lieu (p. 14) sans détailler à quoi l'ensemble des activités peut ressembler concrètement. La thèse contribue à démontrer certaines activités et défis concrets au cours de cette phase de développement des affaires.

a) Première contribution : extension du concept de « pre-stage » à l'indisponibilité du produit

La première contribution théorique de la thèse est l'élargissement du concept de « pre-stage » (Cavalcante, 2014) d'une indisponibilité technologique à une indisponibilité de produit.

Cavalcante (2014) distingue la phase de CME de sa phase préalable par la (non) disponibilité de la technologie nécessaire pour mettre en œuvre le CME. Une entreprise qui peut surmonter les défis de la phase préliminaire sera en mesure de mettre en œuvre un changement de modèle commercial au moment où la nouvelle technologie sera disponible (ou peu après) (Cavalcante, 2014, p.13). Cavalcante (2014) définit implicitement le « pre-stage » comme une phase avant un CME lorsque la technologie requise pour mettre en œuvre CME n'a pas encore été acquise. Cavalcante (2014) souligne, avec des preuves empiriques, que l'entreprise est confrontée à différents défis au cours de cette phase. Il souligne l'importance de l'expérimentation et de l'apprentissage au cours de cette phase.

La thèse, avec ses preuves empiriques, affirme la nécessité de définir le « pre-stage » d'un CME. Puisqu'un IME est un type de CME qualifié d'innovant, l'auteur souligne l'importance de définir le « pre-stage » d'une IME.

La thèse, avec ses preuves empiriques, suggère une extension de la définition de « pre-stage » de celle définie comme l'indisponibilité de la technologie à celle définie comme



l'indisponibilité de la technologie **et du produit**. La thèse suggère une définition du « pre-stage » comme une phase de CME, ou d'IME, lorsque la technologie requise **ou le produit** requis n'est pas disponible.

b) Deuxième contribution : le « pre-stage » nécessite des capacités organisationnelles différentes

L'auteur a appliqué le concept à la société de cas et a montré que la nature des capacités organisationnelles requises au cours de cette phase doit être distinguée des capacités organisationnelles requises pour exécuter un CME dans « post-pre-stage ».

c) Troisième contribution : influence sur les écosystèmes d'innovation et leadership des écosystèmes

Comme troisième contribution, la thèse indique qu'il existe des conditions préalables que l'entreprise doit satisfaire afin de surmonter de manière proactive les défis de l'écosystème d'innovation au cours de la phase préliminaire. Le positionnement sur le marché, l'image de marque et la formulation d'un ME qui soit mutuellement bénéfique pour l'entreprise et le fournisseur peuvent être des conditions préalables potentielles. L'entreprise, avant de s'engager dans un CME, doit évaluer dans quelle mesure l'entreprise satisfait à ces conditions préalables au cours de la phase préalable afin d'évaluer dans quelle mesure l'entreprise peut aspirer à assumer le leadership de l'écosystème et passer de manière proactive au « post-pre-stage ». Plus de recherches empiriques doivent être menées afin de mieux comprendre la généralité de ces prérequis.

d) Quatrième contribution : proposer un modèle de recherche pour les futures recherches sur ME et IME

La quatrième contribution est la proposition de l'auteur pour de futures recherches sur ME et CME afin de mieux comprendre « quelle est réellement la nature d'un ME et de l'IME et comment il devrait être conceptualisé » (Foss & Saebi, 2018). La proposition est de répondre à l'appel : la littérature sur l'IME ne possède pas de modèles de recherche clairement articulés qui présentent les variables antécédent, modératrices et médiatrices de lien causal de base avec le concept clé et les conséquences (Foss & Saebi, 2017).

La thèse a confirmé que l'accent mis sur un point de bascule critique - la disponibilité de la technologie et du produit - sert à définir le « pre-stage » de CME. Comme mentionné dans la troisième contribution, les recherches futures pourront identifier d'autres points de bascule

importants à considérer. De plus, l'auteur suggère que le modèle de recherche qui prend en compte différents points de bascule sera utile pour mieux évaluer l'importance des différentes composantes de ME suggérées par les chercheurs. L'auteur affirme que la recherche empirique sur le ME et le CME, qui prend en compte les points de bascule et les composants de ME, aide à construire une définition rigide de ME et de CME. Les recherches sur ME et CME (passées et futures) peuvent être normalisées avec les composants ME et les points de bascule correspondants afin d'évaluer la validité de chaque composant ME.

L'auteur encourage la recherche empirique longitudinale qui prend en compte les points de bascule critiques en analysant les différences avant et après les points de bascule, afin de pouvoir comprendre les différents aspects (composants et phases) de ME et d'IME.



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Technological advancement, change in society, change in people's lifestyle and ambition induce changes in the market. In the last three decades, there have been revolutionary social changes and trends such as the spread of the Internet, the diffusion of Information and Communications Technology, the development of robotics technology, an increasing awareness of environmental problems associated with global warming and fast urbanization, an increasing awareness of healthy life-styles and an aging society. Such changes in society influence the market environment, creating new business opportunities and promoting changes in existing business activities. The ability to quickly detect these changes and exploit business opportunities now seems critical for private companies in order to take the lead in developing their businesses and creating wealth. This is not only true for private companies, but also for society as a whole. It is beneficial to society if newly developed technologies are rapidly commercialized and disseminated through smooth social implementation. In fact, the profits obtained through business activities resulting from the commercialization of technology-oriented products can be used for the development of next-generation technology both by private actors – such as the research and development department of a private company – and public actors – such as an academic institution or a public research institution. The growth of the national economy then creates an increase in the tax income of a country and, as a result, will lead to improved access for its citizens to a large panel of advantages, from budget allocation to next-generation technologies, including further understanding of basic science.

For the managers of companies, the growth, profit and survival of their own firm are the most important issues. Ideally, they must expand their market size while detecting business opportunities prior to other companies doing so. Building this competitive advantage is important for corporate strategy. Traditionally, there are two major schools of thought concerning competitive advantage development: the **positioning view** explains the importance of market positioning by differentiation, taking into consideration *five competitive forces* (Porter, 1979), which are an important environmental factor for competition, while the **Resource Based View** (Barney, 1986) explains the importance of developing valuable internal resources that are rare among competitors.

Recent studies show that Business Model Innovation (BMI) and the capacity to implement a new Business Model (BM) can be a source of competitive advantage (Geissdoerfer, Vladimirova, & Evans, 2018; Verma & Bashir, 2017). The concept of a Business Model

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emerged during the Information and Communications Technology boom in late 1990s (Foss & Saebi, 2017; Magretta, 2002) that articulates "value creation, delivery, capture" (Osterwalder & Pigneur, 2010). Scholars suggest that major components of the BM include value proposition, revenue model, value network and leadership (Voelpel, Leibold, & Tekie, 2004; Wirtz, Pistoia, Ullrich, & Göttel, 2015).

Developing a competitive BM is an important managerial focus both for established enterprises and for new ventures (George & Bock, 2011; Trapp, Voigt, & Brem, 2018; Trimi & Berbegal-Mirabent, 2012). To this effect, research on the change aspect of BMs, such as research on Business Model Change or Business Model Innovation, are also getting attention. BMI, for example, is defined as "a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes" (Björkdahl & Holmén, 2013, p. 215). The research on Business Models and Business Model Innovation emerged in the late 1990s and continues to flourish (Foss & Saebi, 2017). The Business Model is becoming an important concept for social business companies (Siebold, 2020; Sparviero, 2019) and environmentally-friendly "sustainable" business companies (Geissdoerfer et al., 2018; Pieroni, McAlloone, & Pigosso, 2019). However, the theory of BMs and BMI has yet to be formalized. Since there are critical problems in the accordance of a coherent definition among scholars (Foss & Saebi, 2018), BMs and BMI remain in development as a management theory. This thesis, through a longitudinal case study, seeks to gain insight and better understanding of these concepts so as to contribute to the foundation of the BM and BMI theory. In particular, this thesis focuses on the pre-stage of a Business Model Change (BMC) – a phase preceding the changes of a BM, when the technology and products required to conduct a BMC are not yet available.

The pre-stage of a Business Model Change (BMC) is defined by Cavalcante (2014) as a phase prior to the beginning of a BMC when the technology required for the BMC happens to be unavailable. He highlights the importance of learning and experimentation during this phase. While he initially defines the pre-stage by the unavailability of the required technology, the author expands the pre-stage concept to a phase before a BMC when a **product** required for a BMC is unavailable. The author then applies this extended definition to a start-up company and observes the business development of this company so as to better understand the nature of the pre-stage of a BMC.

This thesis equally mobilizes literature on organizational change management and innovation ecosystems as complementary perspectives on the subject. These concepts correspond to the

internal and external variants of a BMC. In fact, research on Business Models (BM) points out the importance of external factors such as value propositions and value network, as well as of internal resources such as leadership.

Through a longitudinal empirical case study, this thesis secondarily focuses on organizational design and capability development as internal factors, and on innovation ecosystems as an external factor. The correlation between Business Model Innovation and both organizational design/capability development and innovation ecosystems is a domain of research where empirically based detailed studies are yet to be made.

The research analysed in this thesis considers a case study of a mobility service start-up in Bangalore, India. The author started by contacting the co-founder of the company in 2015, the year of its foundation. The company is creating a BM with a novel environment-oriented value proposition using a new technology-oriented product, the Electric Vehicle (EV).

The managers have an abstract idea of the future BM of the company, “becoming an e-mobility service platform” through service diversification and geographic expansion. The managers envisage to develop services such as charging infrastructure and logistics for other e-mobility service providers. With this business idea in mind, the manager is willing to “keep the First-Mover’s Advantage (FMA)” against follower companies they call “copycats”. Copycat competitors are competitors that copy the basic idea of the pioneer’s business model and erode its advantage (Teece, 2010) whereas FMA is “*a special case of competitive advantage resulting from market entry timing* (Kerin, Varadarajan, & Peterson, 1992, p. 39).” According to the author, the company aims at achieving a BMI by developing a competitive advantage through BMC.

The author focuses on four years of the business development, starting with the foundation of the company. The author conducted four field surveys collecting relevant empirical data and analysed them so as to answer the following research questions:

- *How do top managers formulate the vision of a start-up company while the product required to attain the envisaged BMC is missing and the development of the relevant innovation ecosystems remains uncertain?*
- *What are the challenges to developing competitive advantages while envisaging to attain a Business Model Innovation?*



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- ***What organizational capabilities should be developed to prepare a Business Model change while the product required for Business Model change remains unavailable?***

The author first analysed whether or not the company possessed any FMA, and whether the company developed any FMA. The author then evaluated whether the company had attained a BMI. The author ascertained that the company did not possess any competitive advantages nor had attained a BMI by the end of 2019. Though the company did not change its BM, the author gained important insights on the pre-stage of BMC.

Through empirical observation and an analysis of the case company, the author points out the importance of the turning point (or phase transition) suggested by Cavalcante (2014). In fact, this critical turning point marks a change in the nature of the required organizational capability.

Following is the structure of the thesis.

In the first chapter, the author presents the local context of the research. Through this brief overview on the characteristics of relevant industries and recent urban development, the reader is invited to familiarise him or herself with the specificities of the research context, such as the electricity supply situation, the evolution of transports and mobility, and the concept of a Smart City. The profile of the case company is also presented so as to facilitate the understanding of the choice of the literature review in the following chapter (chapter 2).

The second chapter is a literature review. Three streams of literature – business model, organizational change management and innovation ecosystem - are explored so as to better formulate the research questions. The main focus of the research is the business model and on the Business Model Innovation (BMI), addressing how a newly-born start-up company can transform its business to increase its business performance by adapting to the business environment. Complementing the main focus, the thesis addresses the organisational change management aspect as internal factor, especially regarding the capability development and organizational design. To understand the external factor of BMI, the author mobilises literature on innovation ecosystems. Based on the analysis of the literature review, the author formulates the research questions presented in the following chapter (chapter 3) that address the identified research gaps and are both empirically and academically coherent.

The third chapter presents these research questions and research methodologies. In order to pursue this research, the author takes a comprehensive research approach and uses the case study method.

The fourth and fifth chapters contain a description of the case. The fourth chapter first establishes an overview of the business development and the vision of the managers since the company's foundation. The business development of the company is then divided into four phases with representative turning points, and the author explains the logic behind the managers' formulation of the company's vision and its transition. The fifth chapter continues by depicting a detailed description of the company's organizational structure, its business model and its potential orientations for market development. In this chapter, the author intends to highlight the characteristics of the company's business model by explaining the value propositions, along with the associated organizational profile and business environment in order to prepare the analysis of the following chapter (chapter 6).

In the sixth chapter, the author analyses the business development of the company by focusing on the development of competitive advantage and the accomplishment of BMI. The first part of the chapter analyses the gaps between the strategic intentions of the managers and their actual business achievement. The second part analyses the company's action plan. Finally, the third part analyses the organization of the company for future business development.

The last chapter (chapter 7) highlights the results found in response to the research questions established previously, followed by discussions on the BMI, the organization change management, and the innovation ecosystems. The author then clarifies the limits of the research and presents possible future research orientations. The author also expresses critical managerial recommendations based on the analysis and discussions of the thesis. Finally, the author concludes the thesis at the end of this chapter.



*CHAPTER 1: LOCAL CONTEXT*

I) Industrial and geographical characteristics: electric vehicles and urban India	53
II) Focal enterprise and its primitive vision	56
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This research concerns a start-up company in India, specialized in providing a mobility service with Electric Vehicles (EVs). It is an interesting business case to observe, even out of an academic context, since the subject has a direct link to the social implementation of a technology-oriented product and the development of a new mobility service. The diffusion of EVs is relevant to national level policies such as electricity supply policy and plan (Ji & Huang, 2018). This chapter describes the local context of the case study so as to better understand its specificity.

The chapter mainly gives contextual information as in 2015 up to 2017. This period corresponds to the foundation of the case company, in October 2015, and to the early stage of business development when the managers formulated initial vision of the company. The intention in chapter 1 is to give a perspective as in this period so as to better understand the local context of the start-up's business activity. The most recent evolutions will be described in chapter 7 after the results, discussions and managerial recommendations. The recent evolutions up to early 2021 presented in chapter 7 helps to better understand the signification of the pre-stage of Business Model Innovation that the thesis mainly focuses on.

India is the world's largest democratic country today, with a population of 1.2 billion in 2011 (Census of India, 2011). Its 3 287 140 sq. km are divided into 29 states and 7 union territories (Census of India, 2011). The economy has kept growing by an average growth rate of 7.09 % during the last 15 years, from 2004 to 2018 (World Bank, n.d.).

For the economic growth of a country, securing energy supply is an important factor. In India in 2018, the electrification of all villages was complete (Bhaskar, 2018). The deficit in electricity generation is, theoretically in statistics, solved as well ("India to be power surplus in 2018-19: Central Electricity Authority," 2018). However, this remains a statistic and does not necessarily reflect the reality of the country: electricity outages happen daily in urban area as well as in rural area. Also, the demand for electricity consumption will continue to grow in accordance with the increasing population, while the volatility of petrol prices can cause a rise at any given moment, causing energy supply issues. Assessing future demand of energy consumption is as important as prefiguring changes that can destabilize the energy security of a country<sup>1</sup>.

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<sup>1</sup> As from energy security perspective, it is important to ensure the diversity and the dispersion of energy sources so as to avoid heavy concentration and excessive dependence. Shifting from ICE vehicles to EVs can diversify the source of energy for

## *1) Industrial and geographical characteristics: electric vehicles and urban India*

### *1) The electric vehicle and its industrial characteristics*

The social implementation of EVs is inevitably a socio-industrial phenomenon involving a variety of actors. At first, the deployment of charging infrastructures is important for the usability. The deployment can be carried out both by public utilities and private enterprises. Because the purchase of a car represents an important amount of money for an average household, customers may appreciate having different car makers - Original Equipment Manufacturers (OEMs) - provide several options of car models. Customers would also appreciate an easy access to a maintenance and repair service, as it is a safety concern. This aspect can be taken care of either by EV manufacturers themselves or by third party service providers.

The central government also welcomes the diffusion of EVs, as it has a big stake in national energy security and future competitive advantage in EV technology, as well as in the EV market of the country. The Government of India (GoI) launched a policy called Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme in the year 2015 to promote the manufacturing of electric and hybrid vehicle technology and to ensure their sustainable growth. The deployment of new technology-based products would stimulate the economic activities of various companies as well. Here, a holistic socio-industrial perspective is essential.

The situation of EV market growth is of great interest for many private companies, as it has the potential to change the power balance within the automobile industry in a large sense. The deployment of EVs and EV-based mobility services could potentially lead to a convergence of different industrial sectors such as the automobile sector, ICT and the energy industry. As is the case for existing ICE vehicles, the dominant players that lead the market would expect an excessive profit. While both investment and return are expected to be high, the demand increase of EVs remains unclear as ICE vehicle remain an alternative product that embody a dominant design in the current transport and mobility system. It is essential for private companies to reflect what kind of business model and business strategy they should

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mobility: the energy source of electricity can be wind-power, solar-power or hydropower as well as petroleum fuels. This is one reason why the government and the private sector are working to spread electric vehicles. The most primitive and fundamental questions about this dissemination are 1) can the local electricity supply network provide sufficient power to accommodate EVs and 2) are a sufficient amount of charging infrastructures in place? As is better understood through this study, these questions are not always valid.

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choose in order to stay competitive and survive the evolving business environment (c.f., Beaume & Midler, 2009).

### ■ *History of automobile industry in India*

The local history of the automobile industry dates back to the 1970s. It was described by Balcet & Ruet (2011) in the following manner:

During the 1970s, the first technical and industrial agreements were signed between Indian firms and several Japanese producers, including Toyota, Mitsubishi, Nissan and some component suppliers. The large investments in the education system, especially as regards the science and technology field, produced a pool of skilled labour force that turned out to be a competitive advantage for different sectors of the Indian economy (Guha, 2007). Moreover, the strategy of technological self-reliance itself proved to have positive fallouts, as recognized as back as in the early 1980s by Sanjaya Lall (Lall, 1982). The restrictions on technology imports forced the Indian industry to develop technical capabilities, which generated the ability to manufacture a range of intermediate components of some sophistication (Forbes, 1999: 408). It was the case of Indian casting and forging companies (Balcet and Bruschiari, 2008). But this had an even more profound and lasting impact which we believe is central in understanding catching up, innovation and internationalisation of Indian firms till today (Richet and Ruet 2008, Balcet and Bruschiari 2008). (p. 4)

### *2) Urban India and its geographical characteristics*

Cities in India have two specific characteristics when it comes to the diffusion of EVs. Firstly, social infrastructures such as roads and electricity supply infrastructures are under development. This means that there is a lot of space for new designs and construction, unlike in developed cities. Secondly, many Indian cities are experiencing steady economic growth. These factors signify an important fluency in terms of future development of the city. The lifestyle of local citizens is expected to change accordingly. Like the other side of the coin, development of the cities implies many uncertainties. From the EV deployment perspective, unlike in the suburbs or rural villages, solid support from the central and local governments, as well as public electricity utilities and regulators, are essential. In this, close coordination among these actors should be important.

In this context, private companies' business strategies and business models<sup>2</sup> can hardly be planned without the socio-industrial perspective. On the contrary, an action taken by one private actor has a significant impact on the development of the socio-industrial ecosystem. Business models and socio-industrial ecosystems should be discussed all together coherently. For potential OEMs of EVs, such as Renault India, the core issue is to reflect upon what kind of business model they should develop, taking the development of relevant socio-industrial ecosystems into consideration. For a company that is already on the market, like the case company of the research – Lithium Urban Technologies – a critical question is that of which competitive advantage it should establish and reinforce beyond the development of a feasible business model, once more taking the development of relevant socio-industrial ecosystems into consideration.

Both types of companies have the same underlying concern: depending on the potential development of the EV industry, a company may not be able to exploit the market opportunity and may need to change its comprehension of doing business in a new evolving business environment. This is a concern rooted in uncertainties which threaten potential EV diffusion. These uncertainties include technological development of battery capacity, deployment of the required infrastructure, the price of fuel and electricity, and governmental regulations. In addition, there is a potential convergence of different industries (such as the ICT industry, the automobile industry and the energy industry), yet another possible uncertainty.

It should be an important challenge for a company to prepare for future competition: what position shall a company seek in those industries so as to be competitive? This concern hinders a steady development of the EV market by keeping new entrants unconvinced. What is the potential market development of EVs and related industries? How are the uses of EVs diffused into society? Such questions are also relevant to policy makers because of the socio-environmental advantages of the product. Then how can one answer these questions? Who can demolish the uncertainty and how?

As an entry point for the research, the author started the conceptualisation of the research by supposing that, for the diffusion of EVs and EV-based mobility services, five elements that constitute Electric Mobility Systems (EMS) need to be developed spontaneously: governmental policy and regulation, electricity and transport infrastructure, products, services and market segments (users). As it constitutes relevant knowledge to

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<sup>2</sup> Please refer to the literature review part for the definition.



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better understand the local EMS development, detailed information on these five elements will be presented throughout the thesis (especially in chapters 1 and 5).

As the metropolitan areas develop or expand, people's daily transportation habits change. These changes result from the development or extension of metro lines, the commercialization of battery-operated vehicles and/or the deployment of ICT based services. These phenomena concur with the central government's initiatives such as the 100 smart city program that aims at improving social infrastructure. With these initiatives, renewable energy sources such as solar and wind energy are integrated into the existing public grid electricity transmission and distributing systems. By interlocking public policy with drastic changes in energy and transports while simultaneously deploying relevant services and technology, this evolution improves citizens' convenience of daily mobility.

Bangalore is the fifth most populated city in India. It is known as the "Silicon Valley of India" due to its leading exports in information technology (IT) in the nation. The population inflow of IT engineers and other human resources caused its population to increase by 47.2% in a decade from 2001 to 2011, while that of Karnataka is only at 15.7%. Delhi is the capital of India. It has several nearby-satellite cities such as Gurgaon, Faridabad and Noida. Metro lines are currently being expanded to these areas, increasing accessibility to and from Delhi.

In the above-mentioned context, the focal company of this thesis started an EV-based mobility service in 2015 in Bangalore, and later in Delhi in 2017 (see figure 1 for the location of the two cities).

### *II) Focal enterprise and its primitive vision*

The research takes a mobility service provider as a case study. It is a start-up company founded in late 2014. Through the interactions with the managers of the start-up company at the initiation stage of the research (in late 2015), the company's problematic was identified as:

**"How can the company remain as a pioneering company in a dynamically changing business environment?"**

The research adopts this primitive question as a starting point for the exploration of the literature and the data collection concerning the company and its business environment.

The literature review seeks to reformulate the initial practical research question:

**What are the actions to be taken by a first-mover to build a competitive advantage?**

“Replacing existing mobility services with a new EV-based mobility service” is the main strategy of this start-up. More detailed information about the case company will be given in the case description in chapter 4 and chapter 5.

Figure 1 - Map of India



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### *III) Electricity supply, transport and mobility, and Smart City*

When considering the diffusion of a product and of a service, it is important to take in consideration different infrastructures required to do so, as well as consumers' preferences (Brown, 1975; Robinson & Coiner, 1986). For the diffusion of EVs, an important infrastructure

to be considered is charging infrastructure (Bailey & Aksen, 2015; H. Choi, Shin, & Woo, 2018; Hardman, et al., 2018; Reid & Spence, 2016). The Government of India also recognizes this feature and allocates a dedicated budget for the deployment of charging infrastructure for the adoption of EVs (Government of India, Ministry of Heavy Industry and Public Enterprises, & Department of Heavy Industry, 2015). The deployment of electric charging infrastructure is regarded as one of the key elements for the diffusion of EVs and e-mobility services. Therefore, it is critical to examine electricity supply infrastructures themselves in Indian cities, since the discontinuity of electricity supply is an important aspect of the local context.

This section firstly presents the local electricity supply situation, followed by the recent changes and trends in transport and mobility. This section also explains smart city projects promoted by the central government.

### *1) Electricity supply*

The electricity supply situation in India varies from state to state, as do the regional and individual income levels. However, broadly speaking, India as a whole, is struggling hard to catch up with the rapidly growing demand. The electricity supply is discontinuous and unstable even in urban areas (Heynen, Lant, Smart, Sridharan, & Greig, 2019). Citizens' lifestyle and social activities, as well as commercial activities, must adapt to the situation (Amiraly & Sawamura, 2018). It is common to have electric back-up systems such as an uninterruptible power supply unit or a diesel electricity back-up system (Sawamura, H., & Amiraly, 2015). What are the reasons behind this electricity shortage? What changes are to be expected regarding electricity supply and generation? What are the links between electricity supply and EV diffusion? There are essentially two reasons explaining the electricity outages. One is the imbalance of supply and demand. The other is technical issues on the transmission and distribution of electricity.

#### ■ *National level demand and supply*

In the year 2013, India produced the third largest amount of electricity, with 4.8% of global share in electricity generation (BP, 2014), surpassing Japan and Russia. According to Central Electricity Authority (CEA), India as a whole had an installed electricity generation capacity of 250 257GW as of the 31st of July, 2014 (CEA, 2014). India still has great potential to increase its electricity generation compared to that of China, which boasts a similar population size. Also, India's per capita electricity consumption is far below average when compared to the world average or even the average of European Union (CEA, 2014).

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In fact, according to *World Energy Outlook 2011* (2011) “Electricity consumption in India in 2009 was 96 kWh per person in rural areas and 288 kWh in urban areas on average over all people connected to electricity” (p. 12) while “the worldwide per capita annual average of 2,600 kWh and 6,200 kWh in the European Union” (*India Energy Policy, Laws and Regulations Handbook Volume 1 Strategic Information and Basic Laws*, 2016, p. 74). Though electricity generation has increased in the past decade, the electricity demand of India still surpluses 0.8% on base load energy (“India still not power-surplus; Peak deficit at 0.8 per cent in 2018-19,” 2019). This means that the capacity increase of the electricity generation does not meet its growing demand.

### ■ *Technical issues on transmission and distribution*

The electricity supply in India can be divided into three layers: generation, transmission and distribution. The problem of intermittency of electricity supply can be principally broken down into two layers: transmission issues and distribution issues.

In Bangalore, a mobile-based service is being developed by the local electricity distribution company to provide outage and recovery information to the consumers (Express News Service, 2017). Another way to circumvent the inconveniences is to install electricity storage (batteries). Implementation of solar photovoltaic reduces the dependence on the public electricity grid. For example, Bangalore Electricity Supply Company (BESCOM) launched a solar rooftop program in 2016 to promote the installation of this off-grid generation of electricity (DHNS, 2016). This program includes net-metering that enables local users to sell the generated electricity back to the grid. The distribution of a decentralized energy source is an important trend to be continuously observed. The more decentralized energy sources become common, the more important the role of electricity storage becomes. This prefigures the increased value of electric vehicles as mobile batteries.

To learn more about the quality of electricity supply in India, a local NGO, Prayas, constantly observes the quality of electricity all over India at certain data points and opens the data to the public<sup>3</sup>. This allows for more data about the operational details such as the manpower configurations, thefts, Transmission and Distribution losses (T&D) and other technical aspects.

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<sup>3</sup> The daily power outage data collected by Prayas is accessible from the following URL. <http://watchyourpower.org/>

### ■ *Indian energy policy and prospective vision*

Considering that there exist different issues in electricity supply at the distribution level, what are the energy policies at the national level? Electricity generation is an important parameter to be considered because of the three following reasons. Firstly, it is related to CO<sub>2</sub> emissions. As far as using coal or oil-based generators for electricity generation, the use of EVs in the reduction of CO<sub>2</sub> emissions is limited; however, increasing the use of renewable sources of energy such as wind and solar power is expected to reduce the environmental impact (H. Choi et al., 2018; Mouli et al., 2016; Rangaraju, De Vroey, Messagie, Mertens, & Van Mierlo, 2015; Rupp, Handschuh, Rieke, & Kuperjans, 2019; Varga, 2013). The importance of an energy mix transition in India towards sustainable development based on environmental concerns has already been pointed out since the early 2000s (Ruet, 2005).

Secondly, when the use of renewable resource-based generators increases, there will be a fluctuation in the electricity supply during the day due to the fluctuation of energy sources such as solar and wind power (Lean & Smyth, 2013; Lund & Münster, 2003). In order to secure a stable supply and stable grid operations, increasing electricity storage capacity can be a solution (Connolly, Lund, Mathiesen, Pican, & Leahy, 2012; Weitemeyer, Kleinhans, Vogt, & Agert, 2015) and connecting more electricity storage to the electricity grid can be a feasible option. EVs can also play a role as distributed electricity storage.

Thirdly, distributed electricity generation can be more common both in city areas and in rural areas. The solar energy, wind energy and water energy-based generation enables locally-generated-locally-consumed practices. Especially in suburban and rural areas where the electricity grid is less developed, these types of energy sources can be major sources of electricity generation and are getting more attention (e.g., Kamalapur & Udaykumar, 2011; Nasir, Khan, Hussain, Mateen, & Zaffar, 2018; A. Sharma, Agrawal, & Urpelainen, 2020). Even in city areas, these locally-generated-locally-consumed models can be dominant, considering that even today some commercial users install their own diesel generators within their premises as back-up, since the public grid system is not stable enough for these commercial users (Amiraly & Sawamura, 2018). It is important to acquire these perspectives to study the diffusion of EVs and EV-based mobility services.

The central government aims to attract \$100 billion of investment in renewable energy over five years, from 2016 to 2022, setting an objective of 100 GW solar capacity by 2022 (Goswami, 2016; Hairat & Ghosh, 2017; Iyer, 2016). This corresponds to 60% more than French nuclear capacity, which was 63,2 GW as of 2016 (OECD & NEA, 2016). The Central

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Government aims to change its energy mix, increasing the percentage of renewable energy as energy sources (*India 2020 Policy Energy Review*, 2020). It also targets to attract \$50 billion in investments in transmission and distribution (Bhargava, 2014), as well as to achieve 60 GW of wind capacity by 2022 and double the nuclear capacity by 2025 in order to attain 9% of the energy mix and 40% of renewable energy by 2040 (*India 2020 Policy Energy Review*, 2020). Regarding the EVs, the government sets a target of 6-7 millions of hybrid and electric vehicles sales by 2022 (Aakaash Singh et al., 2019).

The local environmental conjuncture may play an opportune role in India. Furthermore, energy constraints may be seen as an opportunity to shape new strategies as the Government of India has finally embarked into ambitious yet credible objectives to diversify and green up the energy mix. For that, accompanying industrial strategies is important in integrating the EV into the business model of the future. Nevertheless, here again the interests for car makers and the strategic importance of the “Make In India” program lead us to think that the time is ripe for an acceleration (Anjali Singh, 2018). Here, the lack of centralised energy and high voltage transmission infrastructure might be an accelerator of industrial strategies relying on decentralised energies.

Interestingly, renewable energies will also include rural micro-grids (Kamalapur & Udaykumar, 2011; Nasir et al., 2018; A. Sharma et al., 2020). Thus the 2-wheelers and 3-wheelers market is also expected to rise alongside that of the 4-wheelers (Aakaash Singh et al., 2019), which are more frequently located in urban cities.

As per stock capacity, renewable power plants constitute 31,5% of total installed capacity and non-renewable power plants constitute the remaining 68,5% as of 2016 (Minister of New and Renewable Energy & Government of India, 2017). The proportion was 37% renewable and 63% non-renewable by the end of 2019 (Minister of New and Renewable Energy & Government of India, 2020). Thus, India often gives the impression of a long-lasting coal-based energy mix. India is indeed the 3<sup>rd</sup> largest coal producer in the world and, at the same time, the 3<sup>rd</sup> largest importer of coal. It is also the 4<sup>th</sup> largest net importer of oil. However, while India experienced an increment in energy consumption between 2013 and 2014 with a +7.1% increase, it caused only a +6.4% increment in coal production in 2014. On the other hand, the renewable energy consumption increased by 11.5% between 2013 and 2014 (EMIS, 2015). This turning point in the use of renewables is leading to a new trend, with in particular three key programs:

### *100 GW solar objective by 2022*

By 2017, 19.8 GW solar capacity would be implemented<sup>4</sup>. To reach the target of 100 GW of installed capacity by 2022, India must maintain its pace during the 2015-2017 period, and then double its efforts for the 2017-2022 period. In addition, India announced a launch of the International Solar Alliance (ISA) at the COP 21 (Ananthakrishnan, 2015), showing positive willingness to play a central role in the international cooperative development of solar power.

### *60 GW wind objective by 2022*

This objective is expected to supplement the solar effort within 5 years. Suzlon, a local wind turbine maker, ranked the world's 5<sup>th</sup> largest wind turbine company in 2013 (North American Windpower Staff, 2014), would play a significant role.

### *13.5 GW nuclear objectives by 2020*

The Government of India has been recently active signing nuclear agreements of different types with France and Russia; though a lot remains to be done and the timeframe goes far beyond the expected 5 years (from 2015), this is a long-term signal to the sector that mix is greening; nuclear energy thus constitutes the third wave of change after solar and wind power (Rao, 2015).

Here it should be highlighted that the investment needed is credible, as it could come to offset currently high expenses on subsidies to coal. The government expenditure on fossil energy is much larger than that of EVs or solar power. \$227 billion of annual subsidies are allocated for fossil fuels and are a budgetary loss. This is the 4<sup>th</sup> biggest coal subsidy in the world, and it is worth double the expenditure on education in the country.

To sum it up, India will have a large additional capacity in solar power within 2 years and expects a quantum jump within 3 to 5 years. Additional wind power capacity would be installed within 5 years, followed by nuclear power plants. All investment policies in energy in India must consider the federal nature of the country and should identify what is under Federal responsibility, and what is decided by the States of the Union. Energy depends upon four ministries (coal, electricity, oil and gas, new and renewable energy), while nuclear power (Department of Atomic Energy) is under the aegis of the Prime Minister.

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<sup>4</sup> Between 2015 and 2016, 4.2 GW has been already connected to the central network and 3.7 GW of solar capacity projects are being installed. Between 2016 and 2017, 10.8 GW of solar capacity projects are pending approval from the federated states.



■ *Links between energy supply development and diffusion of EVs*

The diffusion of EVs is of national-level interest, and the deployment of charging infrastructure is an important parameter to be considered (Hardman et al., 2018; Ji & Huang, 2018), along with charging price policies, standardisation of charging infrastructure (Ahmad, Khan, Saad Alam, & Khateeb, 2018; Foley, Winning, & Gallachóir, 2010), the upgradation of the electricity supply system (Dai & Liu, 2017) and incentives such as subsidies for EV adaptation (Breetz & Salon, 2018; Crist, 2012; Helveston et al., 2015; Holtsmark & Skonhoft, 2014; Masiero, Ogasavara, Jussani, & Risso, 2016). The environmentally-friendly energy mix, using more renewable energy, is an important determinant for the adoption of electric vehicles (H. Choi et al., 2018; Ligen, Vrabel, & Girault, 2018).

The Indian government is working on the “smart cities” scheme (Ministry of Urban Development & Government of India, 2015), and the EV has an opportunity to assert itself through the development of these smart cities (Aijaz, 2020; Madakam & Ramaswamy, 2013; Nayak, 2019).

A growth in the EV market implies an important impact on electricity generators and suppliers. It increases the need for the market to be managed through additional capacity and an efficient grid management. Thus, the increase in solar capacity can be a good supporter to the EV market. In 2014, more than 484 million USD were invested in renewable energy, and India is thus ranked fifth in the world in terms of Investment Attractiveness in Renewable Energy (Warren, White, Dominy, & Rennie, 2015).

The Indian government is aware of the importance of energy storage and the key role of the battery (Padilla, 2015), since the increase of energy storage capacity is essential for the exploitation of renewable energy sources, such as solar power (Hill, Such, Chen, Gonzalez, & Grady, 2012; Zahedi, 2011). More than 4 ministries are responsible for shaping the energy strategy. Thus, India needs an efficient mechanism for effective, continuous coordination at the federal level to achieve the supply and demand shifts required. We believe it is through the regulatory route that India’s commitment and credibility are to be assessed, as proven by the institutional track record on conventional energy which first arose through Central Electricity Regulatory Commission (CERC) / States ERCS and the Oil and Gas Regulatory Board. An energy fund may be implemented with contributions from Indian energy players and from the government. This energy fund could serve to share investment risks of unproven technologies, hence develop and incubate new technology ventures for a bottom-up approach. India must enhance a stronger technology ecosystem by focusing on investing

more in effective research & development programs. Off-grid and micro-grid solutions need also to be developed at a local level: the EV-battery-smart grid renewable ecosystem is to be studied. Industry accelerators may happen through some bilateral investment, notably India-to-Africa as the public and private cooperation between the two zones was recently re-launched in a credible manner.

The relation between the EV-charging infrastructure and the development of mobility services is described in the observation of the case study in this research.

## *2) Transport and mobility*

The increase of urban population caused changes in urban transports and the urban mobility system. New transport means have developed, such as the metro, while mobile-based taxi services and other conventional transport system have improved.

### ■ *Social challenges behind the emergence of EV-based services that this research focuses on*

This research focuses on some of the social challenges implied by the rise of EV-based services. Urban transport is one of big social concerns in India. “In 2011, with nearly 17 million vehicles, the four big cities—Delhi, Bengaluru, Chennai and Hyderabad—alone constituted 12.3 per cent of the total number vehicles in the country” (IIHS, 2015, p. 9). Changes in urban mobility in India are influenced by different factors, such as rapid urbanization, rapid motorization and a dwindling share of non-motorized transportation, according to IIHS (2015). These factors cause problems that are common in Indian urban cities such as road congestion, parking problems, air pollution, and deterioration of road safety. The challenges in solving these problems are also similar from one city to another: gaps in laws and regulations, fragmented institutional frameworks, distortion of land markets affecting transport infrastructure development, lack of comprehensive design standards for transport infrastructure, human resources challenges, absence of reliable transport data and inefficiencies in bus-based public transport services.

According to the growth of city population and economy, upgradations of road infrastructures are necessary to support local traffic. Local governments promote upgradations of road management systems using new ICT and smart technology so as to increase the efficiency and convenience for users.

### ■ *Emerging solutions to tackle these challenges*

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The three interrelated emerging solutions to manage an increasing demand for transport and mobility are explained below. These solutions are the utilization of ICT, ride-sharing and the extension of metro/bus lines.

### *ICT use*

The first solution is the utilization of ICT. The diffusion of mobile phones and smartphones enable people to obtain real-time information on transport and traffic situations.

Some local public bus companies started offering real-time operation timetables online from 2017 (Times News Network, 2017), while in some major cities such as Bangalore and Delhi, the real-time operation update became available online only after 2018 (Philip, 2019, 2020; Times News Network, 2018). This technology enables users to better calculate faster and/or cheaper ways to reach a destination.

### *Ride-sharing*

Ride-sharing is the second emerging solution. Related to the wider ICT use explained above, mobile-based taxi dispatch services applications such as Uber and Ola have become popular, despite some regulatory issues (Julka & Sharma, 2014; Sundaram, 2017). Thanks to the diffusion of mobile phones and the development of ICT technologies, these service platforms offer new additional values such as price transparency, ease of booking taxis, ease of payment and better prevision of the waiting time. There are several benefits, but the ride-sharing aspect is especially remarkable. Ride-sharing lowers the price of using taxi services for users while indeed optimising the number of passengers that a taxi can service. This serves to reduce the traffic of the city.

### *Extension of metro lines and development of bus rapid transit*

The third emerging, though conventional, solution is the extension of metro lines and the development of the Bus Rapid Transit (BRT) system. The development of metro lines in developing cities such as Bangalore and the extension of metro lines to new city extensions such as Gurgaon and Noida in the National Capital Region near New Delhi are expected to reduce traffic congestion. Along with the development and extension of metro lines, BRT is also developed in several cities such as Ahmedabad. BRT has dedicated bus lanes in the city, enabling the buses to avoid being caught in heavy traffic. This increases the fluidity of the traffic since the buses caught in traffic can cause further congestion.

As of 2017 in Bangalore, two metro lines were in operation. The purple line has 17 stations and traverses the city from East (Mysore road station) to West (Baiyyappanahali station). The

green line has 24 stations and traverses the city from North (Nagasandra station) to South (Yelachenahali station).

The company studied in this research offers a mobility service that responds to the growing demand of mobility in Indian cities with newly available technologies such as EVs and ICT. Since the company offers Corporate Employee Transport service, these three trends are not negligible in setting its strategy: which cities should be chosen to expand the market and what alternative means of transport are available?

### *3) Smart city: 100 Smart Cities program of Government of India*

The central government of India advanced the 100 Smart Cities program across the country. How far does the program potentially impact the development of electric mobility ecosystems? This chapter overviews the content of the “100 Smart Cities Mission” launched by the central government. Investment on infrastructures, especially on energy management and urban mobility, is expected mostly before 2020 (Government of India & Department for promotion of industry and internal trade, 2015).

The above sections described the recent development of electricity supply infrastructures, the characteristics of local transportation and recent trends. This background information helps understand the entire ecosystem englobing electricity and mobility services. What types of electric mobility services have developed? What are the needs behind the emergence of these services? The first section of empirical data (chapter 4) will answer these questions by depicting several EV-based services developed in Bangalore and Delhi.

#### *The Smart Cities Mission*

In June 2015, the government of India launched the Smart Cities Mission (Press Trust of India, 2015c). This program aims at developing 100 smart cities across the country to “drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes”. While admitting that the definition of a “smart city” varies from city to city, the Government of India mentions the following 10 elements as core infrastructure: 1) adequate water supply, 2) assured electricity supply, 3) sanitation, including solid waste management, 4) efficient urban mobility and public transport, 5) affordable housing, especially for the poor, 6) robust IT connectivity and digitalization, 7) good governance, especially e-Governance and citizen participation, 8) sustainable environment, 9) safety and security of citizens, particularly women, children and the elderly, and 10) health and education.

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Notably, improvements on the electricity supply and on urban mobility and public transport are expected throughout the mission. The following image (Figure 2) shows some solutions illustrated in the mission statement, as well as guidelines for the smart cities given by the government. This image also highlights what the government expects in regards to the improvement of energy management and urban mobility.

Figure 2 - Solutions exemplified by the government for "Smart cities"



SOURCE: Ministry of Urban Development & Government of India (2015)

At the same time, the department of Industrial Policy and Promotion listed Smart Energy, Smart Transportation and Smart building as part of the 8 pillars of Smart city program.

### ■ Key components of the concept of Smart City

The core components of the Smart City concept are energy (including smart-grid, energy storage and smart meters), transportation and buildings.

#### *Smart Energy*

Smart Energy includes the several crucial dimensions (Government of India & Department for promotion of industry and internal trade, 2015) that will now be explained. The first dimension is Smart Grid. The goals are to assure the electrification of all households with power available for at least 8 hours per day by 2017 and to establish a smart grid test bed by 2014 and a smart grid knowledge centre by 2015; the implementation of 8 smart grid pilot projects in India with an investment of \$10 million (USD) is expected. The second dimension is energy storage. In order to add 88,000 MW of power generation capacity in the twelfth

five-year plan (2012-17), India needs to add at least 250-400 GW of new power generation capacity by 2030. The Power Grid Corporation of India has planned to invest \$26 billion (USD) in the next five years. The third dimension is the smart meter. India plans to install 130 million smart meters by 2021.

#### *Smart Transportation*

Smart transportation includes green transport along with the Metro, high-speed railway and monorail. The Government of India has approved a \$4.13 billion plan to spur electric and hybrid vehicle production by setting an ambitious target of 6 million vehicles by 2020. With this plan, it expects to enable the installation of electric vehicle charging stations in all urban areas and in all states and national highways by 2027.

#### *Smart Buildings*

India is expected to emerge as the world's 3rd largest construction market by 2020, by building 11.5 million new homes every year.

The Intelligent Building Management Systems market is worth around \$621 million and is expected to reach \$1,891 million by 2016. Smart Buildings will save up to 30% of water usage and 40% of energy usage, as well as reduce building maintenance costs by 10 to 30%. Accordingly, smart grid projects and/or the utilisation of decentralised energy sources such as rooftop solar energy would be spotlighted along with the increasing demand for energy storage required to stabilize these systems. Here, the concept of EVs used as vehicles-to-grid and vehicles-to-home might find proper room for application. The Government of India has allocated INR70.6 billion (\$1.2 billion) for Smart Cities in the budget for 2014 - 15.

The following figure (Figure 3) shows the first 20 smart cities published by the government.

Figure 3 - First 20 smart cities announced by the government in January 2016



SOURCE: Khanna, Najib, & Varma (2016)

The business case of this research can be considered as one of the smart mobility initiatives that takes advantage of ICT.

#### *IV) Diffusion of EVs and potential drivers of EV market growth in India*

This section reviews the recent EV market development in India. EVs consist of two-wheelers (i.e., scooters and motorcycle), three-wheelers and four-wheelers (e.g., cars, light commercial vehicles, buses). The significance of the deployment of two-wheeler EVs and three-wheeler EVs is much larger than that of four-wheeler EVs in the Indian context.

##### *1) Diffusion of EVs in India*

###### ■ *Slowly growing four wheelers' market*

The electric four-wheelers market in India is marginal compared to that of the U.S., Japan and China, who are the three leading EV markets in the world.

Table 1 - Number of EV stock in the world

No.	Country	No. of EV stock
1	U.S.	275,104
2	Japan	108,248
3	China	83,198
4	Netherlands	43,762
5	Norway	40,887
6	France	30,912
7	Germany	24,419
8	U.K.	21,425
9	Canada	10,778
10	Italy	7,583
11	Sweden	6,990
12	Spain	3,536
13	Denmark	2,799
<b>14</b>	<b>India</b>	<b>2,689</b>
15	Portugal	743
16	South Africa	48

Source: Global EV Outlook, EVI / IEA, (2015)

As of January 2016, the Electric Vehicle Initiative (EVI)<sup>5</sup> had 17 participant countries; as shown above (Table 1) India remains 14th in the EV stock ranking. Note that this data does not include two-wheelers nor three-wheelers.

#### *Market potential vs. its reality*

The EV's market potential and its reality in India are explained as follows by Plugincars (2013):

On paper, India has many of the characteristics that would indicate a market where electric vehicles should thrive. (...) Reality, however, is falling far short of the potential, as fewer light duty plug-in electric vehicles (PEVs) will be sold in 2013 in all of India (less than 2,000) than in the state of Oregon.

Until the year 2012, Reva sold 4,500 EVs, out of which 2,300 were sold in India (1,100 in Bangalore alone, 250 in Delhi)<sup>6</sup> and another 1,200 in the U.K. Mahindra Reva has sold an

<sup>5</sup> A worldwide multi-government policy forum that is dedicated to accelerating the introduction and adoption of electric vehicles. The participant countries consist of Canada, China, Denmark, France, Germany, India, Italy, Japan, Korea, Norway, South Africa, Spain, Sweden, United Kingdom, United States, Netherlands and Portugal. Electric Vehicle Initiative (EVI) is a multi-government policy forum dedicated to accelerating the introduction and adoption of electric vehicles worldwide. In 2010, EVI was one of several initiatives launched under the Clean Energy Ministerial (CEM), a high-level dialogue among Energy Ministers from the world's major economies. EVI members include Canada, China, Denmark, France, Germany, India, Italy, Japan, Korea, the Netherlands, Norway, Portugal, South Africa, Spain, Sweden, the United Kingdom and the United States. The International Energy Agency facilitates and co-ordinates the collection, analysis and dissemination of EVI data. (Source: IEA) <http://www.iea.org/topics/transport/subtopics/electricvehiclesinitiative/>

<sup>6</sup> Presentation of Mr. Anupam (Anupam, 2012) at a sustainable development meeting in 2012, United Nations – Last accessed on 9<sup>th</sup> Jan. 2016 Accessible on the following URL. <https://sustainabledevelopment.un.org/index.php?page=view&nr=425&type=12&menu=1549>



## CHAPTER 1 - Local context: electric vehicles and mobility services, in India

additional 1,700 EVs within 3 years, reaching 4,000 EVs sold in India up to July 2015. Furthermore, it is currently selling 50-100 units per month (ENS Economic Bureau, 2015). This shows that a second level has been reached in sales, but no further acceleration is yet noticeable, raising the question of whether the vehicle has met a plateau.

However, two points should be noticed: from a general point of view, the first is the concentration of sales, which allows hope for local ecosystems of use to emerge and for early adopters to disseminate. The second is more limited to Reva: some interviews have mentioned recent technological choices in batteries that have altered the cost and made it de facto move from a car targeting a low-cost market towards a car marketed to a niche, urban “second car”, audience. Reva, though a pioneer, cannot thus be used to conclude about a plateau in the four-wheelers market.

### *Significance of two-wheelers market*

According to Sustainability Outlook (2013), 130 thousand hybrid and electric vehicles were sold in 2012. This number is much larger than the sales of 4-wheel EVs, indicating that in India the non-4-wheel EV market is larger than 4-wheel EV market.

For two-wheelers, the market is much larger than that of four-wheelers. One of the reasons would be the large population of youths who need mobility for daily use and don't have the capacity or incentive to buy four-wheeler vehicles suitable for family or business use. This is not to be neglected as an indicator for a future two-wheeler market as an intra-electric mobility upgrade can happen from two-wheelers to four-wheelers as income rises and as people have been used to an electric range of mobility.

As pointed out by cKinetics, if considering only two-wheelers and four-wheelers, the EV market in India seems dominated by two-wheelers accounting for 97-98% of the market with electric bikes, scooters and motorbikes (Sustainability Outlook, 2013).

NITI Aayog:

According to market estimates, in financial year 2018 electric two-wheeler sales almost doubled to 54,800 compared to the previous financial year. Electric two-wheelers have been leading the EV market; estimates suggest they account for 98% of the country's EV sales.

Companies are designing and testing products suitable for the Indian market with a key focus on electric two-wheelers and three-wheelers.

### *Three-wheelers use in Delhi*

Currently, more than 22,000 licensed e-rickshaws run on the roads of Delhi (Express News Service, 2015). The number may even reach 100,000 if the unlicensed e-rickshaws are included<sup>7</sup>.

In 2015, the Delhi government validated the amendment for e-rickshaws which had been illegal until then. The use of three-wheeler EVs (e-rickshaw) was already common, notably in Delhi, in India. The reason for this popularity should be examined, but Delhi was already a city where many cycle rickshaws ran, which was until lately not the case in other cities, for example in Bangalore. The size of the city or the travel distance of a ride might be relevant elements to understand the use of these vehicles as well. Delhi should be a case of further study as it has recently engaged in alternate circulation for petrol engines and has shown a consistent engagement in alternative mobility.

### ■ *Estimated growth of four-wheeler EV market in India*

#### *A future four-wheelers market driven by the infrastructure development of two-wheelers and three-wheelers?*

Though the number of total sales of the four-wheeler EV is not remarkable in comparison to that of global sales or that of the domestic two-wheeler and three-wheeler sales, steady growth of the market is observed so far. Sohinder Gill, director of Society of Manufacturers of Electric Vehicles (SMEV), announced that from a level of "7,000-8,000" units during April - December 2014, India has seen sales of 21,000 EVs (including hybrid and plug-in hybrid EVs) during the April-December period in 2015. The figure for hybrids during April-December 2015 stands at 18,000 units (Barooah, 2016). Gartner (2013) estimates that the annual sales of EVs (including battery EVs, hybrid EVs and plug-in hybrid EVs) has grown to approximately 22,000 units.

#### *Analysis on the diffusion of EVs in India*

Considering the above-mentioned facts, the two and three-wheeler market would not be ignorable and the industrial ecosystem such as charging infrastructures and other services for those vehicles may develop first in India. Four-wheeler OEMs may consider developing vehicles that can utilize those infrastructures deployed for two-wheeler/three-wheeler vehicles. Conversely, consumers' mind-set may be affected by the use of two-wheeler and three-wheeler EVs. The reputation of two-wheeler and three-wheeler EVs may impact the reputation of general EVs, including four-wheeler vehicles. It is thus important to analyse

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<sup>7</sup> Promoting low carbon transport in India - Electric Vehicle Scenarios and a Roadmap for India, UNEP – UNEP DTU Partnership – Indian Institute of Management Ahmedabad – Centre for Urban Equity, 2014

## CHAPTER 1 - Local context: electric vehicles and mobility services, in India

policy and regulation, as well as case studies of services concerning four-wheelers, which project a positive quality image. These would in turn allow an actual leverage on the infrastructure for a real four-wheeler market.

### ■ *Key elements to be considered for the development of EV market*

#### *Technology and infrastructure:*

These are some of the crucial facts to be taken into consideration:

- The two-wheeler market may first grow. Then, charging infrastructure for those motorbikes will be deployed accordingly.
- Public bus projects might be deployed with a strong governmental lead.
- These projects may bring down the price of batteries in the market as it increases the e-bus production.
- Discontinuous electricity supply will then decrease for domestic users in smart cities.
- Service models
- “(...) see other niche alternative-fuel based cars such as electric. But the issue isn't just auto manufacturers investing in this market – where do people with electric cars recharge their batteries in countries where power shortages are so prevalent?” (Michael Boneham, Ford India as in Becker & Nagporewalla, 2010).
- Low-cost BEV would be the main market volume (Dudenhöffer, Arora, Diverrez, Jochem, & Tücking, 2014) if not buses and vans that focus on public transport.

As a result, strong growth is expected for two and three-wheeler markets, and energy infrastructure is expected to flourish for those vehicles. The role of start-ups and proper business models in both manufacturing EVs and charging infrastructure deployment should be highlighted.

#### *EV policy and regulation*

The government of India shows a positive attitude towards the diffusion of EVs. Since 2010 the government has unveiled several policies in consequence. This chapter explains the recent development of governmental policies on EVs and the goals of the most recent policy: Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicle (FAME India)(Government of India et al., 2015). This will be further detailed in the chapter on Innovation Ecosystems.

## 2) Potential drivers of EV market in India

By reviewing current trends in EV use in India, four potential drivers for the diffusion of EVs use can be identified: four-wheeler EV services (a), use of light two and three-wheelers (b), OEMs putting more EV models available on the market (c) and Smart City & smart grid projects (d).

### a) Bottom-up four-wheeler EV service

A potential driver supposes that four-wheeler EV diffusion can be driven by the expansion of EV based services. In Bangalore, there exists a transport service provider using EVs as taxis that operates 125 EVs to offer an employee transport (corporate commute) service to five client companies. This company may expand its service in other Indian cities (*geographical expansion*) or it may expand its service to other domains such as airport taxi services or goods delivery services (*service diversification*). Other companies or start-up companies may also start providing similar types of service (*new entrants*). Apart from that, Ola is starting to deploy EVs in its fleets. Ola is an Indian company that operates a mobile-based trip request application like Uber. It will deploy a few thousand EVs in 2017 in several cities and plans to increase the number to 1 million.

How does the demand for a new product (EVs) and the supply of this product co-evolve at the early stage of its diffusion? This question sheds light on the co-evolution of supply and demand of an emerging product (c.f., Dijk & Yarime, 2010).

### b) Bottom-up light two and three-wheelers

This idea supposes that four-wheeler EV diffusion can be driven by the expansion of two and three-wheeler EV uses. In India, there exist two and three-wheeler EV markets. For example, in Delhi, more than 22,000 electric three-wheelers were licenced by the year 2015. Another example is GoGreenBOV, an electric scooter company in Bangalore, which has sold up to 12,000 units of e-scooters since 2011. Here, the diffusion of two and three-wheeler EVs may trigger the charging infrastructure deployment or another service development such as battery maintenance (infrastructure improvement). On the other hand, the customer base of two-wheeler (or three-wheeler) EVs may consider four-wheeler EVs as their next vehicle (market shift). Most recently, Ather, an e-scooter start-up in Bangalore, has been planning to launch an e-scooter in 2017 and it is trying to deploy charging infrastructure in Bangalore and other cities. It targets relatively high-income users by embedding an ICT-based application in its product. On the other hand, GoGreenBOV, an e-scooter company in Bangalore, sells its

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products targeting relatively lower-income group customers. It develops products that have enough battery capacity that its users only need to charge the scooter in their house. In Delhi, Krishna e-rickshaw, a three-wheeler EV company, offers three-wheeler EVs for commercial use, including human transport and goods delivery. At the same time, ZBee and Smart-E operate three-wheeler EVs to provide taxi services for shopping mall users and metro station users. Local street e-rickshaw taxis are also being diffused under certain conditions, including the size of the city, specific demands of the area, and new town development.

- What are the characteristics of consumers that value EVs?
- What are the different characteristics of EVs for high-end users, low-end users and commercial users?

Seeking answers to these questions may lead to find links among users, products, services, infrastructures, and policy and regulations, the five elements of the Electric Mobility System.

### *c) Bottom-up OEMs supply push*

This idea supposes that four-wheeler EV diffusion can be driven by an increasing supply of EVs from car manufacturers. In India by September 2016, only two models of four-wheeler EVs were available: Mahindra-Reva's e2o and eVerito. Mahindra-Reva may find new customer groups that fit its products, such as new start-up companies similar to Lithium Urban Technologies (new target user discovery). At the same time, other companies (e.g., Renault India and TATA motors) may launch a new model of EVs that targets different types of consumers or that provides different benefits (new manufacturer market entry). Not only existing ICE vehicle manufactures such as Renault India and Tata motors may appear to exploit EV market opportunities, but also new venturing companies.

### *d) Smart city and smart grid projects*

This idea supposes that four-wheeler EV diffusion can be driven by governmental top-down projects. For example, the Government of India launched the "100 smart cities mission". Under this mission, the government defines "assured electricity supply" and "efficient urban mobility and public transport" as core infrastructural elements. Government-driven projects (e.g., public electric bus network and electric car sharing) may be planned to deploy EVs in smart cities (top-down project-driven). Infrastructure improvement of electricity supply and urban mobility (e.g., smart grid and parking space with EV charging stations) may provoke the use of EVs in smart cities (top-down infrastructure-driven).

## Recapitulation – Key takeaways

The first chapter briefly reviews the local context. The chapter briefly presents the interest of focusing the social implementation of EVs in cities in India. The diffusion of EVs is a national government-level concern while it attracts a strong business interest of private companies as well. Since it requires an appropriate deployment of infrastructure such as charging stations and an electricity supply network, urban planning and city development also come into the picture as important elements for the diffusion of the product (EVs).

The chapter then presents the case company and its primitive vision as expressed by the managers at the initiation stage of the research (late 2015). The question expressed by the managers was “how can the company remain a pioneering company in a dynamically changing business environment”, and the research took this question as a starting point of literature exploration and data collection.

After presenting the focal company, the chapter briefly summarizes the recent development of electricity supply, transport and mobility, and a national smart city policy so as to give contextual knowledge to better understand the signification of the mobility service development of the case company. The demand on the electricity supply is increasing and the generation of electricity does not catch up with the growing demand. Regarding transport and mobility, public transport systems such as metro lines and bus rapid transit are newly developed or under development. Also, the diffusion of smartphones induces the emergence of new mobility (and mobility-related) services based on mobile applications.

The chapter, at last, presents the information on the diffusion of EVs and potential drivers of the EV market in India as of 2016 so as to give some insights on the prospective of EV market development at the time when the company began providing the service to the first clients.

- The deployment of EVs is a national-level concern.
- The case company is a start-up company that provides a mobility service in Indian cities.
- Different industries – electricity supply, transport and mobility, smart city – are relevant to the diffusion of the EVs and e-mobility services.



## *CHAPTER 2: LITERATURE REVIEW*

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The second chapter is a literature review. Three categories of literature are explored in order to look for existing knowledge on the theme presented in the introduction.

The first category is *business models*. The key term of “business model” had been repeatedly mentioned during a series of discussions with an OEM and a mobility service provider while the author was preparing the research. The author took business models as an initial departure point of the literature review. A Business Model (BM), according to Amit & Zott (2001), “depicts the design of transaction content, structure, and governance so as to create value through the exploitation of business opportunities” while the definition of the concept has not yet obtained a common accord among scholars (Björkdahl & Holmén, 2013; Foss & Saebi, 2017; Rasmussen, 2015). The author identifies four major components of BMs as suggested by scholars: value propositions, value networks, cost and revenue structures and leadership.

Business Model Innovation (BMI) is defined by Björkdahl & Holmén (2013) as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace (p. 215).”

Recent focus in business model literature lies on how to successfully execute a BMI so as to establish a competitive advantage (Verma & Bashir, 2017). To understand the sources of competitive advantage, Porter’s five competitive forces, Berny’s Resource-Based View and First-Mover’s Advantage are reviewed. To promote BMC, Teece suggests Dynamic Capabilities as critical organizational capabilities. At the end, the concept of the pre-stage of BMC is introduced. The pre-stage of BMC is suggested by Cavalcante (2014) as the phase when the technology required to execute a BMC is not yet available. This phase before a BMC is characterised by experimentation and learnings, according to Cavalcante (2014)

The second category is *business ecosystems* and *innovation ecosystems*. An “ecosystem” is a term that is increasingly cited. Jacobides, Cennamo, and Gawer (2018b) suggest three taxonomies of ecosystems: business ecosystems, innovation ecosystems and platform ecosystems. Business ecosystems can be considered as an expanded concept of the value network of a BM (Chesbrough, 2007). The difference between business ecosystems and innovation ecosystems is explained in this chapter: an innovation ecosystem is a value

proposition (product/service) centric while a business ecosystem is an enterprise centric. By using the concepts of business ecosystems and innovation ecosystems, the business environment of the focal enterprise will be better described<sup>8</sup>. In relation to these ecosystems, a conceptual framework to better understand uncertainty is introduced (Courtney, Kirkland, & Viguerie, 1997).

The third category is organizational change management. When a company aims at developing (or maintaining) a competitive advantage, the company needs to change organizationally since the business environment changes with dynamics. In order to achieve a business model innovation as well, the organizational change aspect is said to be an important subject though it is almost completely neglected (c.f., Rasmussen, 2015). Some perspectives on organizational change readiness are also explained here.

Three above-mentioned subjects (business models, ecosystems and organizational change) are reviewed in this chapter. Through this literature review, the connections among BM, BMI, business ecosystems, innovation ecosystems, and organizational change management are clarified, and several critical research gaps are identified.

■ *Attitude of the author towards literature review (Methodology of literature review)*

The ultimate goal of a literature review is to identify a potential original idea in the research, at the frontier between knowledge and ignorance (Dumez, 2016, p. 47). Dumez lists the sources of research originality and the objectives of a literature review as following.

Potential sources of originality
<p>Potential sources of originality</p> <ul style="list-style-type: none"> <li>- Conducting a new empirical investigation.</li> <li>- Interpreting in new ways already known ideas, practices, or approaches.</li> <li>- Providing new evidence for old issues or problems.</li> <li>- Making an original synthesis of what has already been done.</li> <li>- Applying and finding obtained in a particular context to another context.</li> </ul>

<sup>8</sup> The business ecosystem of the focal company and relevant innovation ecosystems have several characteristics. Most prominently, the development of those ecosystems is at the early stage of its development.

Other specificities of the ecosystems are:

- The development of the Innovation Ecosystem of EVs is uncertain,
- Borders among different Innovation Ecosystems are being blurred,
- Due to those two factors, business development strategy is quite “all-around”.

Because of those reasons, clarifying potential competitors or applying positioning strategy are nearly impossible. Since the development of Innovation Ecosystem of the focal business is at the early stage, there is no competitor in the business environment. Therefore, it is difficult to apply existing business analytical frameworks such as market positioning.

## CHAPTER 2 - Literature review

- Applying a technique used in a discipline or a field to another.
- Adopting a transdisciplinary approach that combines various methodologies.
- Exploring a new area, not yet covered by one's discipline.
- Increasing knowledge in a way that had not been used hitherto.

### Objectives of a literature review

- To identify the boundary between what has already been done and what needs to be studied.
- To discover important variables related to the topic.
- To do a survey, summarize and develop a fresh perspective.
- To identify relationships between ideas and practices.
- To specify the context of the issue to be investigated.
- To clarify the significance of the issue.
- To acquire the vocabulary and concepts related to the issue
- To understand the structure of the topic.
- To link ideas and theoretical frameworks on the one hand, and on the other their applications.
- To identify methods and research techniques that have been used to treat the issue.
- To put the issue in a historical perspective so as to show that we have grasped both its history and the latest state of its development.

Source: Dumez (2016, p.47)

The objectives of the literature review in this chapter are (primarily, but not only):

- To identify the boundary between what has already been done and what needs to be studied,
- To discover important variables related to the topic,
- To acquire the vocabulary and concepts related to the issue,
- To understand the structure of the topic.

### ■ *Identification of literature streams*

To initiate the research and the literature review, the following two facts drive the author to start with the exploration of business model literature.

- 1) Two enterprises with which the author interacted at the initiation phase of the research were using the key term "business model".

- 2) The potential case companies for the observation are newly established start-up companies. New business creations were expected to be observed during the research period through these potential case companies. As it will be explained below, business creation and business models are interlineally discussed.

#### *External factor*

Along with business model literature, ecosystem literature is also explored. This is to increase the accuracy of the research focus and to set an appropriate research perspective. To better obtain insights on the potential diffusion of a product and the potential development of infrastructure and services, different parameters such as governmental policy, regulations, current level of required infrastructures and current level of related services must be understood. Thus, exploring the ecosystem of electric mobility (= Electric Mobility System) will allow us to better characterize the current context of the research and the case.

#### *Internal factor*

Organizational design and dynamic capabilities are evoked in literature identified at the later stage of the research. These will help understand business model innovation from an organisational point of view.

### *1) Literature review 1: Business model and business model innovation*

This section reviews literature on business models. Business Models (BM) and Business Model Innovation (BMI) are better understood by deciphering the history and the concept's connections to other academic domains. Following this study, a definition of BMI that reflects current discussions in literature is presented.

These days, the business model is considered as an important tool (or concept) for the success of new emerging businesses. Though the concept originated from ICT-related business development, discussing it within other industrial domains under development is also important to verify its applicability.

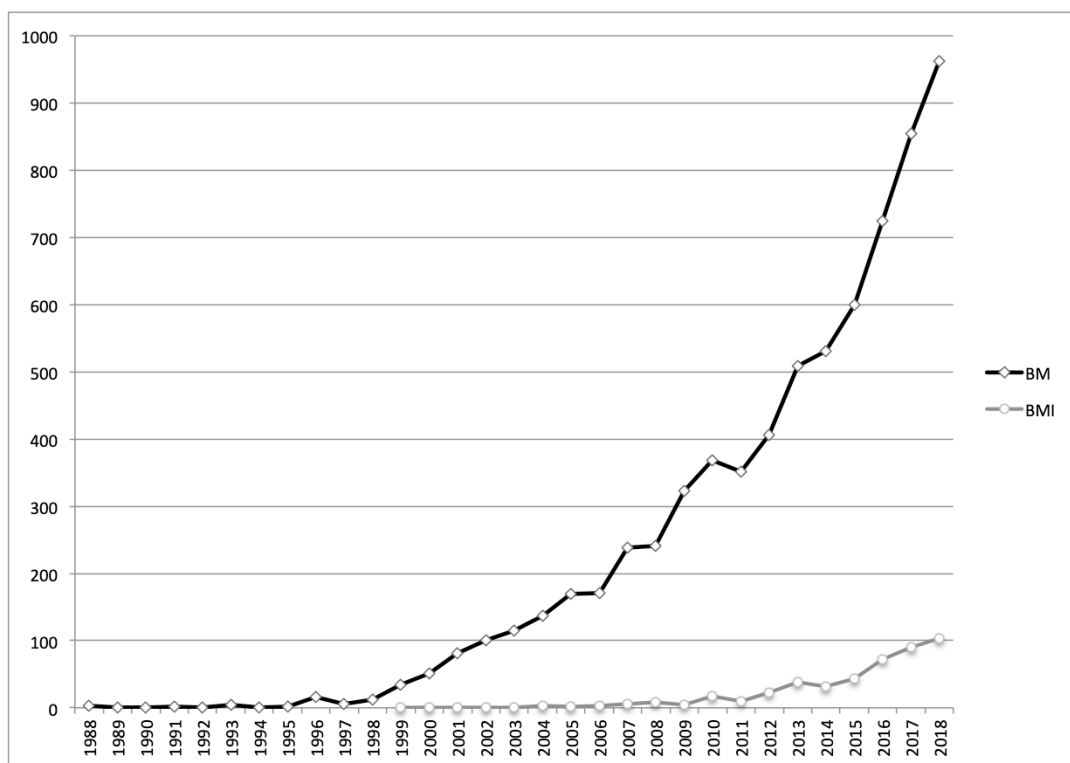
This section firstly (CHAPTER 2 - I)1)) reviews the emergence of the concept and historical development of the concept. BM research emerged in the 2000s and BMI research in the 2010s. Secondly (CHAPTER 2 - I)2)), theoretical connections to other academic domains are demonstrated. The concept of the business model has developed along with strategy, organization theory and technology management, as well as newly emerged disciplines such as innovation management study and entrepreneurship study. Thirdly (CHAPTER 2 - I)3)) this section discusses the definition of these concepts. This research **defines BMI independently**

from **BM**. In other words, this research does not define the business model inductively but rather deductively from the definition of BMI. BMI in this section is defined based on the most genuine definition of **innovation** and **competitive advantage**: a definition based on the business performance – the one of finance and competitiveness - of an organization (p. 78). BMI is defined using a method of elimination. Finally (CHAPTER 2 - I)4)), research gaps are presented.

### 1) Emergence of the concept

This sub-section demonstrates the emergence and growth of academic research on BMs and BMI. “BM” was one of the buzzwords during the Internet boom of 1990s (Magretta, 2002). It was also the case for “strategy” in the late 1970s: strategy was a business buzzword that at once replaced the status of business planning (Gluck et al., 1980). How far has the BM concept then been elaborated a quarter of a century after its emergence?

Figure 4 - Evolution of Business model literatures



Source: Scopus by Elsevier. 1988-2018. Search result of "Business model" and "Business model innovation" in the field of "Business, Management and Accounting" or "Economics, Econometrics and Finance" or "Social Sciences". The result excludes subject areas such as Engineering (2,768 hits), Computer Science (2,506 hits), Environmental Science (1,145 hits), Energy (950 hits) and Decision Sciences (893 hits).

The result as in April 2019.

The BM concept started getting its popularity in the 1990s due to the dot-com business boom that first triggered the interest on the "e-business model" (Cavalcante, Kesting, & Ulhøi, 2011). This evoked a series of discussion on how to develop profitable businesses based on the Internet or on e-markets (e.g., Chen & Ching, 2002; Dubosson-torbay, Osterwalder, & Pigneur, 2002; Gordijn & Akkermans, 2001). The number of publications started increasing after 1995.

The discussion on business models and the e-market are intricate, and in the 2000s this stream reached the "business model study on e-market" (e.g., Mahadevan, 2000; Petrovic, Kittl, & Teksten, 2001), that considers the business model as an independent concept.

Another movement that stimulates scholars' interest on the business model is social business. Social business does not seek only to maximize its profit but also deals with positive social impacts that the business activity brings. For that, social enterprises mix different financial schemes to achieve social goals and profitability (Thompson & MacMillan, 2010): they are hybrid organizations that combine two different logics in one business activity (Battilana & Dorado, 2010). Questioning "how to achieve the social mission while ensuring the sustainable development of its business" leads scholars to discuss business models. Subsequently, the term "business model" has been broadened and discussed in relation to various business sectors (Cavalcante et al., 2011) such as mobile phone-based services (Camponovo & Pigneur, 2003; Macinnes, Moneta, Caraballo, & Sarni, 2002), commercialization of research by entrepreneurial universities (Mets, 2009), electric vehicle ventures (Bohnsack, Pinkse, & Kolk, 2014) and BMI in the healthcare sector (Hwang & Christensen, 2008). These papers discuss how to construct a profitable business to achieve specific goals, such as the monetization of new technologies and the achievement of social upliftment.

#### *Different streams and characteristics of their development*

While the BM concept keeps attracting many strategic scholars, the shape of the concept keeps evolving as it is discussed from different academic perspectives, not only from a strategic point of view. This part identifies and examines different streams of literature so as to understand the theoretical roots of the BM concept. This part aims at identifying different literature streams so as to understand the different points of view of scholars. In order to

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clarify the differences and interrelations of different academic domains, this article then presents an essential question that each academic domain approaches.

Over the years, the business model has been discussed under different academic contexts. For example, Morris, Schindehutte, & Allen (2005) point out that the concept is rooted in several important strategic concepts:

value chain (Porter, 1985), value systems and strategic positioning (Porter, 1996), resource-based theory (Barney et al., 2001), strategic network theory (Jarillo, 1995), cooperative strategies (Dyer and Singh, 1998), firm boundaries (Barney, 1999), and transaction cost economics (Williamson, 1981). (p. 728)

By searching for past literature on Ebsco, BiblioSHS and Google scholar with the query “business model”, three comprehensive literature reviews on business model are identified: Pateli & Giaglis (2004), Wirtz et al. (2015), Zott et al. (2011). Each article classifies business model literature into several streams. This article starts the discussion based on those three literature reviews.

As one of the earliest comprehensive literature reviews on business model, Pateli & Giaglis (2004) identify 29 articles on business models from four literature streams: 1) eBusiness, 2) strategy, 3) information systems and 4) other (e.g., management and economics). The paper was published by the European Journal of Information Systems in 2004. Both terms of “eBusiness model” and “business model” appear in the paper, while the main focus lies on the latter concept. The paper can be considered as a literature review in the transition period from the e-business model concept to the business model concept, which is a more general concept. It is one of the earliest literature reviews on business models.

Seven years later, Zott et al. (2011) examined 103 papers on business models and identified three distinct literature streams: 1) e-business and the use of information technology in organizations; 2) strategic issues (e.g., value creation and competitive advantage); and 3) innovation and technology management.

Four years after that, Wirtz et al. (2015) identified 681 peer-reviewed articles on business models and classified them into three streams: 1) strategy-oriented, 2) technology-oriented and 3) organization theory-oriented. This categorization of literature allows a detachment from the periodical phenomena (= context) - ICT boom - from the business model study by

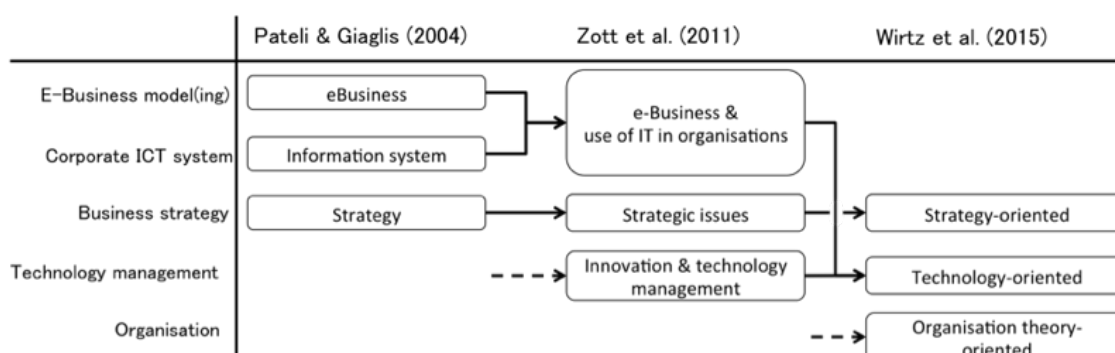
considering it as one of the technology management issues. This article stands upon the most recent perspective of Wirtz et al. (2015).

Table 2 Three identified comprehensive literature reviews on Business model

	Pateli & Giaglis	Zott et al.	Wirtz et al.
Year	2004	2011	2015
# of papers	29	103	681
Stream 1	eBusiness	e-Business and use of IT in organizations	Strategy-oriented
Stream 2	Information system	Strategic issues	Technology-oriented
Stream 3	Strategy	Innovation & technology management	Organization theory-oriented

As research on business models develops, new streams of literature are formed. For example, in addition to the literature categories of Pateli & Giaglis (2004), innovation and technology management appears as a distinct stream in Zott et al. (2011). On the other hand, two literature streams mentioned by Pateli & Giaglis (2004), eBusiness and information systems, are combined and considered as a single stream in Zott et al. (2011): e-business and the use of information technology in organizations. The categorisation of Wirtz et al. (2015) differs from the previous two papers. Wirtz et al. (2015) combine two streams mentioned by Zott et al. (2011): e-business & use of IT in organisations and innovation & technology management

Figure 5 - Evolution of Business model literatures



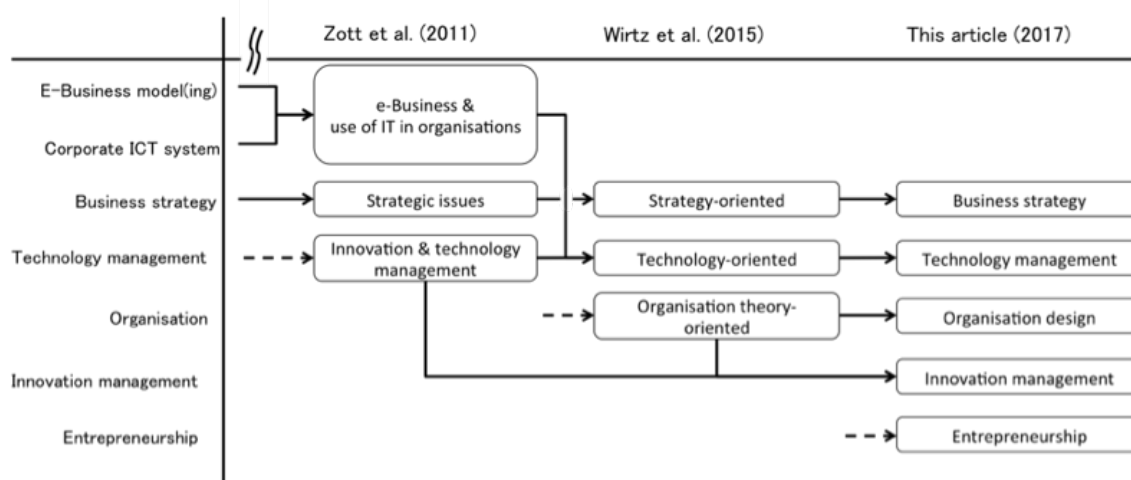


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become part of the technology-oriented category, and the organisation theory-oriented stream is suggested as a new category.

In addition to those categories by Wirtz et al. (2015), BMI should be considered as a distinct academic literature stream. The category of Zott & Amit (2010) considers innovation management as a stream including BMI. They suggest that the articles of BMI consider the change of business model as a source of innovation, along with innovation in products and services, production, distribution or marketing methods, and market (e.g., Zott & Amit, 2010). The importance of changing business models has already been pointed out in 2000 by Linder & Cantrell (2000) and Yogesh (2000). They emphasized the constant pressure from the

Figure 6 - Recent evolution of Business model literatures



business environment of the firms concerning issues such as innovations in technology, changes in the law, competitive moves, or shifts in consumer tastes that potentially diminish the profitability. These elements make firms think about their change model: the core logic for how a firm will change over time to remain profitable in a dynamic environment. To clearly highlight this change perspective, this article suggests instituting innovation management as a distinctive stream of business model study. This innovation management aspect of BMs is the very focus of this research. This is relatively recently emerged focus.

The innovation of BMs is a new source of innovation that “complements the traditional subjects of process, product, and organizational innovation” (Zott et al., 2011). While “it is rapidly growing, suggesting that BMI is an important phenomenon that needs to be conceptualized and theorized on its own” (Foss & Saebi, 2017), it is less well understood in comparison to BMs (Foss & Saebi, 2017).

In addition to the innovation management aspect, relevant discussions are being evoked amidst entrepreneurship studies (e.g., George & Bock, 2011; Morris et al., 2005).

It should be mentioned that those streams of business model literature are not exclusive but are interrelated. Table 1 shows some example articles that discuss business models from different perspectives from those of the above-mentioned literature streams: business strategy, technology management, organisation theory, BMI and entrepreneurship.

Table 3 Articles that discuss business model from two academic backgrounds

<b>Domain 1</b>	<b>Domain 2</b>	<b>Example of articles</b>
Strategy	Entrepreneurship	<i>Morris, Schindehutte &amp; Allen (2005)</i>
Strategy	Organization	<i>Osterwalder et al. (2005) (c.f. The Business Triangle in page 14)</i>
Organization	Technology management	<i>Chesbrough (2010)</i>
Organization	Entrepreneurship	<i>George &amp; Bock (2011)</i>
Entrepreneurship	Business Model Innovation	<i>Trimi &amp; Berbegal-Mirabent (2012)</i>

Articles on business model consist of those based on case studies, quantitative survey, literature reviews and/or authors' own experience. The definitions of business model vary from defining with its functions, its components and questions addressed.

## 2) *BMs and other academic disciplines*

This subsection explains the relationship between BMs and different academic disciplines: business strategy, technology management, organizational theory, innovation management and entrepreneurship.

### *a) Business models and business strategy*

Strategy is one of the literature streams of business models, and it was already recognized in 2004 (Pateli & Giaglis, 2004). Why do business models get the interest of strategists? What is the link between strategy and business model? The competitive advantage of a firm and its differentiated value creation are two key concepts in concern here. This part links business models and the essential questions addressed by strategic management.

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### *b) Strategic management: How to enhance a firm's performance?*

First of all, what is strategic management? Strategic management “deals with the major intended and emergent initiatives taken by general managers on behalf of owners, involving utilization of resources, to enhance the **performance of firms** in their external environments (Nag et al., 2007).” Therefore, understanding the contingent effects of strategy on **firm performance** is a central objective of strategic management research (Amit & Zott, 2008).

Strategy can then theoretically be classified into three categories based on its objectives: 1) corporate strategy, 2) business(-unit) strategy and 3) functional strategy (Hax, 1990). **Corporate strategy** is a concern of top managers about portfolios of businesses, tactics for diversification and growth, and corporate resources and capabilities to be managed (Steyn, 2004). Corporate strategy focuses on macro environment (e.g., economic factor and technological component) considering shareholders as the primary stakeholders (Steyn, 2004). **Business-unit strategy** or **business strategy** deals with a single product/service or a group of related products and how to make the product and service competitive in its market/product/industry segment (Steyn, 2004). At this level, strategies are often marketing-oriented, and the primary stakeholders are customers and other stakeholders in the value chain such as suppliers, distributors, regulators and employees (Steyn, 2004). For single business organizations, corporate and business level strategies become synonymous (Gunnigle & Moore, 1994). **Functional strategy** contains different functional areas such as marketing, production, operations, finance, human resources, customer communication and R&D (Steyn, 2004, Gunnigle & Moore, 1994, Berry & Taggart, 1998). Under this classification, the business model concerns principally **business-unit strategy**.

### *c) Competitive advantage*

As one of the determinants of a **firm's performance**, business strategists focus on the **competitive advantage** of a firm's business against its opponents.

Strategists have two important issues: what can a firm's competitive advantage be, and how can the firm sustain its competitive advantage?

### *d) Market positioning*

Michael Porter (1985) identifies three types of competitive strategy taken by the companies outperforming their competitors: cost leadership, differentiation and focus. A cost leadership strategy aims at offering a service or a product at the lowest possible price while a

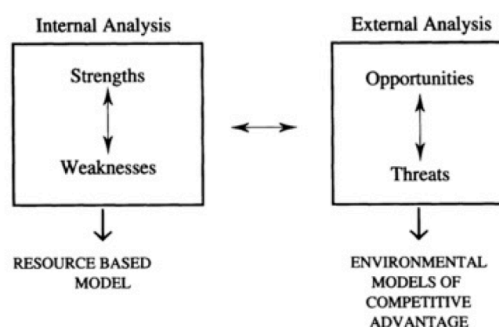
differentiation strategy aims at providing them with a specific value-added aspect that offsets the higher price. Focus strategy, which may be compatible with either a cost leadership strategy or a differentiation strategy, targets a precise market segment with an exhaustive service or product to that specific consumer group. Fundamentally, these three strategies highlight the importance of asking the following question so that a company may be highly profitable: what value should a company offer to which customer group? This is a question about market segment and differentiated value proposition.

As a decision factor of formulating a company’s strategy, Porter (1979) claims the use of understanding the company’s position within the industrial structure by analysing five basic competitive forces. This is to assess the competitive power of the focus company. The consequence of Porter’s five forces is a SWOT analysis, which examines the *Strength* of the firm to exploit the market *Opportunity* and neutralise the *Thread* while avoiding or fixing *Weaknesses* (Black & Boal, 1994: 131).

Amit & Zott (2008) suggest that “the business model is not the same as product market strategy”<sup>9</sup> as the business model “does not refer to firm positioning in product markets based on differentiation or cost leadership in certain activities.” Product-market strategy and business models are complements, and not substitutes (Zott et al., 2011).

e) *Resource-Based View (RBV)*

Barney (1991), on the other hand, sees the sources of competitive advantage in the internal resources of a firm rather than in a firm’s competitive position in relation to its external environment (market). The consequence is VRIO framework that examines whether the internal resources and capabilities are *Valuable, Rare, Imitable or Organised* (Barney, 1997).



SWOT analysis that takes RBV into consideration

*Source: Jay Barney (1991)*

<sup>9</sup> Product market strategy here suggests market positioning strategy represented by Porter’s three competitive strategies.

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Black & Boal (1994, p. 132) point out that VRIO framework ignores “how resources are nested in and configured with one another and the nature of relationship between them.” Black & Boal (1994, p. 133) aim at understanding the network of relationships among *VRIO* resources that are needed for sustainable competitive advantages.

The business model is discussed from an RBV point of view, as George & Bock (2011) state that “the RBV has permeated much of the research on business models, influencing theory building and empirical analysis”. However, George & Bock (2011) continue:

No consensus has emerged, however, on how business models interact with appropriability regimes, and much of the research on business models framed within RBV does not clarify how business models differ from product–market positioning strategy.

One of the suggestions of RBV is to “make the value creation process difficult to imitate”. This difficulty of imitation does not only concern internal resources but also external conditions like customer relationships and the supply network.

Bashir & Verma (2018):

“The sudden and instant success of Dell’s direct selling business model prompted **many companies to imitate their model**. Hewlett-Packard was the first one which tried to imitate the model, but since they already had an established distribution network and a huge network of distributors, it became impossible for the company to run two models at the same time despite their willingness to do the same. The company feared that **if they imitate the new model rather than giving good results, it might collide with the existing model.**”

*f) A business model that depicts value creation*

As described above, the choice of customer value and the choice of a market segment are two critical concerns which shape a competitive advantage. Business strategists, then, started to pay greater attention to the business model once its central focus on **value creation** became evident (Sako, 2012).

Even if it is novel, a business model itself is not sustainably competitive or difficult to imitate. Strategy analysis is thus an essential step in designing a competitively sustainable business model (Teece, 2010). Business models “don’t factor in competition, a critical dimension of performance, and dealing with that reality is strategy’s job (Magretta, 2002)”.

Strategy suggests that a selection of differentiated customer values and target market segments is critical to build competitive advantage and market positioning, and/or a difficulty to imitate internal resource can help to sustain its advantage. However, strategy studies does not clarify **how**: how to create value, a question to be addressed.

Teece (2010) explains that “a business model articulates the logic and provides data and other evidence that demonstrates **how a business creates and delivers value to customers.**” Thus, the study of business models is an important topic for strategic management research because business models affect firms’ possibilities for value creation and value capture (Amit and Zott, 2001). As such, strategists consider the business model as a verbalization of what internal/external value networks make a business unit construct to deliver what value to what target market segment so as to make money.

*g) From value chain in strategy to value network in a business model*

After exploring literature, a value network has been identified as a concept that connects two academic fields: business models and business strategy. To explain value creation, Porter (1985) introduced the concept of the **value chain**. Now business models integrate an expanded concept of it: the **value network** (Peppard & Rylander, 2006).

To summarize, business strategies (or product-market strategy, e.g., Amit & Zott (2008)) and business models complement each other in understanding/explaining strategic management at the business unit level. While business strategy puts its emphasis on market competition (especially through product-market strategy<sup>10</sup>), business models focus on value creation process: how. Business strategy explains how to develop and sustain its competitive advantage, and it implies that differentiation of customer value and choice of market segments are important. Business models explain how to create the customer value (and capture it) and implies that the construction of an (internal and external) value network is important. Business models include a value network that is an expanded concept of a value chain in strategy study.

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<sup>10</sup> Business strategy study seems to focus on product-market strategy and not other functional strategy such as human resources, finance and technology. The reason may be explained as in *contingency theory*, those operational, financial, of *human resources*, of customer communication strategies are specific to each enterprises and industry and technology management can only be applied to technology oriented companies.

This is how strategy literature interrelates to business model literature. The next part explains

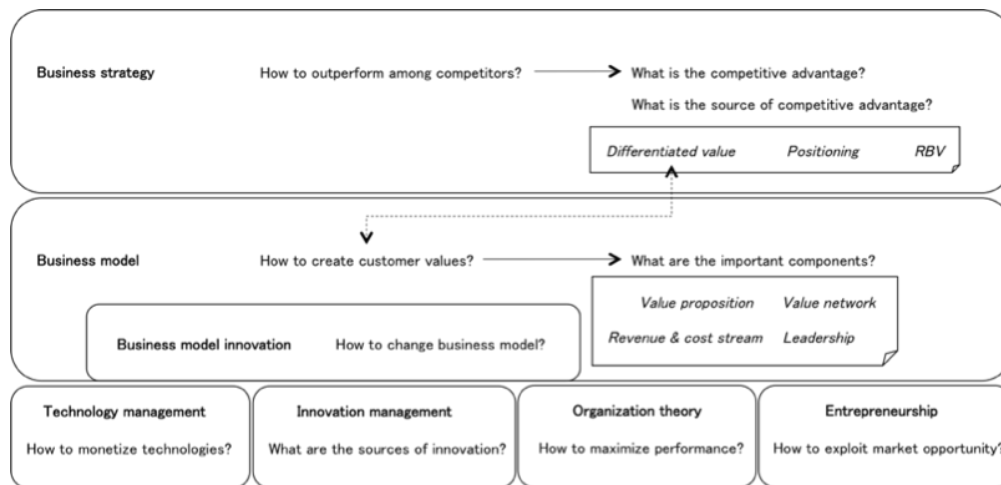


Figure 7 - Relationship of different concepts in strategic management and Business Model

the interrelationship between business models and technology management.

*h) Business models and technology management*

From a technology management perspective, the core function of business models lies in the question of how to monetize a technology. A key point is the transformation of technology, which per se doesn't have value, into valuable capital or assets that in turn yield profit.

*i) Strategic management of technology*

Technology is considered an important element for competitive advantage in 1980s (Harris, Shaw Jr., & Sommers, 1983).

According to Harris et al. (1983):

Technology is a know-how. If this know-how can be recognized as a resource and be managed. This (know-how/technology) complements business strategy, drives business strategy and can be leveraged to achieve a sustainable, competitive advantage.

However, simply adapting advanced technology to an existing product or service does not always provide a competitive advantage. "Following 'dominant logic' can lead firms to miss potentially valuable uses of technology [which] do not fit their current business model (Chesbrough, 2010)." This point is also related to the discussion on BMI.

*j) Technology into asset/resource then into economic value*

The essential question that arises is “how to transform technology into an asset then into economic value?” This perspective is coherent to one of most cited articles on business models. Chesbrough & Rosenbloom (2002) already pointed out the role of business models as:

The business model provides a coherent framework that takes technological characteristics and potentials as **inputs**, and converts them through customers and markets into **economic outputs**. The business model is thus conceived as a focusing device that mediates between technology development and economic value creation.

This also resonates with Zott, Amit & Massa (2011) saying that a business model is “a heuristic logic that connects technical potential with the realization of economic value”. Also, Doganova & Muniesa (2015) argue that:

That problem, we argue, lies in transforming a technology into an asset that has the power to generate a steady stream of future cash flows, that is, into capital.

Technology management is a study that 1) considers technology (know-how) as an asset, 2) estimates the future development of it, 3) links it to corporate/business strategy, 4) so as to create a sustainable, competitive advantage (and to develop valuable technologies). Under the context of technology management, a business model is seen as a tool to illustrate how to valorise/monetize the possessed technology and how to turn technology into an asset (e.g., patent) so as to valorise/monetize it. A business model for technology management is a plan for how to transform this asset (technology/know-how) into customer/market value so as to create economic value and how to maximize its value through the design of this business model.

This explains that in the 2000s, along with the ICT boom, business models emerged. ICT gives companies an opportunity to adapt themselves to new revenue sources via the Internet, for example.

*k) Business models and organization theory*

The organization-oriented researchers consider the business model as a tool for the abstraction of an entire company (Wirtz et al., 2015). In fact, the business model does not address one of the critical questions of organizational study: the maximization of output with



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existing resources. The business model rather addresses two specific aspects in organizational study: **organizational design** and **organizational transformation**. Al-debei (2008) defines a business model as an approach to the abstract representation of a company's structure or architecture.

The terminologies that are nowadays used to describe business models were already used back in 1988. For example, archetypes, gestalts and configuration appeared in a paper of organizational design and change, though they are not yet formulated as a concept of business model. Following is one such example.

Greenwood & Hinings (1988):

There is, however, a growing recognition of the need for a measure of synthesis and a more explicit understanding of **the dynamics of change**. Several writers have suggested design '**archetypes**' (Miles and Snow 1978) '**gestalts**' or '**configurations**' (Mintzberg 1979; Miller and Friesen 1980a) in order to produce theoretical coherence. Others have begun the search for factors explaining the '**transitions**' of **organizations and/or their 'transformation'** (Kimberley and Quinn 1984; Miller and Friesen 1981a; Pettigrew 1985). There is, in short, an emerging focus upon the incidence and nature of design types and the dynamics that control and propel movement from one design type to another.

Organizational study-oriented scholars tend to use "configuration" and "archetype" when defining business models.

### *1) Organizational design*

While claiming that organization-oriented streams play a "subordinate role" in business model study, Wirtz et al. (2015) explain that "the business model is perceived as a theoretical concept, which is defined and broken down into its components." Business models define the organizational design of an enterprise by defining the components of the business model. Literature on business model design have been developed as research on business model components advances. The most recent and comprehensive work on designing business model is a business model canvas developed by Osterwalder & Pigneur (2010).

*m) Organizational transformation*

Organizational transformation is another topic that business models cover in organizational study. This has been recognized since Linder & Cantrell (2000). This discussion is covered by BMI in innovation study. (Also refer to strategic change management.)

Business models overlap with organization theory in the abstraction of architecture and organizational design. The domain of organizational design seems to be interlinked to and discussed deeply in innovation management (shown in the following part) as organizational innovation.

*n) Business models and innovation management*

Innovation management consists in the **management of innovation processes and change management**. Innovation management includes **product innovation, business process innovation and organizational innovation**. Innovation management considers technology, products and processes as sources of innovation. Recently, business models as well have been seen as a source of innovation. BMI constitutes a major stream in business model study. It should be mentioned that the definition of innovation differs in each field of study from technology management or economics to organizational sociology (Gopalakrishnan & Damanpour, 1997), for example.

In 2000, Linder & Cantrell define the change management aspect of business models by explaining it as a change model. Kalakota, Oliva, & Donath (1999) discuss how existing businesses leap the "E-Wall," which is described as the legacies of existing business such as systems, culture, organization, partners and thinking (Kalakota et al., 1999). This was the earliest mention of Business Model Innovation. After the first half of the year 2000, more scholars discussed business models from this innovation perspective, and several books on BMI have been published, such as Malhotra (2001) and Johnson & Lafley (2010).

However, the number of papers on BMI remained limited until the late 2000s or early 2010s. Innovation study of business models was enabled after the research on the definitions and the components of business model had been elucidated. The more scholars understand what the business model really is, the clearer discussions on how to innovate it become. Lately, research by Wirtz (2015) reveals that 26% of business model study focuses on BMI. As this consists of more than one fourth of business model literature, it should be considered as a major (independent) stream. Based on the same survey of Wirtz (2015), 44% of business model papers discuss either business model change, business model evolution or BMI. The

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fact that the majority of business model research focuses on the “change” aspect of the business model is non-negligible. For example, Giesen et al. (2007) consider (in Exhibit 2 of their paper) that BMI consists of industrial model innovation, revenue model innovation and enterprise model innovation.

On the other hand, BMI shares similar features with business model design. Massa & Tucci (2013) consider BMI as a cross point of business model design and reconfiguration.

The essential difference between business model design and BMI is that **BMI** supposes an existing business while **business model design** does not necessarily suppose a currently running business: it can also be applied to start-ups. In this sense, BMI reflects on how to maximally utilize existing business assets and value networks to change a business while business model design asks how to construct the networks and assets necessary to run a business.

BMI studies constitute a critical stream amidst the entire business model study, integrating organizational change management aspect.

**Innovation management** discusses how to apply a novel idea to technology, to products or to business processes to improve business performance, and how to build an environment that facilitates creating such an idea. In this context, a business model is considered as a source of innovation and BMI is actively discussed.

### *o) Business model and entrepreneurship*

Business models are also closely related to entrepreneurship. The definition of entrepreneurship by Venkataraman (1997) is a scholarly field which consists in understanding how and by whom the opportunity to create future goods and services are discovered, evaluated, and exploited. Jones & Butler (1992) defines it as the process by which firms notice opportunities and act to creatively organize transactions between factors of production so as to create surplus value.

While an entrepreneur (entrepreneurship) is defined as an actor (or an action) to discover and exploit a market opportunity, business models can be considered a result of entrepreneurial activity or can be considered a tool that entrepreneurs utilize to exploit the identified market opportunity.

Morris et al. (2005):

The business model can serve as a focusing device for entrepreneurs and employees, especially when supported by a set of rules or guidelines that derive from decisions made at the proprietary level. Rules provide a clearer sense of the firm's value proposition and are a source of guidance regarding actions that might compromise the value equation. Additional research is needed regarding what constitutes a rule, types of rules, differences between rules and objectives, qualities of good rules, and ways in which rules become dysfunctional.

Based on the business model study, Morris et al. (2005) reveal six questions that an entrepreneur needs to answer to develop a business.

- How will the firm create value? (Factors related to the offering)
- For whom will the firm create value? (Market factors)
- What is the firm's internal source of advantage? (Internal capability factors)
- How will the firm position itself in the marketplace? (Competitive strategy factors)
- How will the firm make money? (Economic factors)
- What are the entrepreneur's time, scope and size ambitions? (personal/investor factors)

This sub-section briefly reviewed how business model literature is connected to other academic disciplines.

### ***3) Definition of a business model and its components***

As seen in previous subsections, the business model has been discussed by different academic backgrounds. Each field of study finds different roles in a business model. Strategists consider it to be an explanation of how to create and deliver value while it answers how to transform technology into an asset or an economic value from technology management perspective. Organizational study considers it as an abstraction of a company's structure or architecture. Innovation study sees it as a source of innovation equal to technology, products and business processes. Finally, entrepreneurship studies see the business model as a tool that entrepreneurs can use as a guideline to develop a business.

This subsection reviews the definition of a BM. The definition varies from one scholar to another. Teece (2010) explains that a business model articulates the ideas that demonstrate how a business creates and delivers value to customers (strategy oriented). Chesbrough & Rosenbloom (2002) list six components to define a business model: a value proposition latent in a new technology, market segments, a value chain, a cost structure and profit potential, a

value network and competitive strategy (technology management oriented). More than two decades after the emergence of the concept, the definition of the business model concept has not yet reached to a complete consensus (Morris et al., 2005; Wirtz et al., 2015; Zott et al., 2011). Linder & Cantrell (2000) point out that the business model is sometimes even used to refer to similar but different concepts such as the revenue model.

*a) Different focus and abstraction level of the definition*

These differences in the definition are rooted in the different points of view of scholars such as strategy-oriented, technology management-oriented, organization theory-oriented and entrepreneurship-oriented scholars. Another possible explanation is that the BM can be described with different abstraction levels such as mere narratives, archetypes, graphical frameworks, meta model or detailed activity systems, as is pointed out by Massa & Tucci (2013). Different abstraction and division of BM components are applied to analyse different business activities in terms of size and geographical expansion. Under such a situation, many scholars use the term either by defining it themselves, referring others' definition or simply without explaining it.

To understand the transition of the definition of the business model, different definitions of the BM are examined. Table 4 shows its definitions as extracted from academic papers that have been cited more than 2000 times<sup>11</sup>.

Table 4 Most cited articles' definition of business model

<i>Author(s) (Year) / Times cited in 2018 [in 2020]<sup>12</sup></i>	<i>Definition</i>
<i>Chesbrough &amp; Rosenbloom (2002) / 3217 [5660]</i>	<p><i>The functions of a business model are to:</i></p> <ul style="list-style-type: none"> <li>- <i>Articulate the value proposition;</i></li> <li>- <i>Identify a market segment;</i></li> <li>- <i>Define the structure of the value chain within the firm required to create and distribute the offering, and determine the complementary assets needed to support the firm's position in this chain;</i></li> <li>- <i>Estimate the cost structure and profit potential of producing the offering, given the value proposition and value chain structure chosen;</i></li> </ul>

<sup>11</sup> According to Google scholar as in 2018.

<sup>12</sup> Based on Google scholar's citation data.

	<ul style="list-style-type: none"> <li>- Describe the position of the firm within the value network linking suppliers and customers, including identification of potential complementors and competitors;</li> <li>- Formulate the competitive strategy by which the innovating firm will gain and hold advantage.</li> </ul>
<i>Timmers (1998) / 3118 [4229]</i>	<ul style="list-style-type: none"> <li>- An architecture for the product, service and information flows, including a description of the various business actors and their roles;</li> <li>- A description of the potential benefits for the various business actors;</li> <li>- A description of the sources of revenues.</li> </ul>
<i>Teece (2010) / 2766 [7409]</i>	<i>A business model defines how the enterprises create and deliver value to customers, and then convert payments received to profits.</i>
<i>Magretta (2002) / 2743 [4900]</i>	<i>Business models are <b>stories that explain how enterprises work</b>. A good business model answers Peter Drucker's age-old questions: Who is the customer? And what does the customer value?</i>
<i>Osterwalder, Pigneur &amp; Tucci (2005) / 2050 [4178]</i>	<i>A business model is a conceptual tool that contains a set of elements and their relationships and allows <b>expressing the business logic of a specific firm</b>.</i>

Those definitions of BM vary a lot especially till early 2000s when fewer papers on BM were published. Scholars had been making effort to clarify the definition and usage of the term.

Scholars define the concept in two distinct ways. One way is to define the term descriptively by explaining its general functions. The other way is by showing its components that construct the business model.

The most cited article on business models is that of Chesbrough and Rosenbloom (2002). They define the concept with six components: 1) value proposition, 2) market segments, 3) structure of value chain, 4) cost structure and profit potential, 5) position of the firm within the value network and 6) competitive strategy. Timmers (1998) also defines a business model by describing components: i) an architecture for the product, service and information flows, ii) a description of the potential benefits for the various business actors and iii) a description of the sources of revenues. These scholars name the components of a business model in order to define the term. The other way of defining the concept is to describe its functions. For example, Teece (2010) describes its functions (“how the enterprise creates and delivers value to customers, and then converts payments received to profits”) to define the term.

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Hereafter, descriptive definitions are examined to highlight the essence of the concept. Then, definitions with components are looked into to specify the functions of a business model.

### *b) Descriptive definitions of a business model*

Table 5 shows selected BM definitions with descriptive descriptions.

Table 5 Definitions of business model (descriptive definition)

Amit & Zott (2001)	<i>The business model depicts the design of transaction content, structure, and governance so as <b>to create value</b> through the exploitation of business opportunities.</i>
Chesbrough & Rosenbloom (2002)	<i>“a heuristic logic that connects technical potential with <b>the realization of economic value</b>”</i>
Chesbrough (2006)	<i>A business model “<b>creates value</b> by defining a series of activities from raw materials through to the final consumer that will yield a new product or service with value being added throughout the various activities. The business model <b>captures value</b> by establishing a unique resource, asset, or position within that series of activities, where the firm enjoys a competitive advantage.”</i>
Teece (2010)	<i>A business model articulates the logic and provides data and other evidence that demonstrates how a business <b>creates and delivers value</b> to customers.</i>
Svejenova, Planellas & Vives (2010)	<i>“we define individual business models as sets of activities, organizing, and strategic resources that individuals employ to pursue their interests and motivations, and <b>to create and capture value</b> in the process”</i>
Casadesus-Masanell & Ricart (2010)	<i>A business model is “the logic of the firm, the way it operates and how it <b>creates value</b> for its stakeholders”</i>
Smith, Binns & Tushman (2010)	<i>A business model is “the design by which an organization converts a given set of strategic choices into value, and uses a particular organizational architecture in order to <b>create and capture this value.</b>”</i>

By the late 2000s, more scholars began mentioning two distinctive functions of business models: 1) defining how to create values and 2) defining how to deliver the created value.

These papers argue that a business model answers how an enterprise **creates value** to be **delivered** to its customers to **earn financial profit**. This is critical in the nature of a business

itself as Grant (2008) argues that “business is about creating value.” He continues by saying that “value, in its broader sense, refers to the amount of money customers are willing to pay for a good or service” Based on the Oxford dictionary, a business can be defined as “an activity that makes or intends to make a financial gain”. The financial gain here signifies a difference between money earned and cost spent. This difference is equal to a company’s value added (Grant, 2008).

EQ

$$\text{Value added} = \text{Sales revenue from output} - \text{Cost of material inputs}$$

Grant (2008)

These aspects, value creation and value capture, are repeatedly emphasized in business model literature, as these two aspects are essential to yielding financial gain (e.g., Velu and Stiles, 2013; Casadesus-Masanell and Ricart, 2010; Gambardella and McGahan, 2010; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010).

However, the question of how to create and deliver value is too general, and the way to answer it may differ largely from one person to another. In order to identify and provide an analytical focus on a business model, the definitions that specify its components are examined.

*c) Business model components*

19 articles that clearly define business model components are identified. What are the critical components for the business model concept? The number of business model components varies from one scholar to another, ranging from three to nine components. A great number of components is suggested, and they remain far from establishing an agreement (refer to Appendix B for a holistic summary). In order to focus on essential elements to be addressed by a business model, the definitions with minimal components are extracted: definitions with three components. Table 6 shows the components in those extracted definitions.

Table 6 Three components business model definitions

Author(s)	Value proposition	Value architecture & value network	Revenue & profit	Others
<i>Mahadevan (2000, 2004)</i>	Value stream: a list of value propositions		Revenue stream	Logistic stream (asset control and configuring the supply chain)



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<i>Voelpel, Leibold &amp; Tekie (2004)</i>	Customer value proposition	Value network (re)configuration for the value creation		Leadership capabilities
<i>Lehmann-Ortega &amp; Schoettl (2005)</i>	Value proposition	Value architecture	Revenue model	
<i>Tavlaki &amp; Loukis (2005)</i>	Value proposition	Value production architecture	Sources of revenues and cost structure	
<i>Demil &amp; Lecocq (2010)</i>	Value propositions	Organizational structure		Resources and competences
<i>Yunus, Moingeon &amp; Lehmann-Ortega (2010)</i>	Value proposition	Value constellation	Profit equation	

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It reveals three components as common critical components: value proposition, value architecture & value network, revenue & profit stream. As a fourth component, leadership capabilities or resources and competences to manage the business activities/network are suggested. Those four components constitute critical elements in other scholars' articles that suggest more than three components as well. Following briefly explain the meaning of each identified components.

### *d) Value proposition (perceived value)*

Value proposition constitutes an important aspect in business. Linder & Cantrell (2000) argue that "a business model is the organization's core logic for creating value." They imply that a good business model is one that creates value: "how do managers develop a good business model—one that creates value?" Yunus, Moingeon and Lehman-Ortega (2010) explain that a value proposition answers "who are our customers and what do we offer to them that they value?" Lehmann-Ortega & Schoett (2005) consider that the value proposition comprises the type of customer, or the market segment addressed by the business, the product or service or mere information, and the partners who form a link between the business and the customer.

This value proposition of a business is not strictly limited to customers, as "the value stream identifies the value proposition for the buyers, sellers, and the market makers and portals in an Internet context" (Mahadevan, 2000).

Within the context of strategic innovation, Lehmann-Ortega & Schoettl (2005) emphasise that the value proposition can be a source of differentiation of a business from its competitors. (See also *value curve*<sup>13</sup> of Kim and Mauborgne (1999).)

According to Doganova & Muniesa (2015, p111), value became a centric concept in business models in 2000.

*e) Revenue and profit model (monetized value)*

The revenue and profit component constitutes an important element not only because it is essential for business but also because the **development of ICT** opens multiple modes of revenue streams for companies. Mahadevan (2000) takes the examples of Schlachter and Fedwa to explain this. Most cited papers on business models also refer to this aspect. For example, Timmers (1998) speaks of “sources of revenues”, Chesbrough & Rosenbloom (2002) mention “cost structure and profit potential” and Magretta (2002) asks “how do we make money in this business and what is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?”

*f) Value network and value architecture (holistic value creation process)*

The value exchange process (and structure) in business operations is considered to be an important component of business models. Different scholars use different terminologies to designate the concept such as value network, value architecture and structure of transaction.

Table 7 Similar terminologies that signify value exchange process and structure (value network)

Terminology	Author(s)	year of publication
system value	Viscio and Paternack	1996
an architecture for the <b>product, service and information flows</b> , including a description of the various business actors and their roles	Timmers	1998
value network	Hamel	2000
structure of transaction	Amit and Zott	2001

<sup>13</sup> “The value curve – a graphic depiction of the way a company or an industry configures its offering to customers – is a powerful tool for **creating new market space.**”

value architecture	Staehler	2001
what is the underlying economic logic that explains how we can <b>deliver value</b> to customers at an appropriate <b>cost</b> ?	Magretta	2002
<b>structure of the value chain</b>	Chesbrough & Rosenbloom	2002

Through literature reviews on business models, value networks appear to be a core concept that connects business models and business strategy. The external value network corresponds to a business ecosystem that will be introduced in the next section. Peppard & Rylander (2006) state that “it [value chain] has proved a very useful mechanism for portraying the chained linkage of activities that exist in the physical world within traditional industries, particularly manufacturing. Furthermore, it has also framed our thinking about value and value creation. However, as products and services become dematerialised and the value chain itself no longer having a physical dimension, the value chain concept becomes in an inappropriate device with which to analyse many industries today and uncover sources of value” (p. 6). According to Mariotti (2002), a value network is “an interactive combination of information machines, and people.” Peltoniemi (2004) explains that “value networks are concentrated in creating value in each node” and “value network is not seen as bound to certain region - it can even be global” while “companies inside a value network can be parts of different industries”.

*g) Leadership of the company to manage the value network*

Value propositions, revenue and profit models and value architecture and value network are identified as three important components; nevertheless, beyond that, a coordination of internal and external business activities is required to run a business. Mahadevan (2000, 2004) emphasizes the role of asset control and of configuring the supply chain while Demil & Lecocq (2010) take resources and competences as the business’s fourth important component. Voelpel, Leibold & Tekie (2004) define leadership as a capacity to “ensure the satisfaction of relevant stakeholders”.

*h) What are the main questions of business models and how do other academic domains relate to them?*

The three previously classified components, 1) value proposition, 2) revenue and profit model, and 3) value architecture and value network, and additional elements such as i) logistic streams, ii) leadership capacities and iii) resources and competencies highlight key managerial questions to be asked to build a business.

Ultimately, these elements answer four essential questions in business:

1. What are the requests of consumers? (Value identification)  
What are new/different products, services or solutions that consumers are waiting for?
2. How to combine the resources and capabilities of the company and of (potential) partners?  
(Coordination of a supply chain)  
What are the resources and competences that exist internally, and what are those to be found in external organizations?
3. What revenue model is to be adopted? (Revenue modelling)  
What do the targeted consumers pay for? How should this captured capital be shared with partners in an optimal way?
4. What kind of a management tool is required to maintain this whole system of creating and sharing values? (Management model of the supply chain)  
Is any kind of leadership required? If so, is it a single strong leadership or a collective one?  
What is a mechanism to control the system or the logic behind?

These interlinked questions can be explained as follows.

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First of all, consumers are waiting for products, services or solutions that are new to them or different from substitutes. This leads to the 1<sup>st</sup> question on value identification: what are the requests of consumers? Secondly, for an objective company, it is essential to organize internal and external resources and capabilities to realize this identified value: 2<sup>nd</sup> question. That is to say, some parts of value creation can be taken care of internally, while the other parts should be taken care of externally. Then, the 3<sup>rd</sup> question answers the money flow issue. On the income side, what do the consumers pay for and by which means of payment? Is there any part of the service that would be offered for free? Do clients pay one time when they

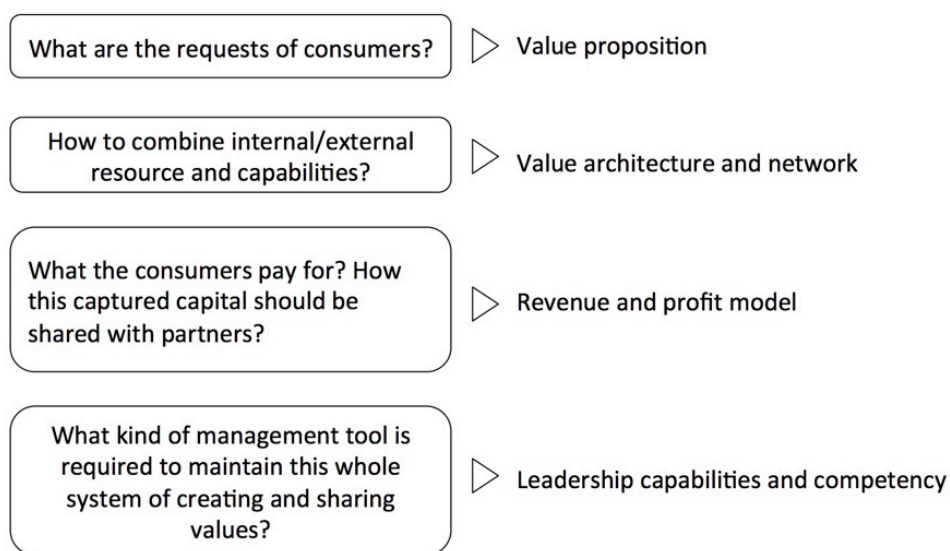


Figure 8 Identification of questions that corresponds to highlighted elements

merchandize the product or pay monthly? On the expense side, how should this captured capital be (re)distributed among the partners? After this, the final essential point is to realize this system with executions.

From an operational point of view, those questions would be more meaningful as they lead practitioners to ask how we can do it.

Still, it is not evident why those 4 components are repeatedly mentioned in literature. Reasonable explanations are lacking on following questions: why do those four components appear to be important in BM literatures? How should other components not included here be considered? Isn't there a better way to explain which components should be included in a BM and excluded from a BM?

For example, Osterwalder & Pigneur (2010) suggest a business model canvas that shows 9 important components to design a business model: value proposition, key activities, partner network, key resources, cost structure, client relationship, client segment, distribution channels and revenue flows.

<b>Partner network</b>	<b>Key activities</b>	<b>Value proposition</b>	<b>Customer relationship</b>	<b>Customer segments</b>
	<b>Key resrouces</b>		<b>Distribution channels</b>	
<b>Cost structure</b>			<b>Revenue flows</b>	

Figure 9 Nine components of business model suggested by Osterwalder as "business model canvas"

A further elaborated framework, triple layered business model canvas, developed by Joyce & Paquin (2016) even shows 27 components to depict a business model.

As is seen, different definitions of BMs have been suggested, as well as variant components. From the latest literature trend, the minimal and essential elements used to describe BMs are identified as value proposition, value network, revenue model and leadership. However, the problem of a different abstraction level and a reasonable number and combination of BM components is not solved.

Though this subsection demonstrated four essential components of business models that seem to comprehensively enough depict a business, the fact is still that "extant literature on BMs is characterized by disagreement and confusion" (Rasmussen, 2015). In this context, Björkdahl & Holmén (2013) argue:

One reason why scholars so far have failed to develop a single understanding or definition of business model is that idiosyncratic definitions are applied, to suit the purpose of the particular study or paper. In addition, the concept of business model frequently is used to refer to anything related to firms and their business. (p. 218)

If the definition of a BM lacks coherence, it is then technically impossible to build the definition of BMI upon it. Most BMI scholars take this approach, and they still have not

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managed to propose a convincing definition of BMI. Their suggestion is half-baked and far from reaching concordance. Reasons are followings:

- BM components do not get accordance,
- Both BM components and their connections are considered as BM,
- Definitions of BMs are suggested spontaneously by different disciplines.

Since the definition of BMs remains under discussion, it may not be realistic to define BMI with an inductive approach based on the definition of BMs, as many scholars have already tried many times. For this reason, the author suggests defining BMI independently from the definition of BMs, without using the term “business model”. This research adopts the definition of BMI defined by Björkdahl & Holmén (2013) as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace (p. 215).” As desired, this definition does not use the word “business model” to define BMI, a non-inductive approach.

Based on this definition, BMI in this research is defined as *a modification or an addition of business activities that is accompanied by changes within the company’s value network so as to improve business performances, such as by achieving an increase in financial performance and an enforcement of competitive advantage.*

The definition of Björkdahl & Holmén (2013) expresses the innovation aspect by stating “new combination” as an important element of an innovation suggested by Schumpeter: “innovation combines factors in a new way, or that it consists in carrying out New Combinations” (Schumpeter, 1939, p.62, as cited in Hanappi & Hanappi-Egger, 2004). The author’s definition explicitly highlights the financial performance so as to clearly embrace the innovation aspect.

We can define innovation also with reference to money cost. (...) Whenever a given quantity of output costs less to produce than the same or a smaller quantity did cost or would have cost before, we may be sure, if prices of factors have not fallen, that there has been innovation somewhere. (Schumpeter, 1939, p.63, as cited in Hanappi & Hanappi-Egger, 2004).

Also, as it is the case for the definition of Björkdahl & Holmén (2013), the author's definition includes the competitiveness of the business. This is to reflect the latest study arguing that BMI can be a source of competitive advantage (Verma & Bashir, 2017).

It should be mentioned that though the definition of BMI by the author does not include the term "business model", the author considers that a BMI is an innovation of a company's business model. While the definition of BMI does not require the definition of a BM, the author treats a BMI as a special case of a Business Model Change (BMC) that is innovative or that enhances the competitive advantage of the company.

#### ***4) Research gap (BMI and BM)***

This subsection presents research gaps suggested by scholars in the literature review of BMI and BM. This subsection shows five research focuses identified as such research gaps.

##### *a) Scarcity of empirical case study*

Firstly, in BMI research, it is pointed out that detailed in-depth empirical case studies based on primary data are rare, for both established firms and new firms. For example, Bucherer, Eisert, & Gassmann (2012):

Although the literature offers a great number of examples of business model innovation, in-depth case studies based on recent cases and primary data are rare (p. 186).

Björkdahl & Holmén (2013) also claim that "there is a need for detailed descriptions and analyses of business model innovation, including failures, and fewer ex post success biased studies of a few internationally well-known (and over-cited) firms. These descriptions should be complemented by surveys and other quantitative approaches to answer such basic questions as how common is business innovation, how time consuming is it, and how costly and how profitable are different types of business model innovations" (p. 215). The thesis anchors itself to a quantitative approach so as to fill the research gap of BMI study.

Spieth, Schneckenberg, & Ricart (2014) point out that there is no solid foundation for the study of BMI. Rasmussen (2015) claims that this is a reason for which there is a "relatively small amount of published articles on BMI in peer-reviewed management journals (such as Journal of Strategic Management, and Academy of Management Review)" (p. 22).



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In order to overcome this situation, Foss & Saebi (2016) say that BMI research requires “simplification, conceptual clarification, theoretical models, and cumulative empirical work” (p. 222). They continue by saying that “this should start from an identification of key conceptual, theoretical, and empirics-related gaps—the filling of which can be argued to advance the literature” (p. 222).

In order to advance the understanding of BMI, more in-depth empirical case studies are necessary. This is the first research gap identified through the literature review.

### *b) Basic understanding of Business Model Innovation*

Secondly, related to the first research gap, the second is that BMI research has not yet developed enough to reach a general conclusion.

For example, Schneider & Spieth (2013) state:

we argue that approaching business model innovation under consideration of specific contexts is highly useful to first understand the phenomenon in its particular situation before being capable of deriving more general conclusions.

They offer to cover several questions “to provide analytical support for business model innovation’s discovery-driven process” (p. 23), for example.

Schneider & Spieth (2013) also evoke following questions to be addressed:

- What determines the process and elements of BMI in specific contexts?
- Which general types or forms of BMI can be identified? How do distinct forms of business model innovation impact on the underlying process?
- How can firms be supported in conducting BMI in terms of tool and methods? (p. 23)

They mention the process and elements of BMI, general type or forms of BMI, and tools and methods to conduct BMI as focuses of interest.

Björkdahl & Holmén (2013) give a set of questions that the scholars of BMI should address to establish a coherent definition of business models and business model innovation. They argue that “a major issue for business model innovation scholars is clarity in relation to what constitutes a business model innovation, what is ‘merely’ an upgrade of an old business model and what is a product innovation for example” (p. 215).

The following six themes are suggested by Björkdahl & Holmén (2013) as research gaps. They also list some representative questions. The variety of the suggested questions shows that there are many issues to be addressed in order to deepen the basic understanding of the nature of business model innovation.

Figure 10 Six research themes suggested by Björkdahl & Holmén (2013) as research gaps

**1) Definition and characterization of business model innovation**

Business model innovations - what are they and how do they differ from other business model changes?

How common is business model innovation and how difficult (time consuming, attention, costly) is it?

How do customers respond to different types of business model innovations? How do these reactions affect the innovating firm?

What concepts, models, frameworks and theories are needed to explain business model innovations, and why?

What is the relation between product, service and process innovations on the one hand, and business model innovation on the other?

**2) Managing business model innovation (in established firms)**

How do firms work with business model innovation and how can they do it systematically?

How are business model innovation processes organized, and how well do they function, and why?

How do and should firms overcome organizational inertia to innovate their business models?

How can the uncertainties involved in business model innovation be reduced?

How can established firms work with new business models when they have existing business models up and running?

How can established firms innovate their business model when not under pressure?

How do and should firms interact with users in order to manage their new business model creation?

In what circumstances do several business models co-exist in the firm and how can this be managed?

**3) Experimenting, testing and implementing new business models**

How do firms experiment with new business models? What are the “best” processes?

How can firms test new business models in an efficient and cost effective manner?

Are there patterns to business model innovation?

How should firms implement changes in their current business model?

What is the role of users in business model experimentation?

**4) Business model scalability**

How can firms design scalable business models?

What are the most critical business model elements required to achieve a scalable business model?

When is a business model scalable?

How can the firm “know” whether it has a scalable business model?

Profiting from business model innovation

In what circumstances are business model innovations (almost) non-imitable and why?

Is there first mover advantage involved in business model innovation? When and why?

What makes business model innovation profitable?

What business models are more likely to fend off competing business models or imitators?

Are some business model element changes more profitable than others?

#### **5) Business model innovation and changes in the eco-system**

What types of business model innovation affect the eco-system? How?

How do eco-systems affect patterns of business model innovation?

What business model innovations are the most profitable for a given type of eco-system?

#### **6) The role of capabilities for business model innovation**

What is the role of capabilities in business model innovation?

How does business model innovation affect the firm's capabilities and why?

How do changes in capabilities affect the firm's motivation and ability to undertake business model innovation?

How can the capability literature contribute to understanding business model innovation?

From this list, this research particularly addresses the fifth theme – the ecosystem - and the sixth theme – the role of capabilities for business model innovation. The following subsection details these two research gaps.

#### *c) Business model innovation and the ecosystem*

As is mentioned in the list of research themes to be addressed, suggested by Björkdahl & Holmén (2013), the ecosystem is one of the research gaps in BMI research. This is the third research gap identified in the literature. BMI principally brings an innovation to the concerned company. At the same time, if the result of BMI is new to the industry, BMI can be an innovation for the innovation ecosystem that the company belongs to. Bringing BMI into an innovation ecosystem in fact results in innovating the relevant ecosystem since a BMI can bring a higher economic performance to the relevant innovation ecosystem. Business model innovation of a company in an ecosystem can be considered as innovation of the ecosystem as well. This aspect is explained as a co-innovation by Björkdahl & Holmén (2013):

Adner (2012) stresses that the likelihood and ability of firms to profit from their *business model innovation* [emphasis added] depend crucially on the extent to which other actors need to innovate (co-innovation) or to change their behaviour to allow the focal firm to profit from its business model innovation. There are

several examples of changes to firms' business models changing the industry and the way that firms compete and collaborate in that industry. This suggests that 'getting this right' will bring business success. (p. 223)

Björkdahl & Holmén (2013) continue by raising different questions to be addressed:

This raises the question of which types of business model innovation are more likely to affect the eco-system and in what circumstances? On the other hand, the eco-systems of suppliers, competitors and other actors both enable and constrain how successfully firms can innovate their business models as Berglund and Sandström point out in their paper in this Special Issue. An important question for research is how the setup of the eco-system affects the speed and pattern of business model innovation. The paper by Schneider, Spieth and Clauss in this Special Issue discusses how a change in one industry enabled the creation of a new specialised industry with two distinct new business models. More generally, we would argue that the *business model(s) and the eco-system of actors co-evolve* [emphasis added] but further research is needed to identify and analyse the mechanisms or sources of the changes. (p. 223)

The co-innovation between a company's business model innovation and the ecosystem is an important research gap where further empirical research is expected.

#### *d) Business model innovation and organizational change*

The fourth research gap of BMI concerns organizational change management. Rasmussen (2015) points out that, "although notions such as design, systems, structure, architecture, configuration, and organizational elements dot the BMI literature, only a few contributions have attempted to clarify the role of organization in bringing about BMI" (p. 37). Björkdahl & Holmén (2013) highlight the importance of the changes and the evolution of capabilities during BMI:

The capabilities discussion relates most to the firm and its ability to develop new products and services. However, with a few exceptions, the way capabilities change, fosters and shapes business model innovation and vice versa has not been dealt with in the literature (Brink and Holmén, 2009). We would emphasise that capabilities and changes to them can contribute positively to business model innovation and to the evolution of the business model. At the same time, business

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model innovation shapes the emergence and evolution of capabilities (Brink and Holmén, 2009; Jacobides and Winter, 2012). We argue that important research questions include how capabilities contribute to business model innovation and vice versa. (p. 223)

Rasmussen (2015) suggest that the reason for which there are fewer studies that focus on the causal link between organization and BMI is as follows:

Not surprisingly, it remains unclear which role(s) the organization plays in bringing about BMI. Is it an antecedent, moderator, mediator, or all at the same time? Or should it be considered a part of BMI? In other words, ambiguity remains about the causal link(s) between the organizational context and BMI. One of the problems might be that firms emphasize strategic fit in discussions prior to conducting BMI, while neglecting considerations of organizational fit. (p. 38)

The causal links among organizational change, capability development and BMI are another one of the research gaps suggested by scholars.

### *e) Preparing business model innovation*

The fifth research gap concerns the pre-stage of BMI or Business Model Change. A pre-stage of BMC is a concept suggested by Cavalcante (2014). Cavalcante (2014) defines a pre-stage of BMC as a time period when the technology required to make a BMC is not yet available, meaning that the company cannot execute the BMC. There has been a call for research on the preparative stage of BMI; for example, Schneider & Spieth (2013) stated that “even though of crucial importance for firms operating in volatile environments, only limited knowledge exists about how firms can prepare for exploring perceived opportunities through business model innovation” (p. 21). The importance of Cavalcante’s (2014) research lies in the fact that the article explicitly defines a type of preparative phase as a *pre-stage*, clearly distinguished by the unavailability of the required technology for a BMC. While he calls for further empirical-based research on the pre-stage, there is no research whose clear focus is on the pre-stage as defined by Cavalcante (2014).

In order to prepare BMI, as BMI is a reconfiguration of internal and external resources, both internal resource management and external resource management are required. This is where RBV (Barney) and positioning strategy (Porter: through inside and outside value network) meet, and this explains why research on BMI is essential in management study.

'Learning' refers to aspects such as: (1) acquiring new knowledge in connection with the technical aspects of the emergent technology; (2) discussing new ideas on possible commercial opportunities for the companies; (3) interacting and contacting, i.e. networking with the other partners in the project. (p.13)

The preparation for a BMC or a BMI has a close link to the capability development, while the organizational aspect is, according to Rasmussen (2015), almost completely neglected in BMI research. This issue of organizational change management (and organizational change readiness) will be reviewed below.

Sources of innovation are business capabilities. Internal value network (resource allocation and configuration) brings inimitability. External value network (resource allocation and configuration) brings discussion on positioning.

This is confirmed by Urbancova (2013):

The present concept of **innovations** is that they represent an open approach that reaches beyond the threshold of an **organisation** and thus exploits not only inspections and changes in the internal environment, **but also changes in the external environment.**

To summarize, this section reviewed literature concerning BMs and BMI. First, theoretical development was reviewed, followed by the examination of connections between different academic domains (strategy, technology management, innovation management, organization theory and entrepreneurship). Possible definitions of BM and BMI, as well as possible components of BM and BMI, were then discussed.

Four essential components of BM were respectively identified: value proposition, value network, revenue model and leadership. This research uses those four components to describe a case study.

Finally, research gaps were identified. This research aims at filling the following four research gaps:

1. Issues of definition of BMI and BM components.
2. Issues of how firms can prepare for BMI.
3. Issues of connections between ecosystems and BMI.

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### 4. Issues of connections between organizational change and BMI.

The next section reviews literature on innovation ecosystems and business ecosystems.

## *II) Literature review 2: Innovation ecosystems and business ecosystems*

The second part of the literature review is about innovation ecosystems and business ecosystems: two interrelated but different concepts important for discussing business strategy and Business Model Innovation. In the previous section, Business Model Innovation was introduced along with another important concept: -value network. The concept of business ecosystems is introduced in this section is an extension of this value network concept.

14 years after Michael Porter's Five Competitive Forces (Porter, 1979) that try to reveal the sources of competitive advantage from the positioning of a company in an industry, the concept of a business ecosystem<sup>14</sup> is suggested by Moore (1993). While Porter's Five Competitive Forces are criticized as the "Five Forces framework has inherent weaknesses in dynamic environments" (Teece, 2007, p. 1325), Moore (1993) explains that both competition and cooperation interplay with each other. Moore (1993) points out that resources, capital, partners, suppliers, and customers in the business ecosystem co-evolve; therefore, it is important to consider an ecosystem that is trans-industrial as well. The phenomenon of *coopetition* – a portmanteau word for cooperation and competition – in business is empirically explained by scholars (e.g., Bengtsson & Kock, 2000). Later, in the 2000s, the business ecosystem was discussed in line with other terms such as dynamic capabilities (Teece, 2007) that orchestrate the ecosystem and the business model (e.g., Tsvetkova, Gustafsson, & Wikström, 2014) to fit the business into the ecosystem.

### *1) Why an ecosystem?*

The concept of the ecosystem was introduced because a company should "be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries" (Moore, 1993, p. 76). Moore (1993) points out that an "industry-based view" is not capable of answering strategic questions on business performance such as:

How is it that a company can create an entirely new business community – like IBM in personal computers – and then lose control and profitability in that same business? Is there a stable structure of community leadership that matches fast-changing conditions? And how can companies develop leadership that successfully adapts to continual waves of innovation and change? (p. 75)

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<sup>14</sup> Be aware that Moore's "business ecosystem" (1993) is not clearly defined. It should be rather considered as innovation ecosystem that is introduced in this chapter or the mix of innovation ecosystem and business ecosystem..



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The limitation of an industry-based view for business strategy is particularly critical in high-technology business and information-intensive industries (Moore, 1993; Baldwin, 2012). The reasons are considered to be following:

### *Combination of different technologies in continuous development*

Under the business circumstances where commercial use of high-technologies and ICTs become common, products and services exploit different technologies in combination. Therefore, the development of multiple technological bricks (distributed innovations) impacts the value of products/service. The company needs to have access to the (most) advanced technologies so as to integrate them into its products/services and keep the products/services updated.

### *Products/services require complementary products, services and/or infrastructure*

High technology and/or ICT-based products/services often require complementary products/services or infrastructure in order to maximize its value of use. In order to attract other companies or organizations to invest on those complementary products/services and infrastructure, the business environment should be structured in such a way as to incentivize others to be involved.

### *Good orchestration of supply networks so as to deliver the product/service within the appropriate timeline*

In a dynamic business environment, the success of a business relies on how efficiently a company can create a favourable business community, as well as acquire a large market share. Also, in order to improve the business performance, it is important for a company to efficiently drift its role/position in the ecosystem in favour of its resource and capability. (This is a type of question that Business Model Innovation deals with as well.)

Above is an explanation of why an ecosystem perspective is expected to deepen the understanding of the business competition mechanism and, along with Business Models, the ecosystem perspective is considered important for a new value creation process (Adner & Kapoor, 2010). This research domain regarding ecosystems is in development, resonating with other related ideas, as Adner (2017) explains:

Along with a cohort of related ideas—business models, platforms, coopetition, multi-sided markets, networks, technology systems, supply chains, value networks—the notion of ecosystems has raised awareness and focused attention on new models of value creation and value capture. (p.39)

To better understand the concept of ecosystems, the duality of the ecosystem strategy is important.

#### *Ecosystem versus Ecosystem*

As Moore (1993) already pointed out, several ecosystems “vie for survival and dominance” (p. 76). There can be competition between the ecosystem that the company belongs to and other ecosystems formed to offer similar value propositions.

#### *Positioning within an Ecosystem*

On the other hand, the main role of the company in the innovation ecosystem (Valkokari, Seppänen, Mäntylä, & Jylhä-Ollila, 2017) should also be considered a part of the ecosystem strategy. The company needs to explore and define its proper role in the ecosystem it belongs to.

It is here that the company’s resource allocation (Adner, 2006) becomes important, and the boundary of the firm is rediscussed (Anggraeni, Den Hartigh, & Zegveld, 2007). Knowing that the boundaries of different business ecosystems are also a blur, this research introduces two distinguished but interrelated concepts: business ecosystems and Innovation ecosystems. This section introduces a general definition of an ecosystem and then gives the respective definitions of business ecosystems and Innovation ecosystems.

## **2) Theory of ecosystems**

This subsection explains the definition of ecosystems and relationships among similar concepts.

### ■ *What is an ecosystem?*

In contrast to the definition of Business Models and BMI that are still under discussion, the definition of an ecosystem in management study does not significantly differ from scholar to scholar<sup>15</sup>. However, there are several variations of other terms such as “social ecosystems” (Mitleton-Kelly & Papaefthimiou, 2011), “business ecosystems” (e.g., Barnett, 2006; Moore, 1993; Peltoniemi & Vuori, 2008), “innovation ecosystems” (e.g., Adner, 2006) and “platform ecosystems” (Helfat & Raubitschek, 2018).

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<sup>15</sup> One possible explanation is that the term is borrowed from biology and it is not an invented term, like “business model” which was invented within management science.

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For the definition of an ecosystem, this research adopts the latest definition of Jacobides et al. (2018): an ecosystem is defined as “a set of actors with varying degrees of multi-lateral, non-generic complementarities that are not fully hierarchically controlled” (p. 2264). This definition is in accord with Adner's (2017) definition of an ecosystem as “the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize” (p. 42). The generic definition of an ecosystem can be applied to explain different types of ecosystems. Based on their definition, Jacobides et al. (2018), for example, formulate different ecosystems so as to link them to strategy research, namely business ecosystems, innovation ecosystems and platform ecosystems. This research focuses on business ecosystems and innovation ecosystems, that are depicted as enterprise-centric and value proposition (product/service) centric concepts of ecosystems. This literature review does not deal with platform ecosystems<sup>16</sup>.

### ■ *Business ecosystem*

A business ecosystem is a company-centric concept of an ecosystem. Business ecosystems focus on an individual firm or a new venture (Jacobides et al., 2018). A business ecosystem is defined, for example, as “the community of organizations, institutions, and individuals that impact the enterprise and the enterprise’s customers and supplies” (Teece, 2007, p. 1325). That is to say, a business ecosystem “includes complementors, suppliers, regulatory authorities, standard-setting bodies, the judiciary, and educational and research institutions (Teece, 2007, p. 1325).”

A business ecosystem “is a framework that recognizes that innovation and its supporting infrastructure have major impacts on competition (Teece, 2007).”

This business ecosystem perspective overlaps with the value network perspective suggested in the business model literature (e.g., Peppard & Rylander, 2006), though value network and business ecosystems are two distinctive concepts (e.g., Peltoniemi, 2004).

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<sup>16</sup> A platform ecosystem “takes a ‘hub and spoke’ form, with an array of peripheral firms connected to the central platform via shared or open-source technologies and/or technical standards (Jacobides et al., 2018)”. Jacobides et al. (2018) suppose IT-related platforms such as programming interfaces and software development kits. A platform ecosystem is closely related to the concept of open innovation (ref.).

A platform ecosystem is like a department store. The department store profits from each boutique in the building while each boutique benefits from the space that is designed to attract numbers of consumers. Consumers benefit from the multiple choices that are easily comparative. Under a context of the convergence of industries, providing a platform to facilitate the platform ecosystem is one of strategic choices: ecosystem aggregator (Hacklin & Battistini, 2013) enhancing network effect (C. Shapiro and H. R. Varian, “Information Rules: A Strategic Guide to the Network Economy” (Boston: Harvard Business Review Press, 1999). 13.). Discussion of “platform ecosystem” is closely related to discussion on Open Innovation.

Business ecosystems focus on a company and comprehend the ecosystem of actors necessary for the focal company to provide products/services to its users/beneficiaries (excluding users/beneficiaries of other products/services offering the same value proposition).

#### ■ *Innovation ecosystem*

An innovation ecosystem is a value proposition-centric product or service. Innovation ecosystems focus “around a particular innovation or new value proposition and the constellation of actors that support it” (Jacobides et al., 2018, p. 2256). This is coherent with the definition of innovation ecosystems proposed by Adner (2006) “innovation ecosystem - the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution” (p. 2).

Innovation ecosystems focus on the entire users/beneficiaries and comprehend the ecosystem of actors necessary to provide them a novel value proposition. The characteristics of the innovation ecosystem vary depending on the focal customer-facing solution. When the customer-facing solution is assimilated by a technological innovation, the innovation ecosystem can include many academic and research institutions. An innovation ecosystem is a couple of two economies: research economy and industrial economy. Beyond practice and the popular business press, ecosystems have also been eagerly adopted in the field of strategy, with Teece (2016) suggesting that “the concept of ecosystem might now substitute for the industry for performing analysis” (p. 1).

#### *Moore’s business ecosystem should rather be considered as an Innovation ecosystem*

Peltoniemi & Vuori (2018, p13) define a business ecosystem as a dynamic structure which consists of an interconnected population of organizations such as small firms, large corporations, universities, research centres, public sector organizations, and other parties which influence the system. This perspective of a business ecosystem is similar to the business ecosystem explained by Moore (1993). The author remarks that according to the recent study, the business ecosystem suggested by Moore (1993) corresponds to today’s innovation ecosystem and not today’s business ecosystem. Today’s innovation ecosystem is an extension of Moore’s business ecosystem while the origin of today’s business ecosystem is rather an extension of value network that is itself a further extension of value chain concept.

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### ■ *Interrelation between innovation ecosystem and business ecosystem*

The author reviewed above the definition of innovation ecosystems and business ecosystems. These concepts are essentially different. The former – innovation ecosystem – focuses on a value proposition (product/service) while the latter – business ecosystem - sees an enterprise as the core of the ecosystem. However, one needs to be careful as sometimes business ecosystems and innovation ecosystems can be confusing. This is seemingly due to the fact that these two concepts are both complementary for business strategy.

The business ecosystem of a company can be developed among multiple innovation ecosystems of different value propositions (of product and service). Otherwise, the business ecosystem can constitute a part of an innovation ecosystem of a value proposition from which the focal company benefits as a user or as a beneficiary.

Furthermore, one needs to be aware of the dynamism of business ecosystem. For example, company X is a user/beneficiary of a novel value proposition of an innovation ecosystem. One day the company X may choose another provider (company A, for instance) as an additional supplier. In this case, the business ecosystem of the company X expands to include company A and its suppliers. In this sense, a part of an innovation ecosystem that the company X does not include into its business ecosystem always has possibility to turn into a part of the business ecosystem of the focal enterprise X: all actors in relevant innovation ecosystems that concern the focal company are always a part of potential business ecosystems of the company.

This is the reason for which one needs to be careful when mentioning a business ecosystem. The person using the term “business ecosystem” may mean *potential business ecosystem of the company X* and, in that case, he or she may rather be referring to the whole relevant innovation ecosystems of the value proposition that the company X is benefiting from. The author remarks that there can be a confusion between the meaning of Moore (1993)’s business ecosystem, the innovation ecosystem defined in the thesis, and the business ecosystem defined in the thesis. The innovation ecosystem in the thesis is value proposition-centric while business ecosystems in the thesis are company-centric. Moore (1993)’s business ecosystem is also company-centric while his conceptualisation embraces different relevant innovation ecosystems that one day can turn into a part of the company’s business ecosystem.

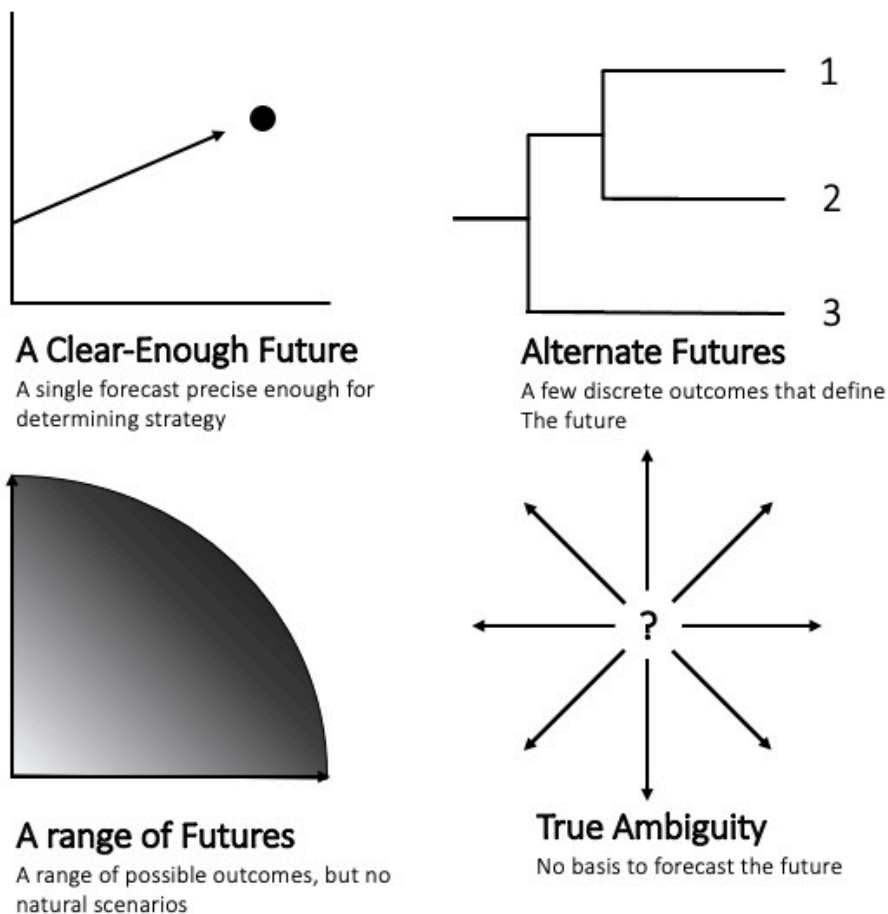
A company is normally concerned with, at least two, different innovation ecosystems. One is that of a supplier, and the other is that of a value proposition that the company offers. Imagine if a company sells digital cameras. The company concerned with the innovation ecosystems of digital lens and that of image processing appear as supply-side ecosystems while it would also be concerned with the innovation ecosystem of entire camera (both digital and analogue) as an offer-side ecosystem.

### **3) Ecosystem and business strategy**

As previously seen, innovation ecosystems and business ecosystems are closely related. Therefore, the research focuses of these two concepts are sometimes inseparable. In this sub-section, research for both types of ecosystem studied by (or suggested by) scholars are presented.

#### ■ *Issues of uncertainty*

When considering developing the business ecosystem of a company within different innovation ecosystems, one of the greatest concerns is uncertainty as to how relevant innovation ecosystems develop, an important parameter to decide the business strategy of the company. Courtney, Kirkland, & Viguerie (1997) give a conceptual framework to deal with *uncertainty*. They claim that there are four levels of uncertainty: a clear-enough future, alternate futures, a range of futures and true ambiguity. With a clear-enough future (level 1) situation, “managers can develop a single forecast of the future that is precise enough for strategy development” (Courtney et al., 1997, p. 3). Under an alternate futures (level 2) situation, “the future can be described as one of a few alternative outcomes, or *discrete scenarios*” (Courtney et al., 1997, p. 4). The level 3 uncertainty is that in which a range of futures can be identified, and the range is bounded according to a limited number of key variables. The fourth level is true ambiguity, where “multiple dimensions of uncertainty interact to create an environment that is virtually impossible to predict” (p. 4).



Source: Courtney, Kirkland, & Viguerie (1997), replication by author

■ *Timing*

Related to the issue of uncertainty, the success of a business depends on the timing of the company's decision, especially when to start offering a new service or product and when to enlarge its business ecosystem so as to develop the business activity. The issue of timing depends on the maturity or the level of development of the relevant innovation ecosystems.

Adner (2006) describes the fact with a case of online music retailing:

Without a perspective on ecosystem-driven delays, managers can commit to overly aggressive targets that they will ultimately miss. The upside of delays, though, is that in cases where an innovative firm is far ahead of its ecosystem partners, the firm may benefit from slowing down to let the rest of the system catch up. These self-imposed delays go against the grain—rushing to market almost seems hardwired in businesspeople—but they can be the logical outgrowth of a systemic risk assessment. For example, Apple Computer, with its iTunes offer,

was a very late mover into the online music-retailing category, which had been pioneered in the mid-1990s. However, the category was held back by lagging complements: Without adequate digital-rights-management solutions in place, the major music labels would not condone online distribution (driving much of the action underground). Absent these critical solutions, and without the convenience of broadband connectivity, the mass market did not emerge. Apple’s brilliance was not in being the first to put down a piece of the puzzle but in being the first to put down the last piece of the puzzle. (p. 8)

■ *Uncertainty and real option logic*

Related to the issue of uncertainty, real-option logic is an important concept in project management (Maniak, Midler, Lenfle, & Le Pellec-Dairon, 2014). The main idea of real options in project management is to take the flexibility of the project into account when evaluating a project so as to better manage the risks that arise from the uncertainty (Huchzermeier & Loch, 2001). A real-option approach suggests having multiple investment decision-making points to continuously evaluate “go or no go” by assuming that the more time passes, the more information to make decision become available (Zeng & Zhang, 2011).

■ *Evolution of a business ecosystem within a relevant innovation ecosystem*

Moore (1993) suggests four evolutionary stages of his *business ecosystem* – defined in the thesis as the combination of the business ecosystem of a company and relevant innovation ecosystems that are potentially be integrated into the business ecosystem – that are noteworthy in understanding different challenges of competition and cooperation at each stage: birth, expansion, leadership and self-renewal.

Table 8 The Evolutionary Stages of Moore (1993)’s Business Ecosystem

<b>The Evolutionary Stages of a Business Ecosystem [of Moore]</b>		
	<b>Cooperative challenges</b>	<b>Competitive challenges</b>
<b>Birth</b>	Work with customers and suppliers to define the new value proposition around a seed innovation.	Protect your ideas from others who might be working toward defining similar offers. Tie up critical lead customers, key suppliers, and important channels.
<b>Expansion</b>	Bring the new offer to a large market by working with suppliers and partners to	Defeat alternative implementations of similar ideas. Ensure that your approach is the market standard in its class through dominating key market segments.



	scale up supply and to achieve maximum market coverage.	
<b>Leadership</b>	Provide a compelling vision for the future that encourages suppliers and customers to work together to continue improving the complete offer.	Maintain strong bargaining power in relation to other players in the ecosystem, including key customers and valued suppliers.
<b>Self-renewal</b>	Work with innovators to bring new ideas to the existing ecosystem.	Maintain high barriers to entry to prevent innovators from building alternative ecosystems. Maintain high customer switching costs in order to buy time to incorporate new ideas into your own products and services.

Source: Moore (1993)

As dynamism of high-tech business is a motivation of the introduction of ecosystem perspective, these evolutionary stages are essential elements for ecosystems. The author assesses that the focal innovation ecosystem of electric mobility in this research is at the birth stage, transitioning to the expansion phase.

■ *Business ecosystem and innovation ecosystems co-evolve since they are interdependent*

*Co-evolution*

Along with evolutionary stages, co-evolution is another key concept. Some examples of co-evolutionary elements mentioned in ecosystem literature are such as technologies, products and services, market mechanisms, business processes, firms’ capabilities, firm and ecosystem structures, and policy and regulation (e.g., Barnett, 2006; Hatch, 2001; Moore, 1993).

According to Mitleton-kelly (2003), “organizations are always co-evolving within a social ecosystem” (p. 23) and “each organisation is a fully participating agent which both influences and is influenced by the social ecosystem made up of all related businesses, consumers, and suppliers, as well as economic, cultural, and legal institutions” (p. 30).

*Degree of interdependence*

When products and services are interdependent upon other products and services, their markets and industries are also interdependent and indispensable for the market development of the others. An example is the development of ICTs: they facilitate connecting

different products. In this context, the ecosystem perspective emerges in the management study as an analogy of biology. Iansiti & Levien (2004) explain that:

The ecosystem-based perspective we have described has a number of broad implications for managers. One is the central importance of interdependency in business: A company's performance is increasingly dependent on the firm influencing assets outside its direct control. This has wide-ranging implications for strategy, operations, and even policy and product design.

The important idea here is that some assets in the ecosystem are outside direct control of the focal company. According to Mitleton-kelly (2003):

Propagation of influence through an ecosystem depends on the degree of connectivity and interdependence. Biological "ecosystems are not totally connected. Typically each species interacts with a subset of the total number of other species, hence the system has some extended web structure." (Kauffman 1993, p255) In human social ecosystems the same is true. There are networks of relationships with different degrees of connectivity. Degree of connectivity means strength of coupling and the dependencies known as epistatic interactions—i.e. the extent to which the fitness contribution made by one individual depends on related individuals.

#### *Risks of interdependency and assessment*

Adner (2006) points out that there is a new set of risks when innovation ecosystems become newly interdependent. He explains that:

innovation ecosystems also present a new set of risks—new dependencies that can brutally derail a firm's best efforts. Even if a firm develops its own innovation brilliantly, meets and exceeds its customers' needs, and successfully excludes its rivals, a market may not emerge. (...) As the company's success depends on others, three important strategic directions are evoked: timing, resource allocation and risk assessment. (p. 3)

Timing, resource allocation and risk assessment are also important for real-option approach when there is uncertainty (see above). He continues:

Creating strategy that explicitly accounts for the delays and challenges that are inherent in collaborative networks is the key to succeeding in ecosystems. (p. 3)

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Adner (2006) suggests that there are three kinds of risks that are backed by three types of uncertainties:

Innovation ecosystems are characterized by three fundamental types of risk: initiative risks —the familiar uncertainties of managing a project; interdependence risks —the uncertainties of coordinating with complementary innovators; and integration risks —the uncertainties presented by the adoption process across the value chain. (p. 3)

Adner (2006) also addresses the issue of timing and mitigation of risks:

Often, though, failure occurs because a market does not emerge within the time frame required to support the investment. When you compete in an innovation ecosystem, you must expect and plan for delays, compromises, and disappointments that are, to a substantial extent, outside your control. You should either craft an innovation strategy that mitigates your risks or consider forgoing the opportunity. (p. 9)

To conclude, Adner (2006) analyses the importance of risk assessment process as a team:

Although these managers' routines are often effective, it is worth reflecting on whether, and how, their collective input is incorporated into the initial process of setting performance expectations. Without a clear process for assessing ecosystem risks, they are unlikely to formulate strategy by seeking input from the full set of actors. The likely, and more common, process is that managers in different roles, confronting ecosystem challenges that were not considered in the original strategy, make tactical adjustments— the familiar, reactive changes to project specification, target segment, scope of the offer, partner support allocations—that collectively lead to unintended changes to the strategy. A group risk-assessment process will deliver better expectations and more relevant strategy. (p. 10)

### ■ *Boundary of industries and a firm, resource allocation and timing*

Related to the issue of co-evolution and interdependency, another research focus is on the boundaries and resource allocation.

#### *Boundary of industries*

Moore's (1993) motivation to introduce the ecosystem perspective is also to see a business from a trans-industrial perspective. By focusing on the boundaries of industries, the birth of new ecosystems can be observed.

Bröring et al. (2006) say that:

Industry convergence, defined as a ‘blurring’ of boundaries between industries, induced by converging value propositions, technologies and markets, appears to be a pervasive phenomenon leading to the emergence of inter-industry segments. (...) Not only technologies blur, but there is also a convergence of demand structures: consumers try to satisfy different needs in one transaction.

Industry convergence happens when there is a change in demand structures: a new value proposition is expected, potentially leading to the birth of a new innovation ecosystem. This is agreed upon by Singer (2006) as well. “The only sensible way for a company to compete is not by offering new products with similar functional attributes, but by being better than its rivals at molding the ecosystem in which the competition takes place. In other words, the key to market dominance and customer value now lies in making strategic choices **across industry boundaries** to form entirely new economic spheres” (Singer, 2006, p. 95).

*Boundary of a firm / Resource allocation*

As is mentioned above, forming a new ecosystem is a way to compete (Singer, 2006). For this reason, developing capability outside of the firm can be a strategic option.

Adner (2006) says:

Resource allocation is another strategic consideration: Because critical bottlenecks may reside outside your own organization, allocating resources externally—to partners—can be more effective than allocating resources internally, to your own project.

■ *Adapting a company to existing network of actors: organizational capability to learn*

Organizational capability to learn about ecosystems is another research focus. All of the above-mentioned focuses are of use for a company only when the information is systematically gathered and analysed. The organizational capability to learn about the ecosystem can be an essential source of competitive advantage.

Pellikka & Ali-Vehmas (2016) claim:

In today's dynamic business environment, an organization's capability to catalyze the emergence and guide the development of a business ecosystem offers increasing potential as a powerful source of competitive advantage that underlines

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the importance of ecosystem strategies and their execution (e.g., Rohrbeck et al., 2009; Williamson & De Meyer, 2012). For example, Adner (2006) highlighted that depending on others in the innovation ecosystem has two important strategic implications: timing of market entry (i.e., getting to market ahead of your rivals is of value only if your partners are ready when you arrive) and resource allocation (i.e., allocating resources externally to the relevant partners can be more effective than allocating resources internally). In addition, Williamson and De Meyer (2012) listed six ways organizations can realize the benefits of the ecosystem: i) pinpointing the added value, ii) structuring differentiated partner roles, iii) stimulating complementary partner investments, iv) reducing transaction costs, v) enabling flexibility and **co-learning**, and vi) engineering value-capture mechanisms.

### *4) Research gaps*

Previous sub-sections presented first the definition of an ecosystem, followed by the definition of business ecosystems and innovation ecosystems. Then, their interrelationship and research focuses were described. Since the 2000s, research on ecosystems has been quite active; nonetheless, what kind of research questions remain unanswered? The last sub-section of the ecosystem literature review presents the latest research gaps suggested by scholars.

According to Jacobides et al. (2018), the following four topics are expected to be covered with further empirical studies.

#### *1) Ecosystem coordination:*

“research linking changes in modularization with the emergence and growth of ecosystems. (Jacobides et al., 2018)” is awaited. “The understanding of ‘accidental’ (or even illicit) ecosystems and the way they evolve is a fascinating area for future research (Jacobides et al., 2018)” is important.

#### *2) Ecosystem collaboration*

“there is benefit to a comparative analysis of different approaches that firms take to similar problems, with some engaging with or even creating different types of ecosystems, others choosing to rely on markets, and yet others becoming system integrators and vertically integrated providers. Is there an inherent advantage to each of these solutions?” “To what extent are there firm-specific skills in

leveraging capabilities, or knowing how to run ecosystems, as Helfat and Raubitschek (2018) argue—and which ones matter most?”

**3) *Ecosystem value creation/capture:*** (Jacobides et al., 2018)

“Our framework could also help explain competitive dynamics. How do the rules and expected fungibility of participating in one ecosystem change as a result of actions in another? That is, how does the growth of ecosystems such as Android affect the rules, required commitments, and standards of competing ecosystems such as iOS? And how do the hub firms and participants respond? Also, what role is played by regulators or social pressure groups?”

**4) *Ecosystem governance and regulation:***

Frameworks such as the RBV mostly concern themselves with owned resources. How should this perspective change when the resources exist not at the level of the firm, but at the level of the ecosystem? Furthermore, linking the RBV, dynamic capabilities, and ecosystems, what sort of resources and capabilities could be valuable for firms in this dynamic context (see Helfat and Campo-Rembado, 2015)? Helfat and Raubitschek (2018) recently argued that innovation capabilities, environmental scanning and sensing capabilities, and, in particular, integrative capabilities are critical for ecosystem orchestration and platform leadership. The question remains, how does the value of resources and capabilities differ depending on the role firms take within the ecosystem (hub vs. participants)?

Those are four research topics within ecosystem research that are expected to be studied further with empirical data. These four research gaps are quite basic, and this research expects to give a certain insight to understand them by posing following research questions.

■ *Possible questions to fill the research gap*

1. What kind of (potential) strategic options are available for a company that already develops certain business ecosystems to further develop its business ecosystem?
2. How can a new entrant company that does not have any business ecosystems develop an efficient business ecosystem fitting into an existing Innovation ecosystem?
3. “To what extent are there firm-specific skills in leveraging capabilities, or knowing how to run ecosystems, as Helfat and Raubitschek (2018) argue—and which ones matter most?”

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### *a) Research questions*

- 1) What type of business ecosystem is created by the focal enterprise?
- 2) What are the characteristics of the innovation ecosystems?
- 3) What type of business ecosystem does the focal enterprise aim to create, why and how?

### *5) Summary*

This section reviewed literature on ecosystems that consider trans-industrial actors as a community. Ecosystems give different visions from Porter's Five Forces, that sees a company facing against different companies in an industry. An ecosystem aims at understanding the nature of competition and cooperation at the same time. Two distinct but interrelated concepts, business ecosystems and innovation ecosystems, were defined. It was pointed out that both competition among business ecosystems and the positioning of a focal company in the business ecosystem are critical for the ecosystem strategy. A company should be aware of both innovation ecosystems of the supply side and those of the offer side (value proposition side).

By clarifying representative research focuses and research gaps, this section serves as an introduction to chapter 4.

Please note that there is a claim that business ecosystems do not concern themselves with the geographical aspect: a "business ecosystem is deliberately rejecting the importance of geography (Peltoniemi, 2004)." However, in this research, business ecosystems and innovation ecosystems are concern by their geographical characteristics. This comes from the nature of the research subject, mobility services, which is inevitably geographically dependent. While an essential value proposition remains the same, people's needs still vary depending on the urban structure, the degree of infrastructure development and the climate.

The next section presents literature on organizational capacity, which was already presented as a research focuses in this section, and organizational change management, that is switching the point of view from the outside of a company to the inside of an organization.

This research defines BMI as any change in business activity that significantly improves the ratio of input value and output value in broad sense. Then, based on this broad definition, this research tries to re-define BMI in a narrow sense by categorizing BMI literature to identify

what kind of changes are considered as BMI, as well as to identify the significance of the Innovation of a BM.

After identifying changes, these change sources are compared with literature on business model generation. After understanding the significance, this significance is compared to literature on innovation.



### *III) Literature review 3: Organizational change management*

“Managing change depends upon – to take just a few parameters – the context of the change, the type of change needed, the prevailing culture, the individuals involved and their personalities, the teams involved and their configurations” (Cameron & Green, 2009, p. 331).

This section explores literature on organizational change management. The interest in observing the organizational change process in the research comes from the perspective of business model innovation. Understanding organizational change management is understanding how a company should prepare for potential change of its business and business environment, knowing its own strategic intentions of business development.

#### ■ *Business Model Innovation, organizational change and capability development*

Organizational change management is a critical component of BMI as well as of ordinary business development. For the study of Business Model Innovation, Foss & Saebi (2017) argue that the role of organizational design has been almost completely neglected. Teece (2018) claims the necessity of studies that provide a better understanding of change and implementation in regards to business model innovation, shedding light on important aspects of dynamic capabilities. Organizational design plays an important role both in business model innovation and relevant capability development, since the introduction of new business models, for example, requires a separate organizational unit (Teece, 2018). Furthermore, according to Teece (2018), provided that the new business model changes are not impossible to reach from the existing business:

The strength of a firm's capabilities is implicated when business model changes are translated into organizational transformation. (...) Excellent asset orchestration skills are needed to effectively manage new business structures alongside existing operations. (p. 48)

Likewise, studies that focus on specific aspects of dynamic capabilities, such as opportunity recognition, entrepreneurialism, or flexibility, will illuminate aspects of business model innovation and implementation. The relationships between organizational capabilities of recognising opportunity, entrepreneurialism and flexibility should be further studied so as to better illustrate different aspects of business model innovation (Teece, 2018).

Continuous business model innovation is an important capacity for every firm seeking success in the long term (Sosna et al., 2010) and for every firm seeking to develop competitive

advantage (Verma & Bashir, 2017); however, no precise definition of business model innovation has yet emerged (Schneider & Spieth, 2013) as is mentioned above. Amit and Zott (2010) state that at a rather abstract level, business model innovation has been defined as the process of designing a new activity system or modifying the firm's extant one. This implies that looking at the process of organizational change is the key to better understanding the nature of business model innovation, while the role of organizational design has been almost completely neglected in business model innovation research (Foss & Saebi, 2016).

In this section, the author aims at constructing a basic understanding of organizational change management in the view of competitive advantage development and the business model innovation process. Important concepts such as organizational design and organizational change readiness as well as entrepreneurship as an agency of change will be presented.

It should be mentioned that in real world business practice, a company faces different constraints such as time constraints, resource constraints, capital constraints and regulation constraints. Furthermore, since early entrants on a market may acquire wrong resources and miss the best opportunities due to technological uncertainty and market uncertainty (Lieberman & Montgomery, 1998), the uncertainty in the development of relevant innovation ecosystems can also be a constraint for a pioneering company trying to develop a competitive advantage. Especially, when technological uncertainty exists and the technology required for a BMC is not available, this phase is pointed out as a critical phase for experimentation and learning by Cavalcante (2014): the pre-stage of BMC. This section also explains that organizational design and capability development have a certain impact on the development of first mover's advantage.

### ***1) Organisational design***

#### **■ *Origin of organizational theory***

One of the most cited articles on organizational change and development is that of Van de Ven & Poole (1995). They suggest four theories to explain processes of change in organizations: life cycle, teleology, dialectics and evolution. Lewin (1947) claims that a successful change of a social group includes three steps: unfreezing the present level, moving to the new level and freezing the new level. Lumpkin and Dess (1996) point out the emphasis on entrepreneurial *process*: the methods, practices and decision-making styles that managers use rather than strategy *content*: "what business shall we enter?" They define *new entry* as the essential entrepreneurial act: entering new or established markets with new or existing

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goods or services; they also suggest different key contingencies for entrepreneurial orientation. Organizational change is also considered as a part of innovation study, referred to as organizational innovation.

### ■ *Organizational design: a re-emerging domain*

The study field of organizational design is defined as “how to organize people and resources in order to collectively accomplish desired ends” (Greenwood & Miller, 2010, p. 78). Organizational design is a field of study for which “recently, there has been a resurgence of interest in understanding the design of organizations and institutions” (Van de Ven, Ganco, & Hinings, 2013). According to Van de Ven, Ganco, & Hinings (2013):

This resurgence is being fueled by (1) appreciating that design is a central and enduring problem of management scholarship and practice, (2) there is a growing demand for robust theorizing and empirical research on new forms for organizing ever-more-complex and dynamic situations, and (3) organization design goes beyond structure, and includes cognitive processes of sensemaking, creation and discovery, as well as social, economic, and political processes of developing and changing programs, policies, and routines. (p. 394)

Organizational design is important to maintain firms’ uniqueness and competitive advantage (Teece, Pisano, & Shuen, 1997). Appropriate organizational design is required to configure resources to firms’ uniqueness and competitive advantage (Benner & Tushman, 2003). Organizational design is a term associated to different terms and used almost synonymously Aubry & Lavoie-Tremblay (2018) to those such as structure (e.g., Chandler, 1962; Galbraith, 1995; Miles and Snow, 1978) and architecture (e.g., Nadler and Tushman, 2003) that are also used to define a business model by some scholars.

### ■ *Change and business dynamics*

As a business environment continuously changes, organization must change accordingly. In relation with BMI study, Foss & Saebi (2017) identified four research focuses dealing with changes and dynamics suggested by various scholars:

- Highlighting the different stages of the BMI process,
- Identifying the different organizational capabilities and processes required to support this change process,
- Citing the importance of experimentation and learning,

- Proposing practitioner-oriented tools for managing the process.

The research of Aubry and Lavoie-Tremblay (2018) mobilizes three theoretical grounds for organizational design: contingency theory, a historical approach and social theory. Be aware that these are interestingly similar to the imperfect imitability that Barney (1991) pointed out: historical independence, causal ambiguity and social complexity.

## *2) Organization as a source of competitive advantage*

In strategic management, development of the competitive advantage is a key research subject. A representative perspective from organization is Resource Based View (RBV) of (Barney, 1991).

### ■ *Resource Based View (RBV) - Competitive advantage*

Barney (1991) lists four essential requirements for a resource and/or skill to be a source of a sustainable competitive advantage:

- It must be valuable,
- It must be rare among a firm's current and potential competitors,
- It must be imperfectly imitable; and
- There must not be any strategically equivalent substitutes for this resource/skill.

Bharadwaj, Varadarajan, & Fahy (1993) state that distinctive skills (capabilities) and unique resources (asset) are two broad sources of competitive advantage.

A key focus of the research lies on the development of competitive advantage, in particular first mover's advantage. While the Resource-Based View and First-Mover Advantage have evolved as independent research streams, studies on first-mover advantages provide evidence on the accumulation of resources and capabilities by market entrants and how resources and capabilities evolve over time (Lieberman & Montgomery, 1998).

Helfat & Lieberman (2002) state:

In analysing the relationship between market entry and organizational resources and capabilities, we build upon a diverse and still somewhat sparse collection of research. Building on this research, we ask a series of interrelated questions:

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What are the types of potential entrants to a market?

How does the nature of resources and capabilities vary by type of entrant?

How do the pre-entry resources and capabilities of different types of entrants affect:

— which markets firms enter?

— what is the mode of market entry?

— what is the timing of market entry?

How do all of the above affect the success of entry? (p. 726)

In relation to ecosystem study, different capabilities such as innovation capabilities, environmental scanning and sensing capabilities, and in particular, integrative capabilities can be developed to remain competitive within an innovation ecosystem (Jacobides et al., 2018).

### ■ *First-mover advantage*

First-Mover Advantage (FMA) is defined as “a special case of competitive advantage resulting from market entry timing” (Kerin et al., 1992, p39). First-mover advantage can arise from both organizational competitive sources and non-organizational competitive sources. Organizational ones are, for example, the resource and skill pointed out by Barney (1991) in his RBV. Lieberman & Montgomery (1988) give some examples of non-organizational sources: “first-mover advantages arise from three primary sources: technological leadership (1), pre-emption of assets (2), and buyer switching costs (3)” (p. 41). These three sources pointed out by Lieberman & Montgomery (1988) are not necessarily organizational. In another article, Lieberman & Montgomery (1990) give three example actions for a firm to build FMA: (1) produce a new product, (2) use a new process, or (3) enter a new market. Here along with new product/process, a new market entry is mentioned as a way to establish FMA.

While a new market entry is suggested as a way to develop FMA, firms should be careful not to suffer from first-mover disadvantage. For example, Lieberman & Montgomery (1988) states that:

The mechanisms that benefit the first-mover may be counterbalanced by various disadvantages. These first-mover disadvantages are, in effect, advantages enjoyed by late-mover firms. Late-movers may benefit from:

(1) the ability to 'free-ride' on first-mover investments,

(2) resolution of technological and market uncertainty,

(3) technological discontinuities that provide 'gate-ways' for new entry, and

(4) various types of 'incumbent inertia' that make it difficult for the incumbent to

adapt to environmental change. These phenomena can reduce, or even completely negate, the net advantage of the incumbent derived from mechanisms considered previously.

Uncertainty is an important key word here as well to discuss FMA. For example, “all else equal, there is an indirect inverse relationship between demand uncertainty and the first mover’s preemptive-investment cost advantage” (Kerin et al., 1992). Doing things earlier than competitors does not necessarily mean that the company can develop FMA due to uncertainty. It is explained by Lieberman & Montgomery (1998) as following:

The bulk of First Mover Advantage literature focuses on the potential for pioneering firms to acquire superior resources and capabilities. Early entry into an emerging market may facilitate such accumulations. But pioneers often miss the best opportunities, which are obscured by technological and market uncertainties. In effect, early entrants may acquire ‘wrong’ resources, which prove to be of limited value as the market evolves.

The author considers that the case company is a pioneering company because of the following three reasons:

- The company builds a novel business ecosystem to create a novel value,
- The company operates where the innovation ecosystems of the key product/service required for its business operation are under development, and
- The company already developed a stable business model with reasonable (profitable or expected to be profitable) cost/revenue structure.

This type of company, after some months or a few years of operation, faces both strategic and organizational challenges. A typical fear is the emergence of copy-cats. Copycat competitors are competitors that copy the basic idea of the pioneer’s business model and erode its advantage (Teece, 2010) by diminishing differentiated features of a product (Linder & Cantrell, 2000) and/or a service. It is therefore important for a company that is in advance in terms of business development to prepare copycat measures. A copy-cat company can mimic the business of the pioneering company and can potentially dominate the market by putting much more capital than the pioneering company. This is explained by Lieberman & Montgomery (1988a):

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Managers who have chosen to emphasize pioneering must address a number of issues. First, how can the pioneer protect itself from imitation, to prevent later entrants from 'free-riding' on the pioneer's efforts? (...) Pioneers can sometimes preempt key resources, such as the most desirable retailing locations or distribution networks. If the product is one where consumer switching costs will be important, it may be essential that the pioneer induce trial by the majority of potential customers before rivals have an opportunity to do so. (...) Changes in the environment can give potential competitors a window of opportunity. Pioneers may want to consider broadening the product line, thereby thickening their relationship with customers and blocking opportunities for competitors to enter. First-movers must recognize that initial success does not automatically confer a franchise for permanent competitive advantage. Rather, first-mover advantages must be sustained by careful nurturing.

As is pointed out by Barney (1991) and Bharadwaj, Varadarajan, & Fahy (1993), capability development can be important in order to develop (or maintain) competitive advantage.

### *3) (Competitive) Capability development*

#### ■ *Dynamic capabilities facilitate to innovate the business model to stay competitive in the business ecosystem*

Dynamic Capabilities are one type of competitive capabilities that promote a BMC and BMI suggested. Teece (2007), for example, claims:

Understanding and implementing the processes and structures that undergird dynamic capabilities is enterprise specific, and requires intimate knowledge of both the enterprise and the ecosystem in which the enterprise cooperates and competes. In this regard, a useful distinction can be made between entrepreneurs, managers, and administrators. Administrators are responsible for the day-to-day operations and the routine; they help ensure that the enterprise is technically fit, in the sense defined earlier. They are not expected to engage in entrepreneurial activities; e.g., they are not relied on to sense new business opportunities. Nor are they typically expected to discover the need for and to design new enterprise-wide operating routines, as this constitutes evolutionary fitness. The distinctions made earlier are implicitly recognized by Porter (1996) when he claims that operational effectiveness is not strategy. He

recognizes that both operational effectiveness and strategy are essential to superior performance, but notes:

The quest for productivity, quality, and speed has spawned a remarkable number of management tools and techniques, total quality management benchmarking, time-based competition, outsourcing, partnering, reengineering and change management. Although the resulting operational improvements have been dramatic, many companies have been frustrated by their inability to translate gains into sustainable profitability. And bit-by-bit, almost imperceptibly, management tools have taken the place of strategy. As managers push to improve on all fronts, they move farther away from viable competitive positions (Porter, 1996: 61).

Chien & Tsai (2012) state that the dynamic capability of a firm has a positive impact on its performance. They also show that knowledge resources and the learning mechanism of the organization are critical drivers of dynamic capability.

Teece et al. (1997) addressed the question of “how and why certain firms build competitive advantage in regimes of rapid change” by introducing dynamic capability concept. They define dynamic capacity as “the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (Teece et al., 1997).

Dynamic capability can be considered as an academic stream that is based on Barney's Resource-Based View since dynamic capabilities are equivalent to organizational capabilities for reconfiguring existing resources. Agarwal & Selen (2009) summarize the arguments of Barney (1991) as “organizational creativity and performance is built through the deployment and use of idiosyncratic, valuable, and inimitable resources and capabilities that might be heterogeneously distributed across the organization.” The term dynamic capability is defined by Eisenhardt & Martin (2000) as follows:

The firm's processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die. (p. 1108)



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This is a definition built upon the one of Teece, Pisano, & Shuen (1997):

the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments. Dynamic capabilities thus reflect an organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions (Leonard-Barton, 1992). (p. 516)

The research of Agarwal & Selen (2009) focuses on “the impact of dynamic capability building on service innovation through Elevated Service Offerings (ESO), with ESO defined as a new or enhanced service offering that can only eventuate as a result of a collaborative arrangement, one that could not otherwise be delivered on individual organizational merits.” They pose a critical question: “what are the dynamic capabilities that collaborative organizations need to manage and inculcate in order to create and deliver ESO in collaborative settings, with particular focus on customer interactions in service organizations?” (Agarwal & Selen, 2009). They divide the capabilities into five categories: Entrepreneurial alertness, collaborative agility, customer engagement, collaborative innovative capability and collaborative organizational learning.

In addition, entrepreneurship and organizational learning are two critical components closely linked to (or even as a part of) Dynamic Capabilities (Teece, 2007; Teece et al., 1997).

### *4) Change management and entrepreneurship*

For organizational change management, entrepreneurship is an important element, especially concerning a new business development, therefore, concerning BMC and BMI.

#### ■ *Change as a process*

Organizational change is a study domain of process. According to Smallman, Van de Van, & Tsoukas (2013),

process studies address questions about how and why things emerge, develop, grow, or terminate over time, as distinct from variance questions dealing with covariation among dependent and independent variables (Langley, Smallman, Tsoukas, & Van de Ven, 2009; Mohr, 1982). Process research, thus, focuses empirically on evolving phenomena, and it draws on theorizing that explicitly incorporates temporal progressions of activities as elements of explanation and understanding.

### ■ *Entrepreneurship / Corporate entrepreneurship*

Entrepreneurship research has been expanding its boundaries by exploring and predicting entrepreneurship phenomena such as innovation, new venture creation, individual entrepreneurs and entrepreneurial organizations (Antoncic & Hisrich, 2003). Venkataraman (1997) defines entrepreneurship as a scholarly field which consists in understanding how and by whom the opportunity to create future goods and services is discovered, evaluated, and exploited. Other scholars define it as the process by which firms notice opportunities and act to creatively organize transactions between factors of production, so as to create surplus value (Jones & Butler, 1992). The opportunity is a fundamental element within entrepreneurship study that transversally connects relevant knowledges such as on individual(s), organization and business environment (Chabaud & Messeghem, 2010). The author considers entrepreneurship as a source of new business creation (if not a source of innovation) as an active agent that continuously seeks opportunities to create future value which answers the potential needs of consumers.

A recent topic of entrepreneurship research is the combination of the studies on (1) processes of new venture development and (2) business models (Trimi & Berbegal-Mirabent, 2012). The study on (1) the entrepreneurial process of starting a new venture is composed of three main elements: the recognition of an opportunity, the arrangement of an entrepreneurial team and the selection of the resources to exploit the opportunity (Timmons & Spinelli, 1994), in order to deliver the desired values. On the other hand, (2) business models articulate the logic, the data and other evidence that support a value proposition for the customer and a viable structure of revenues and costs for the enterprise delivering that value (Teece, 2010). It also depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities (Amit & Zott, 2001). It should be noted that there is a discussion about the business opportunity: if it is something pre-existent to be discovered or if it is something to be created (Chabaud & Messeghem, 2010).

Since entrepreneurship is concerned by the discovery and exploration of profitable opportunity (Shane & Venkataraman, 2000), it shall be mentioned that business models that keep evolving to reach a certain level of maturity (McGrath, 2010) can be discovered, adjusted, and fine-tuned by "doing" (Winter & Szulanski, 2001). In this context, entrepreneurship can be defined as the active bodies trying to discover the business models that can potentially be adopted by the company in the future. These active bodies, if they are

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in association with an existing organization, constitute corporate entrepreneurship, defined as the process whereby an individual or a group of individuals create a new organization or instigate renewal or innovation within that organization (Sharma & Chrisman, 1999).

### ■ *Lead user*

For new market exploration, it is important to identify the lead users to understand potential needs or requirements of the service or product that the company develops. Companies address lead users to understand the future needs and even more to obtain solutions or keys to potential solutions (Eisenberg, 2011). Lead users of a novel or enhanced product, process or service are characterised by following two aspects (von Hippel, 1986):

- 1) Lead users face needs that will become general in a marketplace, but face them months or years before the bulk of that marketplace encounter them, and
- 2) Lead users are positioned to benefit significantly by obtaining a solution to those needs.

Lead users offer very important insights for firms since they can contribute to the development of innovative products and services (Lehnen, Schmidt & Herstatt, 2016) and particularly customer-oriented ones (Herstatt & von Hippel, 1992). Early adapters, in contrast to lead users, are defined as the first users to buy a product that already exists on the market (Churchill, von Hippel & Sonnack, 2009). Firms can develop a new or enhanced product by answering the needs of lead users, and early adapters then buy the developed product placed on the market by the firm. A practical method is proposed by Luthje and Herstatt (2004): The Lead User method. The third step proposed in this methodology is the identification of lead users. How to identify these lead users is one of the topics actively covered by scholars (e.g., Tuorob & Tucker (2015).

Those identified as lead users are important initial customers who allow firms to expand their business through relationship marketing.

### ■ *Relationship marketing*

The strategic intention of the case company is to develop services upon the existing services and/or existing clients. This approach is studied as relationship marketing, where a company aims at creating customer loyalty so as to build a mutually profitable and long-term relationship with existing customers (Ravald & Gronroos, 1996). This definition describes

what the case company intends to do to develop its business. However, this definition lacks an entrepreneurial perspective.

The rise of relationship marketing was closely linked to the growth of the service sector, characterized by long-term customer relationships (Gummerus et al., 2016). "Firms are linked to their environments, not only being dependent on them but also actively shaping them" (Gummerus et al., 2016).

Relationship marketing is defined by Berry in 1983 as "attracting, maintaining and - in multi-service organizations - enhancing customer relationships" (Berry, 1995).

The purpose of relationship marketing is "to identify and establish, maintain and enhance, and when necessary, terminate relationships with customers (and other parties) so that the objectives regarding economic and other variables of all parties are met. This is achieved through a mutual making and fulfilment of promises" (Grönroos, 2015, p. 281).

To implement relationship marketing, Berry (1983) suggest five strategic elements:

- developing a core service around which to build a customer relationship,
- customizing the relationship for the individual customer,
- augmenting the core service with extra benefits,
- pricing services to encourage customer loyalty, and
- marketing to employees so that they, in turn, will perform well for customers.

Gronroos (2016) writes that "relationship marketing readiness: theoretical background and measurement directions". In the paper, he discusses relationship marketing readiness that focuses on "the firm's readiness to maintain and enhance relationships".

Gummerus et al. (2016) suggest two possible future orientations for this research domain:

- 1) a holistic approach to establish a grand theory of relationship marketing or inspecting it on the market or *ecosystem level*,
- 2) extending the limit of relationship marketing: inspecting relationships in an evolving context, such as digital relations, or special and temporal objects, but also with more multifaceted research methods, in particular qualitative ones, or through the practitioner theories in use, practices, or *capabilities* needed for successful relationship marketing. [emphasis added by the author]

#### ■ *Entrepreneurial marketing*

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The other important concept is entrepreneurial marketing. As Kilenthong, Hultman, & Hills (2016) explain:

Firms today operate in a rapidly changing environment with fierce competition and increasingly demanding customers. Firms have a limited ability to forecast customer demand and their market boundaries are hard to define (Day & Montgomery, 1999). Entrepreneurial marketing (EM), an interface between marketing and entrepreneurship, has emerged as a marketing practice for firms operating in highly dynamic environments. Entrepreneurial marketing integrates marketing and entrepreneurship through the concepts shared by the two fields (Morris, Schindehutte, & LaForge, 2002). Those concepts are innovativeness in their approach to management, having customers as an intense focal point, and a requirement to cope with risk and uncertainty (Hills & LaForge, 1992).

Entrepreneurial marketing is defined as “marketing carried out by entrepreneurs or owner-managers of entrepreneurial ventures” (Stokes, 2000). The market orientation and innovativeness are two key factors. Market orientation is defined as actions such as listening to customers and delivering solutions on the basis of customer demands, whereas the innovativeness is defined as a firm’s proclivity, receptivity, and inclination to adopt ideas that depart from the usual ways of approaching business (Menguc & Auh, 2006).

### *5) Organizational change readiness*

When discussing organizational change management, change readiness is a key concept, as well academically as in practice. Change readiness is defined by Rafferty et al., (2013) as an individual’s “beliefs, attitudes, and intentions regarding the extent to which changes are needed and the organization’s capacity to successfully undertake those changes” (Armenakis, Harris, & Mossholder, 1993, p. 681). Change readiness is the most prevalent positive attitude toward change that has been studied in organizational change literature.

Table 9 Definitions of change readiness

Author	Definition
Armenakis et al. (1993)	Readiness for organizational change: Organizational member’s beliefs, attitudes, and intentions regarding the extent to which changes are needed and the organization’s capacity to successfully make those changes. The

	cognitive precursors to the behaviour of either resistance to, or support for, a change effort.
Jansen (2000)	Readiness for change: An organization's capacity for making changes and the extent to which individuals perceive the changes as needed.
Holt et al. (2007)	Readiness for organizational change: Employees' beliefs that (a) they are capable of implementing a proposed change, (b) the proposed change is appropriate for the organization, (c) the leaders are committed to the proposed change, and (d) the proposed change is beneficial to organizational members.

According to the definition of the organization, "people", "structure" and "collective goal" are the three key elements that determine the organization. Armenakis, Harris, & Mossholder (1993) states that readiness for change is distinguished from resistance to change. They define the readiness as "the *cognitive* precursor to the *behaviour* of either resistance to, or support for, a change effort".

Looking deep into the literature on readiness for organizational change, individual readiness for organizational change is distinguished from organizational readiness for change (M. Choi & Ruona, 2011). Readiness for organizational change can be defined as employees' beliefs that (a) they are capable of implementing a proposed change (i.e., change self-efficacy), (b) the proposed change is appropriate for the organization (i.e., appropriateness), (c) the leaders are committed to the proposed change (i.e., management support), and (d) the proposed change is beneficial to organizational members (i.e., personal valence) (Holt, Armenakis, Feild, & Harris, 2007) .

Coch and French (1948) demonstrated the effect various forms of employee participation had on productivity and satisfaction during times of change. They found that the greater the extent of participation (i.e., none, participation by representation, and total participation), the more employees were satisfied and the quicker they met new production goals (Armenakis, Feild, & Harris, 2007). Knowing the importance of employees' beliefs towards change, once a change process starts, the question is rather how quickly employees can redefine their work responsibility to continuously execute the new mission of the organization. This capability is

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not only critical for intended changes but also for unpredictable changes imposed on the organization from external factors due to the change of the business environment, for example. Amis & Aissaoui (2013) point out that the readiness for change is a shared and co-developed property of individuals and organization, and few studies have accounted for their combined effects. Holt, Armenakis, Feild, & Harris (2007) explain that:

as these purposeful changes are introduced, differences and conflicts between the organizational leaders and members may be confronted. For change to occur in the direction that leadership desires, conflicts must be resolved such that organizational members' beliefs and cognitions align with those of the leaders (termed dialectical change by Van de Ven & Poole, 1995). In essence, a state of readiness must be created. (p. 234)

### ■ *Resource constraint*

The creative use of a company's resources is also an interesting topic to cover in organizational study. Sonenshein (2014) reminds us of a contrary view that scholars have on scarcity or abundance of resources and creativity.

Sonenshein (2014) claims that:

While resources are unquestionably important in shaping creative outputs, scholars too have presented contrasting viewpoints. On the one hand, some scholars suggest that more abundant resources are a prerequisite to creative action through the direct effect of providing individuals with what they need for creative action and through the symbolic effect of demonstrating an organization's commitment to a project (e.g., Amabile, Conti, Coon, Lazenby, & Herron, 1996); furthermore, a firm's slack resources allow for learning and experimentation (Cohen & Levinthal, 1990). On the other hand, some scholars argue that limited resources foster creativity through enhancing task challenge (Ohly & Fritz, 2010). Scholars have also argued that external resource constraints can foster creative behaviors through generating urgency (e.g., Baker & Nelson, 2005). Conversely, better-endowed organizations may struggle with creativity because too many resources can lead to wasteful spending and a lack of urgency (Nohria & Gulati, 1996). (pp. 814-815)

The above cited paragraphs indicate the scholars' interest regarding the links between limitation of resources and creativity of the organization.

### ■ Assessing readiness

Based on the model suggested by Armenakis et al. (1993), Holt, Armenakis, Feild, & Harris (2007) explain that readiness assessment is a step “intended to determine just how ready for change employees are before organizational changes are implemented.” “This assessment enables leaders to identify gaps that may exist between their own expectations about the change initiative and those of other members. If significant gaps are observed and no action taken to close those gaps, resistance would be expected, and therefore, change implementation would be threatened” (Holt et al., 2007). “Assessment enables leaders to identify gaps that may exist between their own expectations about the change initiative and those of other members” (Holt, Armenakis, Feild, & Harris, 2007). Holt, Armenakis, Feild, & Harris (2007) suggest that (1) discrepancy, the belief that a change was necessary, (2) efficacy, the belief that the change could be implemented, (3) organizational valence, the belief that the change would be organizationally beneficial, (4) management support, the belief that the organizational leaders were committed to the change, and (5) personal valence, the belief that the change would be personally beneficial, are five factors that measure the change readiness.

### ■ *Emotion and participation*

Glinow, Shapiro & Brett (2004) focus on the emotional conflict of a team and its performance.

Coch & French (1948) suggest that the rate of productivity recovery is proportional to the employees’ participation to the change process. They take a case of a sewing plant that makes pyjamas and examine the productivity of workers.

Rafferty, Jimmieson, & Armenakis (2013)

future researchers should explore whether affective and cognitive change readiness have distinct antecedents, and by conducting longitudinal research, they should consider whether the importance of affective and cognitive change readiness shifts over time.

### ■ *Path dependency*

As is pointed out by Teece et al. (1997) an important research focus is understanding how some organizations first develop firm-specific capabilities, and how they renew competences to respond to shifts in the business environment. These issues are intimately tied to the firm's business processes, market positions, and expansion paths (Teece et al., 1997).



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Sydöw, Schreyögg, & Koch (2009) give an interesting focus on organizational path dependence, suggesting that there are three different phases: preformation, formation and lock-in. They question “how organizations can lose their flexibility and become inert or even locked in” (Sydöw et al., 2009). Sydow, Schreyogg & Koch (2009) examine how organizations can lose their flexibility and become inert or locked in, as opposed to asking how to maintain organizations flexible.

### 6) *Potential contributions*

This research can enrich the understanding of **organizational designs** (process and content) through empirical observations that are in accord with LUT’s strategic intention. Referring to Greenwood and Miller (2010)’s definition of organizational design: “how to organize people and resources in order to collectively accomplish desired ends”, the desired ends are strategic intentions of the company (chapter 4):

1. accomplishing effective *relationship marketing* to create “a client club”,
2. accomplishing *entrepreneurial* service development, and
3. accomplishing the implementation of *dynamic capability* to develop competitive advantage.

### IV) *Literature review summary*

A **Business Model** (BM), according to Amit & Zott (2001), “depicts the design of transaction content, structure, and governance so as to create value through the exploitation of business opportunities” while the definition of the concept has not yet obtained accordance among scholars (Björkdahl & Holmén, 2013; Foss & Saebi, 2017; Rasmussen, 2015). BM literature suggests that 1) value proposition, 2) value network, 3) revenue/cost stream and 4) leadership are four essential components of a business model. The value network is equivalent to a **business ecosystem** (Chesbrough, 2007) by its definition.

Jacobides, Cennamo, and Gawer (2018b) suggest three taxonomies of ecosystem: business ecosystems, **innovation ecosystems** and platform ecosystems. The difference between business ecosystems and innovation ecosystems was explained in this chapter: an innovation ecosystem is centred around value proposition (product/service), while a business ecosystem is an enterprise-centric ecosystem.

The concerned innovation ecosystems of the business impact the business model of the focal company. **Business Model Innovation (BMI)** is defined by Björkdahl & Holmén (2013) as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace” (p. 215). Some scholars suggest that BMI can be a source of **competitive advantage** (e.g., Verma & Bashir, 2017). The author distinguishes mere Business Model Change (BMC) and BMI by the fact that the BMC can improve the business performance of the company, including financial performance and the development of competitive advantage.

To understand the sources of competitive advantage, Porter’s five competitive forces, Barney’s Resource-Based View and First-Mover’s Advantage were reviewed. **First-Mover’s Advantage** is defined as “a special case of competitive advantage resulting from market entry timing” (Kerin et al., 1992, p39).

In the context where the development of innovation ecosystem remains **uncertain**, the organization’s **dynamic capabilities** can be an important source of competency. Identification of market opportunity is **entrepreneurial** activity and careful observation on **lead users** and a close relationship with these lead users would be of use to diversify its service: **relationship marketing**. To exploit the identified market opportunity by using existing internal and external resources, **organizational design** and **organizational change readiness** shall be key elements to be thought. To promote BMC or BMI, Teece suggests Dynamic Capabilities as critical organizational capabilities.

In addition to what was evoked above, it is suggested by Cavalcante (2014) to define the phase when technology required for **BMC** is not yet available as the **pre-stage** of BMC. In relation with the **uncertainty** (Courtney, Kirkland, & Viguerie, 1997) within the development of relevant **innovation ecosystems** and with the development of **FMA**, this concept of a pre-stage can be applied to product unavailability as well.

### Recapitulation – Key Takeaways

This chapter reviews three streams of literature: business models, innovation ecosystems and organizational change management.

Business models is an academic domain emerged in the 1990s along with the dot-com business boom. Four essential components of business models are identified and presented: value proposition, value network, revenue model and leadership capability. The first sub-section presents a history of the development of the concept and its relationship to other academic disciplines such as business strategy, technology management, organizational theory, innovation management and entrepreneurship. The main theoretical focus of the thesis is business model innovation, that can be considered as an intersection of business model study and innovation management study. The last sub-section presents a fundamental research gap pointed out by Bucherer, Eisert, & Gassmann (2012) stating that “although the literature offers a great number of examples of business model innovation, in-depth case studies based on recent cases and primary data are rare” (p. 186). The thesis aims at filling this research gap by giving an in-depth case study on business model innovation based on a recent case and primary data. In particular, the pre-stage of a BMC suggested by Cavalcante (2014) as a critical phase for a BMC is explained. The main contribution of the thesis is developed upon this concept.

The second section reviews innovation ecosystems and business ecosystems. The thesis adapts the definition of an ecosystem by Jacobides et al. (2018): an ecosystem is defined as “a set of actors with varying degrees of multi-lateral, non-generic complementarities that are not fully hierarchically controlled” (Jacobides et al., 2018). The distinction between an innovation ecosystem and a business ecosystem is explained: the former is a value proposition-centric concept while the latter is a company-centric concept. The business ecosystem can be assimilated as a component of a business model - value network. Business ecosystems can be considered as an extension of the concept of value network. At the end of the second section, a research gap is identified: “ecosystem governance and regulation” (Jacobides et al., 2018). While “frameworks such as the Resource Based View mostly concern themselves with owned resources (...), how should this perspective change when the resources exist not at the level of the firm, but at the level of the ecosystem?” (Jacobides et al., 2018). And, linking the RBV, dynamic capabilities, and ecosystems, what sort of resources and capabilities could be valuable for firms in this dynamic context (Helfat and Campo-Rembado, 2015)? These research gaps are also addressed by the thesis.

The third section is on organizational change management. The section overviews basic organizational theory focusing on change management aspect and presents the intersections with business model innovation and innovation ecosystems. Two key concepts that help to address above-mentioned research gaps are identified: organizational design and dynamic capability. Greenwood and Miller (2010) define organizational design as “how to organize people and resources in order to collectively accomplish desired ends”. Here in the thesis, a “desired end” is considered as the accomplishment of a BMI. On dynamic capabilities, Teece (2007) states that “understanding and implementing the processes and structures that undergird dynamic capabilities is enterprise specific, and requires intimate knowledge of both the enterprise and the ecosystem in which the enterprise cooperates and competes.” He points out that the knowledge on both the enterprise and the ecosystem are required to deepen the understanding of dynamic capability. Since the thesis deals with the business model innovation of a company and its pertinence to the innovation ecosystem, the dynamic capability is an organizational capability that should be taken into consideration during the research and in the discussion.

*CHAPTER 3 – RESEARCH QUESTION AND METHODOLOGY*

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This chapter presents research questions and the methodology of the research. The research questions are formulated based on the literature review and possible access to the field, as well as social demand.

### *1) Formulation of the research questions*

This section presents the research questions. Before presenting the research questions, the institutional setting, case and social demand are explained in order to clarify practical aspects of the author's research activity.

#### *1) Institutional setting and social demand*

##### ■ *Institutional setting*

This research was financially supported by l'Institut de la Mobilité Durable<sup>17</sup> (IMD: Sustainable Mobility Institute) during three years from May 2016 to April 2019. Renault India was also ready to finance the research, but it could not do so due to administrative reasons. Lithium Urban Technologies – the case company - also expressed its readiness to finance the research, though it neither happened. Still, both companies supported the execution of the research in practice, especially during the field surveys. Renault India and Lithium Urban Technologies gave the author opportunities to closely observe their business activities. Lithium Urban Technologies supported the author's local stay practically, as well as local logistics for the execution of the field surveys in Bangalore.

This research was initially planned as a part of the "NextVolt 2" project of IMD<sup>18</sup>. Therefore, the field and the main observation focus of the research were determined a priori: urban India and electric mobility. Based on that predetermined field and focus, a preparative survey of six months was conducted from April 2015 to August 2015 (see p. 169) so as to identify potential case studies and an academic focus for the research. It was during this preparative survey that the author identified Renault India and Lithium Urban Technologies as research collaborators. Lithium Urban Technologies had just begun operating in May 2015. Through a series of discussions with these actors, the *business model* emerged as an important key

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<sup>17</sup> Institut de la Mobilité Durable is a research institution co-founded by Fondation Renault (Renault Foundation) and ParisTech.

<sup>18</sup> NextVolt is the antecedent research project of the thesis led by Jean Grebert (urban mobility expert) in Institut de la Mobilité Durable (Sustainable Mobility Institute).

concept. The author, then started exploring literature on business models as a starting point so as to understand the evolution of this academic domain.

#### ■ *Case*

The studied case company began operating in May 2015; its activity consists in providing an employee transport service to client companies using EVs. With more generic terms, it is a start-up company providing a mobility service to business users. From the beginning of its operation, the company has been aware of the thread of potential business competitors: copycats. The company mainly labels copycats as other start-up companies setting up the same business and having access to larger capital so as to dominate the market. A main operational quest has been to determine how to prepare for the emergence of copycats and maintain its pioneering position.

#### ■ *Social demand (problematics of the case company) and access to the field*

The author followed the business development of the case company since the first contact with a co-founder in 2015. From the very early stage of business development, the managers of the company – the CEO and a co-founder – intended to expand the company's market beyond Bangalore. Cities such as Delhi, Mumbai, Chennai, Pune and Hyderabad have always been the targets of new market development. Also, the managers of the company intend to diversify its service.

How does LUT explore those two options? That is a common interest from operational and academic perspectives. The operation-oriented research questions provided by the company are twofold:

- how does a pioneering company stay a pioneer? (as in 2016),
- what are the organizational challenges to preparing the future development of the business? (as in 2018).

The first question was provided by the company. The second question was formulated through a series of discussions with the company.

In order to explore insights to answer these questions, four field surveys were led (see methodology - chapter 3). The first field survey was mainly dedicated to understanding the business model of the company. The second and the third surveys were to understand the local business environment. The last survey was mainly dedicated to understanding the organizational aspects of the company, especially its change and change readiness.

## Chapter 3 – Research question and methodology

Through these field surveys, in addition to continuous desktop surveys, the understanding of internal and external business environments is increased so as to better describe the reality of the company's business development and business environment.

During the four field surveys, the author enhances the understanding on other EV-related projects as well, such as mobility services using different types of electric vehicles (two and three-wheelers) and different strategies of the concerned companies towards the deployment of charging infrastructure.

By the end of 2017, the focus on organizational change emerged through discussions with the co-founder. The principal objective of the survey in 2018 was to deepen the understanding on the organizational aspect. The aim of the survey in 2018 was to comprehend the changes in organization and operation of the past two years and to discuss the mitigation actions against different constraints with the co-founder. Through this, the author tries to provide an analysis for the company explaining what kind of organizational challenges exist within the company.

The data collection is executed in such a way as to answer the operation-oriented questions of the company (social demand) as well as the research questions of this research. By doing so, the author obtained access to the field data.

Besides, since the research was financially supported by IMD, the data collection took the fundamental requirements from the institute into consideration: to better understand and illustrate the potential development of the EV market, EV-related services and EV-related infrastructure in India.

Cited above are three aspects – institutional setting, case and social demand – that the author took into consideration in his research designing and execution.

### *2) From the literature review*

Having taken the above-mentioned parameters – institutional setting, case and social demand – into consideration, the author identified business model innovation as a principal domain of study to which the research can potentially contribute. The research mainly mobilizes three streams of literature (see chapter 2):

- Business models and business model innovation,
- Innovation ecosystems and business ecosystems,
- Organizational change management.

On the one hand, the exploration of literature on innovation ecosystems and business ecosystems allows the author to comprehend the external factors of business model innovation. On the other hand, exploring the literature on organizational change management helps to understand what the importance of internal factors in a business model innovation's feasibility.

### ***Business Model Innovation***

Business Model Innovation (BMI) is considered as a new source of competitive advantage (Urbancova, 2013; Bashir et al., 2017)<sup>19</sup>. It is defined as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes” (Björkdahl & Holmén, 2013, p. 215). BMI is also said to help enterprises “*compete and differentiate themselves successfully in their marketplace*” (Baregheh, Rowley, & Sambrook, 2009). This aspect of BMI should be further studied. (The transition from a business strategy to a corporate strategy and the reconfiguration of business ecosystems are two other interesting focuses.)

BMI requires a reconfiguration of its value network in order to be successful. The value network can be found inside and out of the organization. While the former – value network inside the company – leads to the study of organizational change management, the latter – value network outside of the company – leads to the literature exploration of business ecosystems and innovation ecosystems.

### ***Business ecosystems and innovation ecosystems***

Innovation ecosystems and business ecosystems are two interrelated concepts and are concerns to be taken into account when the environment of the business is dynamically changing (Chapter 2). An innovation ecosystem is defined as “*the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution*” (Adner, 2006). A company, so long as it collaborates with other companies, needs to take the innovation ecosystem into consideration when constructing its business ecosystem. The evolution of the innovation ecosystem is indeed a critical parameter for BMI.

### ***Organizational change management***

In the literature on organizational change management, the importance of organizational capabilities<sup>20</sup> building and change readiness is ascertained. Change readiness only happens when the change is planned and predicted. When a BMI change lacks predictability due to an

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<sup>19</sup> As innovation constitutes one of the sources of competitive advantage and business model innovation is a type of innovation.

<sup>20</sup> E.g., Entrepreneurial capability, dynamic capability (capability to obtain capabilities).



## Chapter 3 – Research question and methodology

uncertainty about the innovation ecosystem's evolution, capability development can be a wasted investment for a company; the business opportunity is not exploited. This is why dynamic capabilities, understood as the organizational capabilities to structure and prepare an organization, are of crucial importance. However, developing dynamic capabilities requires business resources. Thus, if the business opportunity cannot be identified or the identified opportunity to exploit is not profitable enough, the company's investment on capability development will be a wasted investment anyways.

### *3) Research questions*

Based on the practical parameters and literature reviews, the author sets the following as research questions:

- How do top managers **formulate the vision** of a start-up company while the development of relevant innovation ecosystems remains uncertain?
- What are the **challenges** in developing competitive advantages while envisaging to attain a Business Model Innovation in the context where the development of relevant innovation ecosystems remains uncertain?
- What **organizational capabilities** should be developed to prepare a Business Model Change while the development of relevant innovation ecosystems remains uncertain?

The author expects to answer these questions and to contribute to the identified research gaps through the discussions on these research questions. To seek answers to the research questions, the research adopts the following methodology.

### *II) Methodology*

*“Critical collective work is the necessary condition of scientific objectivity” (Dumez, 2016).*

This section explains the methodology. This research is a comprehensive form of research that mixes different methodologies and data sources to tackle the research questions: document analysis, a case study and participant observation. It mostly relies on a case study and field observation. Most of the data is qualitative, but some quantitative data has also been used to analyse and understand the case company's business development. The essential data upon which the research is based comes from the interviews and on-site observations carried out in the field by the author.

## ■ *Research strategy*

One of the purposes of social science research is to fill the gap between theory and reality. Thus, the research strategy was to identify existing gaps through an academic literature review so as to design a research strategy that could try to fill them. Through this research approach, a researcher can expect to produce results with many valuable academic contributions. However, this approach has a weak point: the field data is not always to analyse the identified research gaps.

This research took an alternative approach as the field and topic were already fixed. In parallel with the identification of available data on the field through field surveys, relevant academic literature was explored so as to identify the research gaps that the available data can fill. It was possible to adopt this approach because it had been decided in advance to conduct more than three field surveys.

In October 2015, when the research started, the only stream of literature identified as one to be dealt with during the research was that on business models. Other literature domains covering business ecosystems, innovation ecosystems and organizational change management were identified during the research activities.

A term similar to “ecosystem” was used in the previous research project NextVolt: “Electric Mobility System (EMS)”. This concept was defined as the combination of infrastructures, services and vehicles that are necessary for the diffusion of EVs. The development of EMS had been considered important for the potential diffusion of EVs among the researchers of NextVolt project. While EMS is a concept similar to an innovation ecosystem of EVs, the two are different concepts.

The research design has evolved during the research activities, as well as the research question. This research is a comprehensive form of research, based on a case study method that partially mobilizes observation participation.

### *1) Comprehensive research*

The research intends to take a comprehensive research approach, mainly relying on qualitative data obtained through field surveys.

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### *a) Unique dynamics*

A characteristic of the comprehensive research approach is its unique dynamics. As explained by Dumez (2016):

Research is traditionally seen as a sequential process: it begins by formulating questions, goes on by doing literature review, then a methodology is chosen, data are collected, formatted and processed, results are discussed, and the conclusion highlights both the results and limitations of the research, before opening on a future research agenda. Although this pattern is commonly accepted, it does not match the dynamics of comprehensive research. (...) [the] comprehensive research operates by successive loops that allow researchers to specify their approach over time. (pp. 27-28)

The author follows this principle of a comprehensive research approach. The thesis is structured as a linear sequence that first presents a literature review identifying literature gaps, then shows states the research questions, followed by a presentation of empirical data and analysis and finally a discussion and conclusion; however, it does not represent the actual research process that the author takes.

#### ■ *Risks to avoid: abstract actor, circularity and equifinality*

There are phenomena that harm the rigor and rigidity of the research result when conducting comprehensive research. The most common risks pointed out by Dumez (2016) are abstract actors, circularity and missing equifinality. The issue of an abstract actor is essential for a comprehensive research approach since the core of comprehensive research lies in understanding how actors act and why they do so. When actors are left abstractly defined, the researchers tend to not delve enough into how actors think, act, engage in conflict, debate, try things out, fail nor succeed (Dumez, 2016). One concrete and crucial way of avoiding this is to clarify the unit of analysis: the team of managers in the research (CEO, co-founder and COO) with special focus put on the CEO and the co-founder. In terms of circularity, the research as a result “redefines” an existing concept that is considered as a common theoretical result in comprehensive research (Dumez, 2016, p. 148). It does not directly remove the risk of circularity. One way to totally exclude the risk of circularity is to set a hypothesis, for example, and compare the hypothesis with the observed reality. The author does not take this method as the research methodology or as the research process. The last risk in comprehensive research is the missing equifinality. This risk arises since the reason

behind one phenomenon can be explained differently as there are multiple ways and initial conditions that at the end arrive at a final state (Dumez, 2016). The author does his best to explore different possible explanations each time it is necessary, while acknowledging that he can be subject to criticism in this regard.

#### ■ *“Pivoting” in research design and execution*

Related to the unique dynamics of the comprehensive research explained above, the author explains two pivoting points that the research went through. The first pivot relates to the research field. The author prepared a research plan with an observative field focus on electricity supply service in Indian cities. Due to the evolution of the local electricity supply-related projects, to the development of EV-related markets and electric mobility services, and to the change in social demand, the field survey focus changed from electricity supply-related services to electric mobility services. The second pivoting point related to the focal case study. The author, after conducting two field surveys, intended to make three case studies so as to achieve triangular cases. Due to the access to the data, to the richness of the data and to the social demand, the author decided to complete the research with a sole case study. The research design including research questions, and field survey plans have been continuously adjusted according to the dynamic evolution of the research environment.

## *2) Case study method*

This research uses a case study. *“A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context especially when the boundaries between phenomenon and context are not clearly evident”* (Yin, 2003, p13). As defined by Yin (2003), the research examines a contemporary phenomenon within its real-life context. Here, the research revolves around the business activities of a start-up company. The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than there are data points, as each result relies on multiple sources of evidence (Yin, 2003). As is described below, this research relies on multiple sources of evidence such as interviews, on-site observations, academic articles, news articles and public reports. The case study inquiry benefits from the prior development of theoretical propositions to guide data collections and analysis (Yin, 2003). This research benefits from theoretical propositions based on literature reviews on business model innovation, innovation ecosystems and organizational change management to guide data collections and analysis.

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This research does not employ a “comparative case method” with multiple case studies due to a research constraint explained above.

Yin (2003) suggests that there are five components of research design: a study question, propositions (if any), a unit(s) of analysis, a logic linking the data to the propositions, and criteria for interpreting the findings. The study question corresponds to the research questions explained above. The research does not have specific proposition. The unit of analysis is presented above as the team of managers. The logic linking the data to research results and the criteria for interpreting the findings will be explained throughout the case description, case analysis and discussion.

### *a) Case of LUT: Strategy and business model*

The case study focuses on a start-up company in Bangalore. To better collect data on the business model and ecosystem, two complementary data collections are compiled: field surveys and desktop literature reviews.

#### ■ *Field surveys*

Four field surveys and one “preparative” survey were conducted between 2015 and 2018. Their main purposes were to understand:

- the business model of the object company,
- the strategic intentions of the company
- the business development of the company.

The provisional survey took place from April to August 2015, the first field survey from May to July of 2016, the second survey from October to November of 2016, the third survey from February to March of 2017. The last field survey spanned June to August 2018.

The survey relies on both interviews and observations on the field. For the first survey, the author mobilises a participant observation method as the author stayed at the office of LUT for 8 weeks following the pilot project of ZOE with Renault India. The author had the chance to interact with every employee in the office, as well as two drivers in charge of ZOE’s test driving. The last survey also uses participant observation as the author stayed in the office for 12 weeks, working with a co-founder and sharing the research agenda to tackle the question of organizational change readiness.

■ *Literature reviews*

The literature reviews consist of news articles, documents and presentations obtained on the field, as well as documents and information obtained via the Internet, including online news articles.

*b) Case of LUT: Organizational designs*

This section will be described after the June – August 2018 field survey.

*c) Preparation of the entire research*

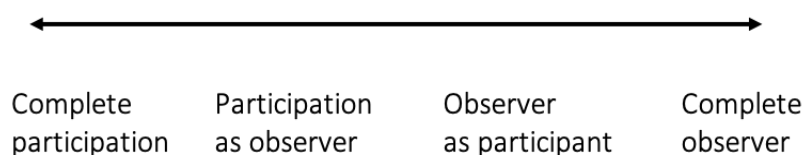
A six-month exploratory field survey has been carried out between April and August 2015.

**3) Participant observation method**

During field surveys, the author uses a participant observation method to collect the data required to answer the research questions. It was made possible thanks to the cooperation of the case company, Lithium Urban Technologies, especially with the support of the managers (i.e., CEO, co-found and COO). Participant observation, in social science, is a means of collecting evidence for a researcher seeking to become a member of a group, organization or event under study and requires skill, knowledge and understanding (Vinten, 2009). It initially originated from ethnographic research and was later applied to organizational study (Vinten, 2009).

Junker (1960) suggests a continuum between participation and observation, with the two intermediate points being the participant as observer and the observer as participant (Figure 11).

Figure 11 Continuum between participation and observation



Source: Junker (1960)

Gold (1958) details the strength and weakness of each role. Following are citations explaining the characteristics of participant-as-observer and observer-as-participant. The participant-as-observer is a method in which both field workers and informants are aware of their relationship (Gold, 1958). Gold (1958) explains the role of the research as “at times he

## Chapter 3 – Research question and methodology

[field worker] observes formally, as in scheduled interview situations; and at other times he observes informally when attending parties, for example.” In contrast, the observer-as-participant role is used in studies involving one-visit interviews. Gold (1958) explains that “since he [the field worker] meets more varieties of people for shorter periods of time than either the complete participant or the participant-as-observer, the observer-as-participant inclines more to feel threatened. Brief relationships with numerous informants expose an observer-as-participant to many inadequately understood universes of discourse that he cannot take time to master.”

### ■ *Application of participant observation method in the research*

This research mobilizes a participant observation method. According to Vinten’s (2009) classification, both participant-as-observer and observer-as-participant are involved in the research methodology. Participant-as-observer is mainly applied to collect primary data for company-level data including interactions with employees, and observer-as-participant is applied to gather primary data for innovation ecosystem-level data including interviews with relevant actors. In addition, research as explicit role mentioned by Vinten (2009) and interrupted involvement were used. This is explained in the section of Execution of research.

### *4) Longitudinal study*

This research is a longitudinal case study<sup>21</sup>. According to Smallman et al., (2013):

Longitudinal data (whether obtained with archival, historical, or real-time field observations) are necessary to observe how processes unfold over time. [...] To study people, subject matter, and their context in meaningful ways, Collins (2004) argues, researchers need to acquire ‘interactional expertise’, the kind of knowledge required for one to communicate about a domain without necessarily being able to practice in that domain.

### *5) Document analysis*

Organizational and institutional documents have been a staple in qualitative research for many years. In recent years, there has been an increase in the number of research reports and journal articles that mention document analysis as part of the methodology. What has been rather glaring is the absence of sufficient detail in most reports found in the reviewed

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<sup>21</sup> See also Collins & Evans (2007) for longitudinal study.

literature, regarding the procedure followed and the outcomes of the analyses of documents. Moreover, there is some indication that document analysis has not always been used effectively in the research process, even by experienced researchers (Bowen A., 2009).

“Document analysis is a systematic procedure for reviewing or evaluating documents—both printed and electronic (computer-based and Internet-transmitted) material” (Bowen A., 2009). Like other analytical methods in qualitative research, document analysis requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008; see also Rapley, 2007). Documents contain text (words) and images that have been recorded without a researcher’s intervention. For the purposes of this discussion, other mute or trace evidence, such as cultural artefacts, is not included. Atkinson and Coffey (1997, p. 47) refer to documents as “social facts” which are produced, shared, and used in socially organised ways. Documents that may be used for systematic evaluation as part of a study take a variety of forms. They include advertisements; agendas, attendance registers, and minutes of meetings; manuals; background papers; books and brochures; diaries and journals; event programs (i.e., printed outlines); letters and memoranda; maps and charts; newspapers (clippings/articles); press releases; program proposals, application forms, and summaries; radio and television program scripts; organizational or institutional reports; survey data; and various public records. Scrapbooks and photo albums can also furnish documentary material for research purposes. These types of documents are found in libraries, newspaper archives, historical society offices, and organizational or institutional files. Researchers typically review prior literature as part of their studies and incorporate that information in their reports. However, where a list of analysed documents is provided, it often does not include previous studies. Surely, previous studies are a source of data, requiring that the researcher rely on the description and interpretation of data rather than having the raw data as a basis for analysis. The analytic procedure entails finding, selecting, appraising and synthesizing the data contained in the documents. Document analysis yields data—excerpts, quotations, or entire passages—that are then organized into major themes, categories, and case examples specifically through content analysis (Labuschagne, 2003).

Document analysis is often used in combination with other qualitative research methods as a means of triangulation—“the combination of methodologies in the study of the same phenomenon” (Denzin, 1970, p. 291). The qualitative researcher is expected to draw upon multiple (at least two) sources of evidence; that is, to seek convergence and corroboration through the use of different data sources and methods. Apart from documents, such sources



### Chapter 3 – Research question and methodology

include interviews, participant or non-participant observation, and physical artefacts (Yin, 1994). By triangulating data, the researcher attempts to provide “*a confluence of evidence that breeds credibility*” (Eisner, 1991, p. 110). By examining information collected through different methods, the researcher can corroborate findings across data sets and thus reduce the impact of potential biases that can exist in a single study. According to Patton (1990), triangulation helps the researcher guard against the accusation that a study’s findings are simply an artefact of a single method, a single source, or a single investigator’s bias.

#### *6) Research ethics: anonymity and credit of persons or organizations*

For each interview, the purpose of the interview and research, as well as the position and name of the interviewer, were clearly declared and disclosed. The interviewer paid attention not to take too much of the interviewees’ time by asking them their schedule constraints beforehand. Naturally, the interviewees were totally free to leave the interview at any time if it was required.

Taking notes and recording some of the interviews were done under the consent of the interviewees. Whenever the interviewee asked not to take note or record a particular part, the interviewer submitted to the request. The anonymity of the interviewees is also ensured. Any personal speech that is thought to interfere with their role, responsibility and future career in any organization is not mentioned in this paper so they cannot be identified in the organization. For any interview that took place in a professional context or at public event such as a seminar, workshop, conference, the name and position of the interviewer was disclosed.

If some parts of interviews were somehow “exploratory”—not relying on the interview grid—all the questions are considered relevant to the research. No personal questions were posed during the interviews.

The anonymity is exceptionally not ensured for the people already highly exposed in the media (TV, radio, newspaper, articles) as it is practically possible to identify them through information displayed through public media. Nonetheless, even in the case where the anonymity is not ensured, the data was as much as possible treated objectively so as not to violate these persons’ credit, nor the credit of any organization. In this sense, the description in this thesis may rather be in their favour. This is a limit of the content description part of this work, which is not necessarily the case for the analysis part.

### III) Execution of the research: empirical data collection

This section describes the research's procedures and execution (data collection). The objective is to clarify data sources so as to make this work verifiable and rigorously scientific for any future references.

#### 1) Field survey: focal cities and a case enterprise

This section describes how the empirical data in this research has been collected through the on-site field research.

##### a) Preparative survey: 19<sup>th</sup> April - 18<sup>th</sup> August 2015

In 2015, a preparative survey was carried out prior to the initiation of the research. This field survey was financially supported by Sustainable Mobility Institute (Paris-Tech) and conducted under the supervision of the researcher Akil Amiraly (Management Research Centre, École polytechnique) as a part of the research project NextVolt.

##### ■ Main activities and objectives

The two-fold objective of this field survey was to identify:

- energy-based innovative projects that may participate in the formation of “technological bricks” for a potential development of EMS,
- institutions, the NGOs and the companies working in the sectors of electricity, energy and transport that could be sources of information for the research.

##### ■ Results, benefits and insights

Through the preparative survey, this research identified:

- Projects and companies/institutions for a potential case study,
- Experts and researchers working on energy and transport issues,
- Problematics and challenges concerning the diffusion of EVs.

During this preparative survey, following the below-mentioned schedule, companies and research institutions were visited for the purpose of data collection.

##### ■ Schedule detail

Dates of visit	City	Major activities
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19 <sup>th</sup> April to 26 <sup>th</sup> April	Bangalore	Participation in an international conference of Micro Perspectives for Decentralised Energy Supply (MES 2015).
26 <sup>th</sup> April to 28 <sup>th</sup> April	Hyderabad	Visiting Indian Institute of Management – Ahmedabad (IIM-A) to identify professors for research collaboration.
28 <sup>th</sup> April to 5 <sup>th</sup> May	Bangalore	Meetings with the co-founder of Lithium Urban Technologies for the first time.
11 <sup>th</sup> May to 16 <sup>th</sup> May	Pune	Interviews at Suzlon (a wind turbine company) and Prayas.
16 <sup>th</sup> May to 1 <sup>st</sup> June	Bangalore	Interviews at BESCO, Centre for Sustainable Development, Embarque-World Resource Institution India. Participating Smart Cities India conference at World Trade Centre
1 <sup>st</sup> June to 4 <sup>th</sup> June	Pune	Interview at Prayas
4 <sup>th</sup> June to 13 <sup>th</sup> June	Ahmedabad	Visiting IIM-A for meetings with experts in electricity supply
13 <sup>th</sup> June to 19 <sup>th</sup> June	Bangalore	
19 <sup>th</sup> June to 20 <sup>th</sup> June	Chennai	Interviews at Renault India and Renault Nissan Technology Business Centre India (RNTBCI)
20 <sup>th</sup> June to 17 <sup>th</sup> August	Bangalore	Interviews at BESCO DAS (Distribution Automation System) project, BESCO rooftop PV project, Biodiversity Conservation India Ltd. (BCIL: A Smart housing company) and Indian Institute of Management – Bangalore.
17 <sup>th</sup> August to 18 <sup>th</sup> August	Ahmedabad	Meeting at Indian Institute of Management - Ahmedabad
18 <sup>th</sup> August	New Delhi	JICA visit for a hearing

### ■ *Companies and institutions*

During the field surveys, different institutions were visited to conduct interviews so as to collect field data: Prayas, BESCO, Mapunity, Centre for Sustainable Development, TERI, World Resource Institute (India). The main case study of the research, Lithium Urban Technologies, was identified during this preparative survey.

Since the main focus of this preparative research was the power supply situation in Indian cities, different electricity supply-related projects, such as the smart-grid project by BESCO, and solar photovoltaic-related projects, such as SELCO and BCIL, were studied in detail.

### *b) First field survey: 11<sup>th</sup> May – 5<sup>th</sup> July 2016*

#### ■ *Main activities*

The principal purposes of the first field survey were:

- Participation in the Smart City Forum in Delhi
- Explorative survey on three-wheeler EV-based mobility services and their innovation ecosystem
- Two-month internship in Lithium Urban Technologies

#### ■ *Objectives*

The objective of the first-half of the field survey in Delhi:

- Networking through the participation in the Smart city forum,
- Identifying new projects for data collection and observation, and
- Observing commercial use of electric rickshaws in urban areas and collecting data.

The objective of the second-half of the field survey in Bangalore was to understand the business model of Lithium Urban Technologies.

#### ■ *Results, benefits and insights*

The first field survey enabled to identify:

- Projects and companies/institutions of potential case study,
- Experts and researchers working on energy and transport issues,
- Problematics and challenges concerning the diffusion of EVs.

Three potential drivers of EV diffusion were identified.

### Chapter 3 – Research question and methodology

Two possible business expansions of Lithium Urban Technologies were identified: geographical expansion and service diversification.

#### *c) Second field survey: October – November 2016*

##### ■ *Main activities*

Discussion with professors at IIM-A on past research activity and on the future research planning. Meeting with the co-founder of the case company so as to plan the future field survey plan.

##### ■ *Objectives*

The objective of the second field survey was the following:

- Modifying research plans to ensure the data accessibility and feasibility

##### ■ *Results, benefits and insights*

Redesigning the research plan.

##### ■ *Schedule detail*

Date period	City	Major activities
19 <sup>th</sup> October to 12 <sup>th</sup> November	Ahmedabad	Meetings with professors at IIM-A
12 <sup>th</sup> November to 19 <sup>th</sup> November	Bangalore	Meetings with the co-founder of LUT

#### *d) Third field survey: 26<sup>th</sup> February – 31<sup>st</sup> March 2017*

##### ■ *Main activities and objectives*

To collect data required to describe the development of the relevant innovation ecosystems.

##### ■ *Results, benefits and insights*

Data collections required to understand the development of the relevant innovation ecosystems.

##### ■ *Schedule detail*

Date period	City	Major activities
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26 <sup>th</sup> February to 1 <sup>st</sup> March	Chennai	Meetings at Renault India and RNTBCI
1 <sup>st</sup> March to 2 <sup>nd</sup> March	Bangalore	Interview with the CEO of BCIL
2 <sup>nd</sup> March to 7 <sup>th</sup> March	Kolkata	Visiting New Town Kolkata to observe e-rickshaw operations. Interview at HIDCO (West Bengal Housing Infrastructure Development Corporation)
7 <sup>th</sup> March to 13 <sup>th</sup> March	Delhi	Participating to Smart Grid India Conference 2017
13 <sup>th</sup> March to 16 <sup>th</sup> March	Ahmedabad	Meeting with professors at IIM-A
16 <sup>th</sup> March to 22 <sup>nd</sup> March	Pune	Interview at Kinetic Energy
22 <sup>nd</sup> March	Mumbai	Interview at Tata power (local electricity supply company)
22 <sup>nd</sup> March to 31 <sup>st</sup> March	Bangalore	Interview with an entrepreneurial EV developer
31 <sup>st</sup> March	Delhi	

■ *Additional note*

The researcher was accompanied by Jean Grebert of the Institute for Sustainable Mobility (the financier of the research, the research leader of “NextVolt2” project) and Akil Amiraly (researcher at Management Research Centre at École polytechnique).

*e) Fourth field survey: 4<sup>th</sup> June – 31<sup>st</sup> August 2018*

■ *Main activities and objectives*

The last field survey aims at deepening understanding of the evolution of the business activities of the case company. This includes the transition of the vision of the managers, the organizational change and business development in general. The author stayed at the office of the case company during the field survey period to collect empirical data to be analysed in the research.

### Chapter 3 – Research question and methodology

#### ■ *Results, benefits and insights*

Detailed empirical data was obtained through interviews with the managers and employees.

#### ■ *Schedule detail*

<b>Date period</b>	<b>City</b>	<b>Major activities</b>
4 <sup>th</sup> June to 28 <sup>th</sup> August	Bangalore	Staying at the HQ of the case company for data collection
29 <sup>th</sup> August	Chennai	Interviews at Renault India and RNTBCI
30 <sup>th</sup> August to 31 <sup>st</sup> August	Bangalore	

#### *2) Desktop document survey*

To complement the field survey data, desktop surveys are equally executed as required. Information such as EV market development, the local electricity supply situation, and local transport and mobility system development are collected so as to complement the locally collected data. The data sources include new articles, industrial reports, governmental publications and academic articles.

## Recapitulation – Key takeaways

Chapter 3 is about research questions and methodology. Based on the literature review taking the case and research context into consideration, two research questions are formulated: considering the uncertainty of relevant innovation ecosystems,

- How do top managers formulate the vision of a start-up company?
- What are the challenges in developing competitive advantages while envisaging to attain a Business Model Innovation?
- What organizational capabilities should be developed to prepare a Business Model change while the product required for Business Model change remains unavailable?

By addressing these questions, the thesis tries to contribute in filling the research gaps identified in chapter 2 and to give additional knowledge to existing literature.

The research is conducted based on a comprehensive research approach that is characterized as a “unique dynamic” (Dumez, 2016). This comprehensive research mixes different methodologies and data sources to tackle the research question: document analysis, case studies and participant observation. It mostly relies on a case study. Most of the data is qualitative, but some quantitative data has also been used in addition to analyze and understand the case. The essential data upon which the research is based comes from the interviews and on-site observations carried out on the field. The research questions, as well as the focuses of the literature review, have evolved during the research, according to the accumulation of field data on the business development of the company and on the changes in its business environment.

This chapter details the calendar of the execution of four field surveys conducted between 2016 and 2018. Each survey has a different objective and was conducted in several cities in India.





*CHAPTER 4 – CASE DESCRIPTION: Business development and vision formulation*

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*CHAPTER 4 - Case description: Business development and vision formulation*

Chapter 4 and chapter 5 are case descriptions. This chapter – chapter 4 – presents the business development and vision of the case company. The next chapter – chapter 5 – presents the organizational structure, business model and external business environment of the case company: three focuses that correspond to the three literature streams reviewed in chapter 2, namely organizational change management, business models and ecosystems. Based on the case observation, chapter 6 gives diverse analyses on the business development of the company that lead to the discussion and conclusion of chapter 7.

This chapter describes the business development and vision of the case company.

Lithium Urban Technologies (LUT) is a company providing a Corporate Employee Transport (CET) service in Indian cities. The enterprise registered officially as a company in October 2014 and started its first pilot project in April 2015 in Bangalore.

The following section presents the development of LUT's business chronologically from October 2014 to July 2018 (46 months). The purpose here is to have a basic understanding of the company and its business. Several questions are addressed, including:

- Why did the company start its operation firstly in Bangalore?
- What are the value propositions of the company?
- What is the vision of the company? How did it evolve over time?

### *1) Business development*

Lithium Urban Technologies is a start-up company that provides CET services to client companies with EVs.

In order to facilitate the understanding of its business development, the author identifies three turning points within the 46 month-period. The first one is in April 2015 when the first pilot project of using five Electric Vehicles (EVs) was launched in Bangalore. The second turning point is about a year later (in May 2016) when the company started providing its service to five different clients. From that time on, the company's growth<sup>22</sup> has remained steady. The third one is in 2018, with the opening of a new branch office in Delhi, symbolising a new era for LUT's business development through a visible geographical expansion.

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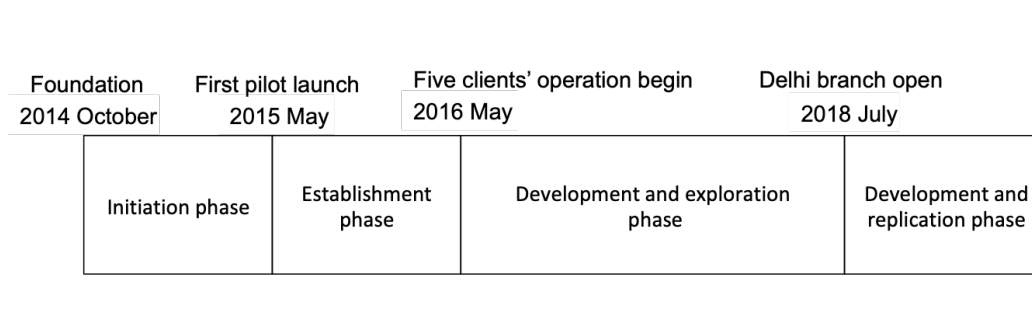
<sup>22</sup>In terms of the number of clients.

Based on these three turning points, the author divides the business development into four phases that coincide with the three turning points. To facilitate the understanding, the author labels the phases as follows (see also Figure 12):

- 1) Initiation (2014 October - April 2015),
- 2) Establishment (May 2015 – April 2016),
- 3) Development and exploration (May 2016 – June 2018),
- 4) Development and replication (July 2018 – December 2019).

This labelling is based on the field observation.

Figure 12 Different phases and turning points



### 1) *Initiation phase (October 2014 - April 2015)*

The first phase is initiation phase. At the beginning of the initiation phase, in October 2014, the company was registered as Lithium Urban Technologies Private Limited (“Lithium Urban Technologies Pvt Ltd,” n.d.). A CEO and a co-founder initially funded the company.

#### a) *Why in Bangalore?*

Why did the company launch its business in Bangalore? It is not a single concrete fact, but rather several interrelated conditions that appeared favourable to the initiation of the service in the city. Those conditions are steady economic growth, population growth, city development and transport development of the city.

#### ■ *Bangalore as Silicon Valley of India*

First of all, Bangalore is recognized as the Silicon Valley of India (Sudhira, Ramachandra, & Subrahmanya, 2007) and one of the nine start-up hubs outside of the U.S.A. (Pullen, 2013). National Capital Region (NCR), Bangalore, Mumbai/Pune area, Hyderabad, Chennai, Kolkata

## Chapter 4 – Case description: business development and vision formulation

are considered as Indian start-up hub cities, and Bangalore accounts for 30% of all early stage start-up companies (K. Joshi & Satyanarayana, 2014). According to Adhana (2016), in Bangalore, 2,516 million US dollars of funds have been raised in five years between 2011 and 2015. This is the largest fund to have been raised among Indian cities, followed by Mumbai and Delhi/NCR (Adhana, 2016).

### ■ *Bangalore: growing city*

Secondly, Bangalore is the fifth largest city in India, with a steady population growth.

Historically, Bangalore is a South-Indian city on the Deccan Plateau. With an altitude of 920m above the sea level, the city is known to have a moderate climate all year-long as compared to other Indian cities. Bangalore is the capital city of the state of Karnataka and the fifth biggest city in India in terms of population<sup>23</sup>. The city, located in the south of India, was founded by the feudatory ruler under the Vijayanagara Empire Nadaprabhu Hiriya Kempe Gowda, also known as Kempe Gowda, in 1537. It was then the capital of his erstwhile kingdom (Sudhira et al., 2007)<sup>24</sup>.

Within the decade of 1993/1994 to 2004/2005, the Gross District Income grew 3.5 times bigger<sup>25</sup>. The economy in Bangalore rapidly grew due to ICT industry, and at the same time the globalization of the economy advanced (Narayana, 2011). This was supported by the governmental IT cluster policy (Van Dijk, 2003). This dynamism of ICT industry-driven globalization was enforced by the “Indian knowledge diaspora”<sup>26</sup> (Chacko, 2007).

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<sup>23</sup> Bangalore population data and source

<sup>24</sup> Sudhira, Ramachandra, & Subrahmanya (2007):

The earliest reference to the name, in the form ‘Bengalooru’, is seen in a ninth century Ganga inscription (hero-stone) from Begur, referring to a battle that was fought in that place. The present name of the city, Bangalore, is an anglicised form of Bengalooru which according to the popular belief is derived from Bengaalu – synonymous of Benda kaalu or boiled beans and ooru meaning a town. Tradition associates Hoysala King Vira Ballala (12th century) with the origin of this name. Vira Ballala, during one of his hunting expeditions in this region, lost his way and, after hours of wandering, reached the hut of an old woman. This woman is believed to have offered cooked beans to the king. Pleased with her hospitality, the king named the place as ‘benda kaala ooru’ (town of boiled beans). But it is interesting to note that there was already evidence for name of the place much before Hoysalas. Kamath (1990) notes that Bangalore is said to have got its name from benga, the local Kannada language term for *Pterocarpus marsupium*, a species of dry and moist deciduous tree, and ooru, meaning town. However, the founding of modern Bangalore is attributed to Kempe Gowda, a scion of the Yelahanka line of chiefs, in 1537 (Kamath, 1990). Kempe Gowda is also credited with construction of four towers along four directions from Petta, the central part of the city, to demarcate the extent of city growth. By the 1960s the city had sprawled beyond these boundaries (Asian Development Bank, 2001).

<sup>25</sup> The Gross District Income of Bangalore is 36,58 billion Rs in the fiscal year of 1980/1981; 71,72 billion Rs. in 1993/1994; 146,96 billion Rs in 1999/2000 and 250,42 billion Rs in 2004/2005 (Narayana, 2011).

<sup>26</sup> Chacko (2007) define “Indian knowledge diaspora” as following: “The dynamism of the globalizing cities in India and the opportunities they offer now draw skilled immigrants homeward. Well-educated and affluent first-generation Indian expatriates are returning to India to take advantage of new job opportunities and to strengthen their connections with their heritage. Transnational migrants whose professional expertise was honed in American universities and through work experience in the United States, they are a tangible force in the cities of Bangalore and Hyderabad, where many have chosen

Indeed, its modest climate and the fact that English is widely spoken in the city attract global companies to set up their outsourcing campuses. Pani (2009) explains the phenomenon as follows:

Bangalore’s English language skills can be traced back to the Cantonment and its emphasis on English education for the poor in the middle of the nineteenth century. (...) Thus by the mid 1980s manpower in Bangalore had both the technical skills and the English language skills the global economy needed. And once technology made it possible to tap this manpower, the city’s IT boom took off. (p. 118)

Please refer to the footnote for more references<sup>27</sup>.

#### ■ *Population transition*

Thirdly, along with economic growth the population of the city grew rapidly.

“The total population of Bangalore urban agglomeration area increased from 2.92 million in 1981 to 4.13 million in 1991 and to 5.69 million in 2001” (Narayana, 2011). “In 2015, a mere ten years from now, Mumbai and Delhi are expected to have populations exceeding 20 million, Kolkata about 17 million, and Bangalore, Chennai and Hyderabad between seven and nine million each” (Narayana, 2011).

Table 10 Population of Bangalore based on the most recent census in 2011

<b>City population (2011 Census)</b>	<b>8,443,675</b>
<b>City + Out growth (2011 Census)</b>	<b>8,495,492</b>

The population growth is linked to the economic growth based on the ICT industry development of the city. The contribution of the ICT sector to the economic growth of Bangalore is demonstrated by Narayana (2011) with quantitative data.

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to settle. Returning immigrants who were part of the “knowledge diaspora” bring skills, connections and capital that helped thrust the Indian IT industry to the forefront. They are also involved in improving the physical and social infrastructure of their hometowns not only with capital but with personal involvement, helping the cities and communities from which they originated.” To know more, refer also to Dhume, S. (2016). From Bangalore to Silicon Valley and back: How the Indian diaspora in the United States is changing India. In *India Briefing* (pp. 103-132). Routledge.

<sup>27</sup> United Nations Development Programme (2001) Human Development Report – 2001, Making New Technologies Work for Human Development, UNDP. New York and Oxford University Press, New York.

(ref) Nair, J. (2005). The promise of the metropolis: Bangalore's twentieth century Oxford University Press. *New Delhi*.

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Until then, Bangalore had been a pastoral country town. The city has experienced a steady economic growth in the last 20 years since the 1990s, accompanied by population growth resulting from the ICT industry's growth. The economic growth attracts talents and workforces from other regions of the country. Accordingly, new leisure facilities such as shopping malls and restaurants are constructed. Bangalore is a city where continuous economic and population growth are expected to last for at least a few more years as a start-up hub in India.

### ■ *Geographical situation and demand in transportation*

The city development is followed by the development of metro lines and other traffic infrastructure, though the increase in demand towards transport exceeds the speed of the public transport system development such as metros and buses. This is the fourth and most critical reason for the company to initiate the business in Bangalore. The offices of ICT companies tend to be located on the outskirts of the city<sup>28</sup> such as Whitefield, due to high real estate costs in the city centre. This is because the operational performance of such IT & ITES companies does not depend on the geographical aspect of its office location: it is indeed not a primary condition to have an office in the very centre of the city for those companies<sup>29</sup>. This phenomenon is well demonstrated by Solomon (2000) with a visualised map.

Although new residential areas are developing in peri-urban areas, the main residential area of Bangalore remains located in the city centre. Commuters thus have to cross the city to the outskirts to go to work. However, citizens in Bangalore don't find public transports convenient; in 2015, there was only one operating metro line, and its usage was limited to a small part of the population. Moreover, the public bus system's usability and comfort do not fully answer people's expectations.

Given the development plans for the city, construction of metro lines was however planned. For example, in 2017, only two metro lines were in operation: the purple line, which has 17 stations and traverses the city from East (Mysore road station) to West (Baiyyappanahalli station), and the green line with its 24 stations traversing the city from North (Nagasandra station) to South (Yelachenahali station). Although these metro lines surely facilitate transportation through the city without too many traffic issues and offer a service for a decent price, the number of beneficiaries is limited, since it only covers limited areas of the

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<sup>28</sup> Approximately within the radius of 7.5km – 15km from the city centre.

<sup>29</sup> The first five clients of LUT thus are as well Information Technology and Information Technology Enabled Service (IT & ITES) companies (e.g., Business Process Outsourcing companies) located mainly in peri-urban area.

city (some areas are left with no transport links). Moreover, this intra-city transport does not help people commuting from the city centre to suburban areas, or vice-versa. Hence, for the employees living in the city centre, it is bothersome for them to commute daily to companies on the outskirts.

The public bus service is operated by the Bangalore Metropolitan Transport Corporation (BMTTC). The bus operation in Bangalore had not been considered as urban until 2000-2001, unlike other cities such as Delhi, Mumbai, Chennai, Kolkata, Ahmedabad, Pune, Chandigarh, Pimpri-Chinchwad, Solapur, Kolhapur, Than, Ludhiana, Amritsar, and Bhavnagar (Madhav & Murtaza, 2007). This indicates that the development of bus operations in Bangalore is a recent phenomenon. As of April 2019, official bus route maps are still not displayed by the BMTTC either online or at each bus stop. They can only be found through web-based route-searching applications. This reflects the difficulties of taking local buses.

In Bangalore, road infrastructures are under construction in many places, such as flyovers to facilitate smooth traffic. This is related to the fact that the rapid growth of population and economic activities in Bangalore is a relatively recent phenomenon. Yet, heavy daily traffic hinders people from pleasant daily transport.

In this context, it is an important business matter for a company, especially for a major enterprise, to be able to offer its employees a hassle-free means of commuting. This aspect of transportation constitutes one of the largest sources of expenditure for companies. Companies wish to ensure the productivity and punctuality of their employees. A CET service thus finds its value here. Indeed, it impacts the satisfaction of employees and increases the attractiveness of a company for potential new workers; a company may attract more talented human resources than one who does not provide CET to its employees. The demand for CET services is expected to be firm in Bangalore. Despite the fact that metro lines will be extended and added (Bangalore Metro Rail Corporation Limited, 2020), CET serves only a part of the commuting population and does not immediately give an effective solution for all the commuters. Road infrastructure updates are expected to contribute to reduce traffic jams but, since more cars are expected to be on the road due to population and economic growth, the traffic situation in Bangalore might not evolve in a positive direction even after these upgradations. Going to work by car will not become common because of this tiresome traffic situation. The public bus network is expected to expand as well, though it may remain sparse to satisfy users in peri-urban area —especially during the rainy season. The last steps from the



## Chapter 4 – Case description: business development and vision formulation

bus stop to the destination can be troublesome in heavy rain with badly paved pedestrian footpaths.

Above are some favourable conditions of why LUT started its business in Bangalore.

### *b) How about in Delhi?*

How about the capital city of India: Delhi and National Capital Region (NCR)? In Delhi, on the contrary to Bangalore, public transport infrastructure is relatively well developed. Seven metro lines were in operation in 2015, and ten metro lines were in operation by March 2019, serving 285 stations (Delhi Metro Rail Corporation Limited, 2020). It is nevertheless a matter of fact that metro lines are highly crowded and tiring during rush hours.

However, there are growing transport needs as well. The economic growth of the capital evokes the development of nearby cities and regions such as Gurgaon, Noida and Faridabad. In these areas, the public transport system has not yet developed though new office areas and residential areas are developing. Since the foundation of the case company, Delhi has been one of the cities chosen to further business expansion along with Pune, Chennai and Hyderabad (Skariachan, 2016).

### *c) Founders and identification of business opportunity by pivoting*

In the establishment of LUT as a company, three people have played an important part: the Chief Executive Officer (CEO), the Chief Operation Officer (COO) and a co-founder. As mentioned previously, providing CET services with EV fleets was not the initial idea of LUT's founders. The initial idea was to provide a city taxi service with EVs. There was a pivoting of the business idea.

#### ■ *Founders*

The founders' profiles are detailed below (with publicly available information). Their position and title in the company are as they were in 2015, during the initiation phase.

##### *CEO*

He developed an idea of using EVs as a mobility service while he was working in a foreign-capital software-industrial company. According to the co-founder, one of the reasons why he – the CEO – came up with this idea was because one of his relatives worked for a transport logistics service provider.

With a Bachelor of Engineering in electrical and electronic engineering (in 1991), he worked at Andersen consulting (today known as Accenture) for seven years. After this experience, he

founded an Internet service-based start-up and provided an exit. He is a serial entrepreneur and LUT is his third start-up project.

### *Co-founder*

The co-founder studied in the U.S and worked as a researcher at an aeronautics and space research institution in the U.S. After moving back to India in 2004 (Subramanian, 2013), he founded Mapunity<sup>30</sup> in 2006. Mapunity is an online platform that provides different geographic-dependent information systems for social use, such as transportation, environment and healthcare. He is part of the *knowledge diaspora* as defined by Chacko (2007). He ran two political campaigns between 2012 - 2013: one for the upper house of the Karnataka assembly in 2012 (Subramanian, 2013) and the other for Karnataka Legislative Assembly elections in 2013 (“Lok Satta Party’s debut in Karnataka not without gains,” 2013).

### *COO*

The COO worked at the same software-industrial company as the CEO. Prior to that, the COO also worked for Reva Electric Car Company that was acquired by Mahindra-Mahindra and is now called Mahindra-Electric. LUT uses the EVs of Mahindra-Electric. Some of the ex-employees of Mahindra-Reva work in EV-related industry such as in Kinetic Energy, whose e-rickshaws LUT used to conduct a pilot project. While he played an important role in the early development of the company, he does not possess any share of the company. Later, in 2018, he left the company.

Officially, the CEO and the co-founder are the principal shareholders of the company. The three founders identified business opportunity in providing CET services using EVs. This idea is derived from using EVs as city taxis that was not realised, since it required a sufficient number of charging infrastructures in the concerned cities.

What was the initial business idea, and how did they think of pivoting this business idea to the current one?

### ■ *Pivoting*

The initial business idea of the founders was to use EVs as city taxis. The essential part of this idea was the exploitation of the low running costs of EVs. The founders thought that a higher initial cost of EVs as compared to Internal Combustible Engine (ICE) vehicles could be recovered faster by using them as taxis, since they run longer than personal vehicles. It is a

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<sup>30</sup> Following is the URL to the official webpage of Mapunity. <https://mapunity.com/>

## Chapter 4 – Case description: business development and vision formulation

common fact for a commercial fleet that the running mileage per day is higher than vehicles meant for individual use.

As the CEO of LUT says, according to Ray (2015):

Macroeconomics of the cab industry and clean fuel can go hand in hand. If I transport 1,000 people a day, then I clock million km a year. This saves me 2.3 to 3 tonnes of carbon footprint per person per year. This cuts fuel cost by a huge margin.

However, the idea of a city taxi business implies a challenge with the deployment of charging infrastructure. To run a city taxi business, a sufficient number of charging points is required all over the city because the EV's autonomous mileage per charge is limited to around 100 km. Also, a city taxi business might not be effective, as the fleets have to run around the city to find passengers.

Then, the founders came up with the idea of providing a taxi service especially dedicated to commuters. The critical factor was that it is easy to predict the distance and timing of travel, which enables them to maximise the benefits of EV fleets and at the same time minimize their disadvantages, such as limited autonomous mileage. Therefore, being able to predict the schedule and distance of travel ensures the business's feasibility. Concerning the disadvantages of EV fleets in comparison to ICE vehicle fleets, one of the greatest was the short cruising distance per charge or per refuelling.

In the case of employees' transportation, each fleet comes back to the client company's parking after picking up and dropping off the passengers — employees of the company. LUT can plan the trips in advance so as not to exceed the autonomous mileage of the EV fleet. In addition, since every fleet comes back to the parking, LUT does not need to deploy its charging stations all over the city but only at each parking (see Figure 14). Based on this idea, the founders, as well as the initial members (approximately ten people) started working to launch its first pilot project with Tesco in Bangalore.

### *d) Initial members and the launch of the first pilot project*

There were about 15 initial members of the company. The business analysis team takes care of ICT system development and scheduling of the trips. The maintenance team takes care of EV fleet maintenance and driver education. The driver recruitment team takes care of recruiting drivers. The human resources team takes care of attendance management and

driver payments. The accounting team takes care of accounting of all the expenses and payments. There was a reception of the office as well.

#### ■ *Launch of the first pilot project*

In April 2015, six months after the registration as a company in October 2014, LUT started operating the first pilot project. The first client was Tesco Bengaluru<sup>31</sup> (Ray, 2015b). Tesco Bengaluru is a company which operates 24h/7days. Its employees work in three shifts to cover a full-time service to support the business process of the company.

The pilot project consists in 5 fleets and 40 registered drivers while the company purchases 10 EVs. The number of fleets in operation and the number of EVs purchased are not always equal since the company possesses surplus fleets for backup purposes.

During the same period in April 2015, the company declared that it planned to operate 100 EVs within two months (Ray, 2015a). It should however be mentioned here that, contrary to their statement<sup>32</sup>, the company could not actually achieve this number in the given time.

During this initiation phase the company identified a market opportunity in the CET service market. The company identified its first few clients as well. Then the company also prepared for the first pilot project that started in April 2015. The preparative activities included recruiting drivers, recruiting initial members and setting up an office. The detail of the pilot project is described below.

#### *2) Establishment (May 2015 – April 2016)*

In April 2015, LUT launched a pilot project with Tesco Bengaluru using five EVs. Eight months later, in December, LUT officially started providing CET service to Tesco Bengaluru with 40 EV fleets (Ray, 2015b). Later, from January until May 2016, LUT progressively began to provide its service to another client and launched pilot projects with three other clients.

The business in Bangalore steadily developed from the first pilot project. The first five clients of LUT were companies of the same kind (Mukherjee, 2017) as Tesco, with a business operating 24h/7days. This is a key fact to understand why LUT started its EV-based CET service in Bangalore, as explained previously. LUT started to develop its business firstly in

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<sup>31</sup> Bengaluru is the official name of Bangalore since November 2014 (Times News Network, 2014) .

<sup>32</sup> The company also claimed that it booked 200 EVs (e2o of Mahindra-Electric) with the total investment of 30 crore rupee including charging infrastructure and payroll so as to prepare full-scale operations and other pilot projects. Again, it turns out that no more than 200 fleets were in operation before the second half of 2016. LUT took at least another 14 months to reach this number.

## Chapter 4 – Case description: business development and vision formulation

Bangalore because of several characteristics of the city. One of them is that there are many ICT/ICT-enabled companies in the outskirts of the city.

While its business developed steadily, it should also be mentioned that the first client considers that the adoption of LUT's service by Tesco Bengaluru was done as a part of its Social Corporate Responsibility (SCR) activity (Rana & Majmudar, 2016). This indicates that the SCR budget of the company is dedicated to paying the service fee of LUT's operation. Therefore, it should be questioned whether the client at first evaluates the company's service unlike to environmental friendliness.

Figure 13 - An operation site: at the parking of a client company



At the same time, LUT started using a fleet management application on a pilot basis for two clients. Since one of the clients had two different campuses, so LUT was providing CET service in a total of three different locations. During the establishment phase, the strength of LUT was not in operational efficacy nor in the convenience of the mobile application.

By May 2016, LUT was operating three pilot projects in Bangalore. Pilot projects are normally operated with five to ten EVs. At this point, LUT was a unique company in India, using electric four-wheeler vehicles<sup>33</sup> (Mahindra-Electric's e2o) as taxi fleets. (Later in May 2017, Ola, an Indian mobile-based on-demand taxi dispatch application service operator introduced EVs on its platform.) LUT started providing service to five clients within the first year. It managed 125 vehicles as in June 2016.

### *a) Novelty of LUT's CET service*

LUT offers a technology-oriented solution to answer its clients' needs. What are then its novelties that distinguish the company from other conventional CET service providers? The

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<sup>33</sup> In India, Mahindra Reva Electric is the only manufacturer that has been selling electric four-wheeler vehicles since 2001. It sells three types of vehicles: REVAi, e2o and e-Verito, whereas former two types have only 2 doors. The last model, e-Verito, was launched on 2nd June 2016, as the first 4-door sedan type electric vehicle.

company takes advantages of two technologies in development: Electric Vehicles (EVs) and Information and Communications Technology (ICT).

#### ■ *EV*

The EV is the first technology-oriented product that the company uses. The principal EV model that LUT uses is the e2o of Mahindra-Electric (Figure 15). E2o is a hatchback car for three passengers and a driver. It was originally designed for individual drivers and not for commercial use. E2o has three doors: two doors on the left and right are for the passengers and the driver, and the other is a hatch-type rear door. The official driving range per charge is 140 km for a P2 model and 110 km for P4/P6 models. For a P2 model, the time required for a full charge with a normal charger is 7 hours and 20 minutes. For P4/P6 models, it is about 6 hours. Nevertheless, using a fast charger, the full-charging time is considerably reduced, taking only 1 hour and 35 minutes. The maximum speed is 80km/h for every model.

#### ■ *ICT*

The other technological component of LUT's service is ICT. The company developed a mobile phone-based application for drivers, passengers and managers, that enables clients to locate the vehicles and check the trip schedule. The company set up a dedicated monitor room named Node of Control (NoC) room in the office so as to monitor the real-time location of each fleet. Conventional CET providers had not been using this kind of mobile-based application system. One reason is that the commodification of smartphones is essential to this system, but the large-scale diffusion of smartphones is a recent phenomenon. The CET services had been operated with over-the-phone communication and paper trip sheets. Many companies still operate this way while a growing number of companies are starting to use similar kinds of mobile-based application systems. This will be explained later in detail (in CHAPTER 5 - III)2)b)).

Figure 14 A fast charger



Figure 15 A fleet of LUT (Mahindra-Electric's e2o)



#### *b) Value propositions*

What are the value propositions formulated by LUT to its clients? This section presents a list of seven reasons why client companies chose LUT's service, according to LUT. These reasons are denoted as value propositions for LUT. Below is thus a list of the value propositions claimed by the company from its perspective, as well as its vision — understood through interviews with the CEO, COO and the co-founder.

#### *CO2 reduction*

CO2 reduction is the first claimed value of the service. The company intends to reduce its CO2 emissions of CET services by using EVs rather than ICE vehicles. In September 2017, the company claimed that more than 11,000,000 km of trips were made free from emissions (from the vehicle) and abated 2,000 metric tons of CO2 equivalent (Krishnan, 2017). By June 2019, the company announced that it had abated 15,000 metric tons of CO2 equivalent (Press Trust of India, 2019b).

#### *Service's convenience*

The second value proposition is the **convenience**. Using small cars (Mahindra-Electric's e2o) increases the convenience of employees' commute. Small cars pick up and drop the passengers on almost any street, even in local narrow lanes. In practice, this means that passengers are able to get in and out of the car at the nearest point to their house. The smallness of the car body also allows it to avoid traffic congestion where larger vehicles, such as 8 or 12-seat vehicles would easily get caught.

### *Cost efficiency*

The third value proposition of LUT is its **cost efficiency**. The company asserts that employees' transportation represents one of the largest costs for companies. LUT offers monthly fixed charges, while other transport providers' charges rely on the number and distance of trips<sup>34</sup>. In this very case, the service's monthly payment based on ICE vehicles can fluctuate, as its running cost is sensitive to the fuel price. Since this is beyond companies' control, these facts hinder the companies' financial visibility of every month and year. In January 2019 (World Resources Institute India, 2019), the CEO claimed that the services of LUT can save "up to 40% of transportation cost".

### *Transparency*

The company ensures **transparency in billing**. The quality of its service is supervised by using GPS and mobile-based trip management applications. Its real-time vehicle tracking system enables LUT to monitor the status of every vehicle, including location, room temperature and the remaining battery charge. The GPS-based trip recording system also increases the accountability of the service's quality to client companies. Even if LUT cannot achieve the Service Level Agreement (SLA), the company can analyse the trip record in order to identify the reasons of non-achievement of the SLA (e.g., heavy traffic, passengers' delay and/or no show). In addition to transparency, the ICT-based trip management system reduces the time and labour spent in completing the billing process.

### *Users' satisfaction*

The fifth value proposition is the **employees' satisfaction**. LUT intends to increase client employees' satisfaction by providing its service with EVs. EVs have an eco-friendly image. Since the air pollution from ICE-vehicle-oriented exhaust gas is visible all over Bangalore, using EVs gives employees confidence that they are engaged into solving local (and global) environmental issues by reducing air pollution, noise and energy consumption.

### *Passengers' safety*

The company also lists the enhancement of **passengers safety** by giving training courses to its drivers, using GPS data to track each vehicle and installing a panic button in its mobile application. For female passengers, the company ensures the allocation of an escort guard. It is an obligation for companies, by governmental rule (Information Technology Biotechnology and Science and Technology Department & Karnataka Government Secretariat, 2015), to allocate an escort guard to female passengers between 8 pm to 6 am (Balasubramanyam & ET Bureau, 2015).

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<sup>34</sup> Some vendors provide fixed monthly rate plan as well.



*Service's compliance*

The last value proposition is the **service's compliance**. As a B-to-B operator, compliance is an essential element. Especially related to transparency in billing and women's safety, LUT strictly complies to the norms, while too many companies cook up fake bills or do not strictly follow the regulation. This is related to the fact that LUT uses a GPS-enabled mobile application.

■ *Productivity as an important parameter*

Apart from these value propositions, the productivity of vehicles – how many trips a vehicle makes per day - is an important aspect as well, as the CEO mentions. How to optimise the asset (vehicle) management, charging timing and drivers' engagement are key points to achieve the claimed value propositions.

Since the information about the value propositions presented above is based on interviews of the company members, the clients' perception might be different. Some clients perceive only a part of these value propositions; even within the client company, depending on the position of the personnel, the perceived value propositions may differ. The information provided by LUT is coherent to the answers obtained from several interviews that the author conducted with client companies during field survey. However, those interviews did not make it clear which proposition was the determining factor in deciding to make a contract with LUT, which proposition was the most critical, or which propositions were important yet not determinant. Some analysis on this is given in CHAPTER 6 - . These value propositions of LUT are realised both through utilisation of technologies (EVs and ICT) and through daily operational efforts of the LUT team.

■ *Fleet management application*

During the establishment phase, the development of the Fleet Management System (FMS) has advanced. In May 2016, the fleet management application was introduced to two clients, including one pilot project. However, three other clients (one official client and two pilot clients) kept using the paper-based trip management. These clients were hesitant about venturing into a digital-based fleet management. One of the reasons explaining this attitude is that these clients' trip schedules change frequently, sometimes even at the last minute. Therefore, the non-utilization of the mobile-based application had been pre-decided in the contract. This indicates that there was room for further improvement in the FMS.

As described, during the year of the development phase (May 2015 – April 2016), the company acquired five clients (including three pilot projects) and about 125 EVs. The establishment phase was characterised by the progressive launch of pilot projects with five clients. Two of those pilot project clients turned out to be official clients. Proof-of-concept was thus conducted, and the value propositions were positively perceived by clients.

### *3) Development and exploration (May 2016 – June 2018)*

From May 2016 to June 2018 was the two year-phase of development and exploration. During this period, the business operation process stabilized organizationally while the number of clients and operational vehicles have steadily increased.

Here, the business operation is mainly composed of daily trip management, fleet management, driver management, service level agreement evaluation, and maintenance.

The daily trip management is divided into three phases: scheduling, re-scheduling and execution.

The daily trip management of EV fleets is more complex than that of ICE vehicle fleets. This is due to two specific parameters of EVs: the mileage limit and charging time. In order to optimise vehicle usage and drivers' workforce, drivers need to change their vehicle or wait until the vehicle is charged. The optimisation of charging time (both in duration and timing of charging), driver allocation and trip arrangement require a lot of effort since it is complicated.

Based on the interviews with managers and employees, for the company to maximise the advantages of low running costs of EV fleets as compared to ICE vehicles, it is important to maximize daily mileage (= distance travelled). Here, fleet management and driver management play an important role. This fact is shared among managers and employees.

The phase of development and exploration between June 2016 and June 2018 is principally characterized by the stabilization of these operation processes including maintenance, driver education, development of a driver engagement program, and analysis. In parallel with this, the company explores the business opportunity of new services and the geographic expansion of the CET service.

#### *a) Further business development*

In June 2016, the company has five client companies in Bangalore. A total of 113 units of EVs (e2o of Mahindra-Electric) are in operation. The mobile-based fleet management system was

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launched in early 2016 on a pilot basis while the largest client kept using paper trip sheets due to frequent and/or sudden schedule changes on the client side, which LUT's trip management process was not able to handle.

In terms of number of drivers, approximately 250 drivers were working for LUT in June 2016. The number has significantly increased, but not proportionally to that of clients, which only doubled. The two pilot projects officially became business operations. By June 2018, the number of drivers reached 500 and the number of clients increased to 12.

Table 11 Number of client and number of fleets

	<b># of city covered</b>	<b># of client</b>	<b># of fleet (stock)</b>	<b># of registered drivers</b>
<b>First pilot</b>	1	1	5 (10)	40
<b>2015 July</b>	1	1	5 (10)	40
<b>2015 December</b>	1	1	40 (-)	NDA
<b>2016 June</b>	1	5	113 (125)	250 +
<b>2016 December<sup>35</sup></b>	1	NDA	200 +	NDA
<b>2017 July<sup>36</sup></b>	NDA	10		800+
<b>2018 April<sup>37</sup></b>	2	NDA	350	NDA
<b>2018 June</b>	3	NDA	NDA	NDA
<b>2018 August</b>	NDA	16	NDA	NDA
<b>2019 January<sup>38</sup></b>	NDA	NDA	600	NDA
<b>2019 February</b>	NDA	NDA	650 (278 owned, 372 leased)	NDA
<b>2019 June<sup>39</sup></b>	NDA	NDA	850	NDA

<sup>35</sup> Data by Skariachan (2016a).

<sup>36</sup> Data by Laha (2017).

<sup>37</sup> Data by (S. C. Kumar, 2018)

<sup>38</sup> Data by Sangani (2019).

<sup>39</sup> Data by Autocar Pro News Desk (2019).

<b>2019 September</b> <sup>40</sup>	4	25	950	NDA
<b>2019 December</b> <sup>41</sup>	NDA	NDA	1000	2000
<b>2020 May</b> <sup>42</sup>	5	NDA	1111 (268 owned, 843 leased)	NDA

Source: The author based on field survey observations (without mention) and various sources (with footnote).

Refer to footnote for respective data sources

#### ■ *Operating profit becomes positive*

During this development and exploration phase, the operating profit of the company became positive.

Table 12 Evolution of revenue, operating profit and net profit by fiscal year

	Revenue (Rs.)	Operating profit (Rs.)	Net profit / Profit after Tax (Rs.)
FY 2016	3.98 Crs	NDA	NDA
FY 2017	12.63 Crs	0.52 Crs	- 2.67 Crs
FY 2018	29.50 Crs	3.85 Crs	- 4.05 Crs
FY 2019	41.84 Crs	-8.21 Crs	- 15.31 Crs

Source: Nagaraj (2019) and Nagaraj & Kahalsingh (2020)

#### *b) Exploration for future business development*

##### ■ *Exploring other feasible mobility service: test pilot projects*

During this phase, LUT tested E-Rickshaw (Kinetic Energy) and eVerito (Mahindra-Electric) for potential future service developments. It was not to test the demand (business opportunity) but rather to verify the financial and technical feasibility (business possibility). In this sense, the company does not test the validity of a new business model but merely tests the performance (including technological and cost performance) of newly available products

<sup>40</sup> Data by Financial Times Live (2019) and Soni (2019).

<sup>41</sup> Data by Nandi (2019).

<sup>42</sup> Data by Nagaraj & Kahalsingh (2020).

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required for the development of new business models. The company executed these pilot projects as a means to tackle a major concern found in the list of “constraints and mitigation actions”: vehicle (un)availability. The author calls this type of pilot project a *test pilot project* so as to distinguish it from the pilot projects executed with an actual client company envisaging to move on to official operations.

### *Test pilot project – Renault ZOE (First with a foreign EV manufacture)*

With the above-mentioned value propositions, LUT steadily gained clients. Along with this business development, LUT conducted a test project using an EV model of Renault, ZOE, for five weeks (from 21<sup>st</sup> May to 28<sup>th</sup> June) in 2016.

The author documented this test project<sup>43</sup> through on-site observation and interviews with employees and relevant actors.

### *Test pilot project –Kinetic Energy E-rickshaw*

LUT explored the possible use of Kinetic Energy’s E-rickshaw for commercial use. The range is less important. The client was not confident. The client was a goods delivery company. It was not economic. In fact, scheduling packages was the main problem, as they didn’t have system for tracking deliveries, thus no data to predict how many vehicles they need. To use EVs, one first needs trip data so as to know when to charge the fleets. SCHEDULING is a major concern when information is not sufficient & vehicle range is limited. How can the company schedule and optimise properly? They seek to maximise kilometrage with minimum charging times. Analysis of when and from where to plan the charging and routing is essential. LUT has accumulated traffic and trip data for the last 3 years; moreover, this data is necessary for the company to be confident enough to offer the service.

### *Test pilot project – Mahindra-Electric eVerito*

As well as e-rickshaws, LUT explored the possible use of eVerito (Mahindra-Electric) for commercial use. The idea of using eVerito as fleets has existed since the launch of eVerito. The use of eVerito as fleets was realised later as a response to the demand of a client. LUT has completed three test projects so far, but none of them leads LUT toward a new business/service development immediately.

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<sup>43</sup> The first project was documented by the author and an evaluation report was submitted to the relevant actors. The initiation of this collaborative pilot project was triggered by the research activity of the author. This thesis does not include the full content of the report since the relevant to the research questions are less while the author reflects the insights obtained from this deep investigation of a pilot project of the case company.

#### ■ *Exploring a new geographical setting: pilot project in Delhi*

The company started a pilot project with Adobe in Delhi in February 2017. The company had been providing the CET service to Adobe Bangalore since 2016. As the client company was satisfied with the service in Bangalore, the client company decided to have a pilot project in Delhi with LUT, envisaging to receive the service officially in Delhi as well.

This was the first opportunity for LUT to provide a mobility service outside of Bangalore. Later, this pilot project became an official service in Delhi to Adobe.

#### ■ *Acquiring new resources*

##### *Former CEO of Reva Electric Car Company joins LUT*

In May 2016, a co-founder and former CEO of REVA Electric Car Company joined LUT. One of his contributions to LUT's operation consists in the efficiency increase of LUT's fleet through trip data analysis of the vehicles, as he is an expert of EVs and their battery. The company thus acquired a talent that supports LUT's vision to become an "e-mobility service platform" (see p. 214) both practically and symbolically.

##### *Receive capital increase*

The company raised its capital to around eight million USD in April 2018 (S. C. Kumar, 2018).

#### ■ *Maturation of operation*

Apart from above-mentioned development, the operation and the business process of the company have developed and matured during this phase. Based on the interview, a business process such as vehicle maintenance and driver education became stabilised routine. Also, a driver engagement program was developed so as to better incentivise the (subcontracted) drivers to work for the company. In addition, the accumulation of past operational data enabled data analysts to analyse different parameters such as the number of trips per day, charging time, battery performance and drivers' driving patterns so as to improve business performance.

Above-mentioned factors enable the company to expand the service to other cities during the next phase of development and replication.

#### ***4) Development and replication (July 2018 – December 2019)***

As mentioned above, since 2017, LUT has operated a pilot project in Delhi. By July 2018, LUT reached the replication phase, symbolised by the opening of a new branch office in Delhi on

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the 15<sup>th</sup> of August 2018. By that time, another office was prepared in Hyderabad. Pune is also explored as a next market (the city had recently lifted the ban to the commercial use of EVs). In August 2018, LUT had 12 clients in Bangalore and four clients in Delhi.

LUT also tied up with the GoI to deploy public EV charging infrastructure. “Lithium has signed an agreement with the government to provide 60 electric chargers across the Delhi-NCR region for public use, for which it will get financial assistance from the government” (Gaur, 2018). LUT obtained up to 8 million US dollars (Rs. 53 crore) in investments from International Finance Corporation, the private-sector investment arm of the World Bank by May 2018 (Keshav, 2018). It is not clear with publicly available data if the investment was done through a loan or by equity.

### ■ *Business expansion towards other major cities*

#### *Delhi*

As is mentioned above, the company started a pilot project in Delhi in 2017 and opened a branch office in Delhi in July 2018.

#### *Hyderabad*

The company started providing CET service to Wipro in Hyderabad since June 2018 (Autocar Pro News Desk, 2019b; Nandi, 2019).

Table 13 City and client (as in August 2018)

<b>City</b>	<b>Clients</b>
Bangalore	12
Delhi	4
Hyderabad	1

Source: Author

### ■ *Partnership with Tata Motors has announced*

In November 2019, Tata motor and LUT announced that Tata motor will deliver 400 EVs (Tigor EV) to LUT by the fiscal year of 2020 (ETAUTO, 2019).

## **5) Summary (Business development)**

This section described the business development of the case company from October 2014 to December 2019 (48 months).

The company provides a Corporate Employee Transport (CET) service to ICT and ICTES companies operating 24 hours / 7 days. From the establishment phase, the company and its business have developed steadily. The company eventually succeeded in providing a CET service in Delhi and in opening a branch office in Delhi. In the fiscal year of 2018, the company succeeded in making the operation profit positive. The company tested several new EV models, and one of them was introduced to the CET service operation.

■ *Complemental data on the company*

*Appointed managers and the date of appointment*

Table 14 Appointment of managers by chronology

<b>Date of appointment</b>	<b>Directors</b>	<b>Title</b>
2014 October 20	Sanjay	Managing Director
2014 October 20	Ashwin	Whole time Director
2015 February 3	HARIHARAN VENKATA SUBRAMANIAM	Director
2018 Nov. 23	NARAYAN RAMACHANDRAN	Director
2019 July 2	MURLI RAMACHANDRAN	Director
2019 Oct. 14	VIGNESH NANDAKUMAR	Additional director

Source: TOFLER (2020)

*Fund raising history*

Table 15 Fund raising history

<b>Date</b>	<b>Amount</b>	<b>Investment type</b>	<b>Investor</b>
		Asset under charge	
2015 sept. 18	3 crore	Book debts	Jain sons finlease limited
2016 Feb. 26, Modified on 01 February, 2017	23.46 crore	Motor Vehicle (Hypothecation); Receivables & DC fast charging stations	Bank of Baroda Indira Nagar Branch
08 August, 2017	25.00 lac	Lien on fixed deposit	TATA CAPITAL FINANCIAL SERVICES



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			LIMITED
			Aspada
	\$8 million USD		International Finance Corporation

Source: (Prasad, 2019; TOFLER, 2020; Zaubacorp, 2020)

*Business development and key facts*

Table 16 Business development of LUT

Year	Month	
2014	October	Company registered
2015	April	1 <sup>st</sup> pilot project, 10 vehicles purchased, 40 drivers Rs. 30 crore invest
	December	1 <sup>st</sup> official operation, 40 vehicles
2016	January to May	T.E. service launch Unisys service launch Accenture service launch Adobe pilot launch  Start the fleet mgt. application (pilot) for TESCO and Accenture
	May	Chentan joined as director  113 vehicles in operation in Bangalore <sup>44</sup>
	October	Paid up capital: Rs. 70,300,000
2017		Setting up Delhi pilot project office (February)
2018	April	Raise \$8 million from International Financial corporation
2018	June	Hyderabad operation starts

<sup>44</sup> Tesco: 38 units, Unisys: 60 units, Accenture: 5 units, Total Environment: 5 units, and Adobe: 5 units.

40 fleets in operation in Hyderabad

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**August**      New branch office in Delhi open

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Source: Author and (Narasimhan, 2018; TelanganaToday, 2018)

***Column: Lithium Urban Technologies Beyond 2020***

The thesis continues its description and analysis based on the development of the company and its business up to the end of 2019. For those readers interested to follow the business development of the company beyond 2020, here are several key progresses that the company made based on the available information as of February 2021.

■ *Change in management team*

In February 2020, the CEO stepped into a non-executive role and the former co-founder became the new CEO, taking up day-to-day operations (Banerji & Balakrishnan, 2020).

■ *Partnership with Fourth Partner Energy and HIDCO for EV charging network*

In September 2020, LUT got a partnership with West Bengal Housing Infrastructure Development Corporation (HIDCO) and Fourth Energy Partner to develop a network of EV charging station in New Town in Kolkata (Economic Times Energy World, 2020). With HIDCO, the company deployed 25 EV charging stations in Fintech Hub in New Town Kolkata (Bandyopadhyay & Chakraborti, 2020).

■ *Partnership with Uber India for EV rental*

In October 2020, Lithium Urban Technologies got a partnership with Uber India to deploy over 1000 EVs across Uber rentals in cities such as Delhi NCR, Mumbai, Bangalore, Hyderabad and Pune (Press Trust of India, 2020).

## *II) Formulation of LUT's vision and recognition of challenges*

What is the evolution of LUT's vision<sup>45</sup> along with the dynamic business development and new business exploration? The evolution of the vision is presented by year by year. The author has had the opportunity to understand the vision of the managers while conducting field surveys through communication with the CEO or co-founder. The CEO and co-founder gave insight about the company's vision to the author in the form of statements or in the form of questions. In this section, the CEO and co-founder are also called *the top managers* or merely *the managers*.

### *1) Vision and recognized challenges during development and exploration phase (1<sup>st</sup> interview): May 2016*

Before describing the formulation of the vision, it is important to remark that the case company is the very first company in India to have started providing a mobility service with four-wheeler EVs.

#### ■ *First entrant of the market*

LUT started providing its service as the first EV-based mobility service provider in the country. From the early stage of its business development (early 2016), the top managers have the intention to build first-mover advantage: the company aims at developing a competitive advantage leveraging the fact that it is starting the business as the first service provider. Since the company does not possess any technological background as its own competency, other business aspects such as organizational capabilities, social networks, value networks and brand development should help develop its business competency.

In this context, one of the principal concerns for managers is:

“How can LUT stay a pioneer in the market?” (CEO of LUT, interview May 2016)

This concern is also shared by the co-founder. It should be mentioned that at this point in time (as of May 2016), neither the word “pioneer” nor “the market” were clearly defined by the CEO or the co-founder.

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<sup>45</sup> The vision of the company will be explained as three layered vision. The first layer is the eventual aim to become an “e-mobility service platform”. The second is strategic intention and the third is the challenges and mitigation actions. These will be explained in this section.

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### ■ *May 2016: 13 months after the first operation (1<sup>st</sup> interview)*

In May 2016 (13 months after the launch of the first pilot project), the author interviewed the CEO, co-founder, COO and managers of different teams of LUT. At this time, the company had already started providing its service to 5 clients in Bangalore. The CEO and co-founder raised two principal questions on its potential business development:

- “What are possible market creations for LUT?”
- “How does a pioneer preserve its competitive strength over time?”

These questions are suggested as two principal interrogations during the discussion. What are the significations/implications behind those two questions?

### ■ *The first question: what are possible market creations for LUT?*

This question raised by the CEO and co-founder during an interview is related to company’s intention to expand its business. The company recognizes that the CET market is the first target market but not the only market that the company can address.

#### *Diversification of its service*

The company expects to diversify its service to other type of services. At the same time, the company recognizes that those new target markets should be **created** by LUT (or at least reached out to first by the company) so as to take advantage of (potential) first-mover advantage. It implies that LUT considers EV-based CET service as a market newly created by the company and that its service is not a mere CET service replacing ICE vehicle fleets by EV fleets.

#### *Geographical expansion*

Based on this perspective, two related questions arise.

- What are related factors for LUT, such as 2<sup>nd</sup> tier cities’ mobility needs?
- What changes are observed in tier 1, tier 2, and tier 3 cities?

These questions imply that LUT intends to 1) diverse its service and 2) expand its geographic coverage of its operation. This geographical aspect, however, does not appear as a recognized challenge as is described below (p. 219).

### ■ *The second question: how does a pioneer preserve its competitive strength?*

This question raised by the CEO and co-founder during an interview implies that the managerial concern of LUT lies on its strategic positioning and competitive advantage: being a

pioneer is an issue of market positioning and competitive strength which implies competitive advantage. According to its claims, LUT recognizes itself as “India’s first EV service operator”. The company expects to preserve its position as a pioneering company. At this point, it is not clear what a “pioneer” means, but other questions evoked during a discussion help to better understand the meaning.

Following is the list of questions evoked by the CEO and the co-founder as of May 2016.

Table 17 Questions evoked by CEO and co-founder in May 2016

<p><b>Market competition</b></p> <ul style="list-style-type: none"> <li>- How to react to copycats? How to deal with copycats?</li> <li>- What kind of knowledge is available on market theory?</li> <li>- What management theory exists on unit economics?</li> </ul>
<p><b>Market positioning and dominance</b></p> <ul style="list-style-type: none"> <li>- Is it possible to apply porter’s five-force model to LUT?</li> <li>- How to strategically step next while remaining as No. 1? What management theory exists on pioneering companies?</li> <li>- Where are we in BCG matrix?</li> <li>- How do pioneers maintain cash cows?</li> <li>- What kind of knowledge is available on new capability in pioneering new markets?</li> </ul>
<p><b>Business environment dynamics</b></p> <ul style="list-style-type: none"> <li>- How to deal with industrial dynamics?</li> <li>- What kind of knowledge is available on consumers of commuting?</li> </ul>
<p><b>Risk evaluation</b></p> <ul style="list-style-type: none"> <li>- How to response to harmful risks for LUT like fuel price changes that could impact the pioneering position of LUT?</li> <li>- How to response to harmful risks for LUT like mobility prices that could impact the pioneering position of LUT?</li> <li>- Is it possible to form a mathematical model to evaluate harmful risks for LUT?</li> </ul>
<p><b>Supply chain management</b></p> <ul style="list-style-type: none"> <li>- What management theory exists on how to control supply chains?</li> <li>- What management theory exists on getting products?</li> </ul>
<p><b>Internal factors</b></p> <ul style="list-style-type: none"> <li>- How to response to harmful risks for LUT like internal factors that impact the</li> </ul>

pioneering position of LUT?

- What management theory exists on the mechanics of activities to carry business?

Those questions address different managerial issues such as market competition, market positioning and dominance, business environment dynamics, risk evaluation, supply chain management and internal factors.

These questions imply that LUT recognizes that:

- emergence of competitors can prevent LUT from developing its business;
- continuous development of new markets helps LUT to stay competitive;
- evaluation of different internal and external factors such as business portfolio, industrial dynamics, fuel prices and mobility price using different theoretical frameworks to assess business risks and market opportunity is a central managerial concern.

Again, the author finds that the managers pay attention to both the current market and new market exploration and pay attention to change risk of both internal and external factors.

At this point of the business development - 13 months after its first operation, market exploration out of the current CET service market was one of the important focuses. This idea became much more concrete by November 2016 (see below: 19 months after its first operation). At this point in time, not many questions were raised on the organizational issues except for the term internal factors mentioned in a question.

## *2) Vision and recognized challenges during development an exploration phase (2<sup>nd</sup> interview):*

### *November 2016*

In November 2016, the CEO envisaged expanding the company's urban mobility service all over India. Moreover, he even envisaged beyond India, in cities in South-east Asia. Three mobility services, intra-city transport, freight and bus services, are mentioned as the services that can be electrified in the near future that LUT considers exploring.

According to the CEO, six elements constitute important factors in the reflection around LUT's future business development: market segments, form factors, energy, ICT & technology, analysis and charging infrastructure. What are the ideas behind those?

### ■ *Factor 1. Market segments*

A market segment corresponds to “what mobility services potentially can be electrified”. For the managers, electrifiable mobility services are its potential target markets. To think this market segment factor, the CEO mentions that form factors (availability of suitable EV), size of market, competition and timing of market entry are important. Competition here refers mostly to the competition with existing ICE-based service providers, but also with potential new entrants.

### ■ *Factor 2: Form factor*

Form factor refers to the design of vehicles. In order to provide an EV-based mobility service, suitable vehicles should be available. Not only the specifications of the vehicle in terms of number of passengers, but also the arrangement of the seats and the luggage space are important for that. This form factor includes the price and battery charging-related parameters, such as battery autonomy, charging time and battery lifecycle. The battery autonomy, for example, determines the range of the vehicle per charge, and the charging time determines the idle time of the vehicle when EVs are not on duty. In the end, these determine the “duty cycle” of the vehicle. This duty cycle is important for LUT as it largely impacts the economic cost competency of EV-based services against ICE-based services. In order to find the “break-even point” of EV-based services, the price and duty cycle are not ignorable, nor is its running cost. All those elements, that LUT calls “form factors”, are important to identify markets’ potential and market opportunities.

### ■ *Factor 3: Energy*

LUT sees energy factor as a parameter that impacts mobility services where the company can potentially identify market opportunity. The CEO asked, “what is the part of energy and is there any opportunity for business?” The first focus is the price factor (or cost economics) of petrol and diesel against electricity. Even within the price of electricity, the CEO mentions different related questions. What is the impact of renewable electricity sources like solar and wind as well as the impact of the decentralization of electricity production by these sources? What is the impact of smart-grid projects? What is the impact of hydrogen as a source and storage of the electricity? Those questions are raised to understand “what is the business opportunity for LUT within these energy transitions?” The development of energy-related innovation ecosystems is non-negligible.



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### ■ *Factor 4: ICT and technology*

The 4<sup>th</sup> focus is on ICT and other technology. The CEO did not explain a lot on this focus. However, one question concerned technology: “what are the key elements of technology?” During the discussion, technological components such as ICT and Global Positioning System (GPS) are mentioned. These technologies can be used for the optimization of routing and analysis, for example.

### ■ *Factor 5: Analysis*

Though the CEO mentioned this element at the beginning of the interview, he did not explain much about it. The author interprets that analysis is important to increase the daily trip efficiency, to improve EV maintenance efficiency and to improve battery lifecycle, for example.

### ■ *Factor 6: Charging infrastructure*

This focus was not much explained either during the interview. Geographic coverage, convenience and accessibility, and cost of EV charging infrastructure seem to be important to the author’s mind. There is a choice to make between having the company’s own charging infrastructure and outsourcing it.

Above are explained six important factors expressed during the interview with the CEO. The co-founder’s focuses are the same as those of the CEO. The co-founder additionally thinks that LUT is not a mere CET company but rather an electric mobility service company. Slight differences in focus elements were observed. The co-founder considers that energy and power infrastructure are in the same category, and for him, direct competition is a focus element for the strategy of the company. During the interview, the CEO also mentioned that it is important for LUT to reflect on “what element is urban mobility” so as to identify market opportunities. This somehow implies that the CEO envisages to develop any service related to mobility in urban context, if there is business opportunity.

Based on the interview, in November 2016, the company was focusing on the following four topics as high-level managerial interests for further business development:

- The possibility of replacing existing ICE-vehicle-based mobility services by using EVs.
- New business opportunities for different services based on the recent development of new mobility products, of new energy supplies and storage products and of energy infrastructure.

- The application of data analysis and new technology to create a new value for new business.
- How to deal with potential emergence of direct competitors.

■ *Exploring diverse strategic possibilities and start identifying concrete challenges towards future business development*

Five months after the previous interviews, some expressions become concrete, such as intercity transport and freight transport. Some more precisions are given on internal factors and external factors in comparison with the previous interview in May 2016.

**3) Vision and recognized challenges during maturation and exploration phase (3rd interview):  
November 2017**

In 2017, LUT started its operation in Delhi, the capital city of India. This was the first step toward a larger vision of LUT's business development. LUT considers that every single mobility service offered by ICE vehicles is a potential market for EV-based mobility services. All mobility service markets can be replaced by an EV-mobility service market. As explained above, based on this idea, the founders raised the question of "how should LUT dominate different mobility service market segments" by leveraging the fact that LUT was the first player to start an EV-based mobility service.

The strategic actions evoked by the managers are to:

- Keep working on the integration of different EV components to create new markets, previewing potential **convergence of different industries** such as energy, ICT and mobility.
- Turn LUT into a **brand** of mobility service.
- Remain in the EV business domain so as to keep attracting **talented human resources**.

The managers claim that modularity, responsibility, sharing and connections are key concepts for a mobility service and requirements for a viable business.

- Modularity is to be understood in terms of EV components and performance.
- Responsibility includes sustainability but also safety-related aspects.
- Shared-ness allows increasing the occupancy rate of EVs.
- Connections mean using data to increase efficiency and convenience.

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For that, the managers explain that market segments, form factors, energy management and data information analytics are key elements to develop business beyond the current market or to create new markets. The market segments and the form factors were already mentioned previously during the last interview in November 2016. Energy management implies energy generation and cold chain/temperature-controlled supply chain. This is backed by the idea that transportation consists essentially in converting energy into mobility. Data information analytics means dealing with the data among different mobility services (human and goods) by operating a mobility service centre so as to integrally manage different mobility services and their optimization.

### ■ *Competition*

While discussing about the research with co-founder, he mentions that the real potential competitors are conventional employee transport service operators, not Ola or E-Smart that provides different services with electric vehicles. The convergence of industries such as energy, transport, ICT and building is mentioned. (This will be analysed below in p. 219 and in p. 308.)

#### *a) Creation of a “client club”: new strategic thought*

The creation of a client club is one of the intentions of the co-founder. A client club serves as a platform to explore new business opportunities and explore the service development possibilities. This idea of creating a client club leads the managers to take a strategic direction: developing business by keeping its closed type of (trust-based) business community.

LUT now seeks to develop its business toward a trust-network-based closed service, instead of a platform-based aggregator service (such as Ola). LUT intends to expand into a goods delivery service as well, and not necessarily stick to human transportation service. LUT considers this is an ideal market for transport service providers. LUT sees more market opportunities in formalizing local informal activities (= sometimes illegal) with more efficient ways of providing the same values.

The following are examples of trust-network-based services that LUT has in its strategic view:

- Providing employee transport for shopping mall management companies,
- Providing an airport taxi service under existing employee transport contracts,
- Having a contract with a hotel to provide on-demand service to its guests, and
- Goods transportation for the companies that can build long-term relationships.

■ *Toward the diversification of its service*

The diversification of its service amounts not to creating new markets, but rather replacing existing ones by newly available products. Different key words are heard: convergence of industries, branding of the company, and securing talent. The statements of the co-founder appeared more actionable than those of 2016 that were rather conceptual.

■ *Learning by doing / discovery-driven approach*

Through two years of operation after the first pilot project, the managers accumulate knowledge on electric mobility and relevant innovation ecosystems. The vision was modified accordingly while the core idea of its business development remained unchanged.

**4) *Vision and recognized challenges at the beginning of replication phase (4<sup>th</sup> interview):***

*August 2018*

By this phase, thoughts on mitigation actions were advanced. Using an excel sheet, each topic and strategic action become clearer and more concrete than before.

At this point, LUT has advanced in terms of vehicle availability and energy infrastructure. LUT finalized a contract with the Gol for EV charging infrastructure deployment.

■ *Strategic questions evoked by co-founder*

The author mainly interacted with the co-founder this time. The author had a series of discussions with him so as to mutually deepen the understanding of the current strategic concerns of the company. He evoked the following three questions.

**1) *What are the constraints that LUT faces to go from what it is currently towards what it is to be?***

According to the co-founder, he precises as following:

The constraints can be at the level of the ecosystem, at the level of the company, at the level of technology, anything. Essentially, you have a pack of constraints, and the company must determine the available strategies to overcome these constraints and maintain its leadership in the market.

Above is the first question evoked by the co-founder. The second question is as follow.

**2) *How can LUT best predict which market segment will become viable next?***

According to the co-founder, he precises as following:

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We are thinking to go to Cargo, going to self-driving whatever. But we already know, we do not really know what the strategy should be for figuring out which market segments to go after next.

Above is the second question evoked by the co-founder. The third question is as follow.

### *3) How to build organizational capacity to do all these.*

According to the co-founder:

To maintain leadership which are the areas in which LUT can/should maintain its own company advantage. What are the potential challenges for the future business development? From the organizational perspective now, so if you take these three words, this document this excel sheet is the answer to that question. These are the challenges. Availability, prices, power infrastructure, these are the challenges, and what are the options available to meet these terms.

Above is the third question evoked by the co-founder

### *Potential business expansion*

Co-founder told the author that:

There still be all of these. But using clean fuels. So, the question is, if this would be viable, how would all of this become viable. And what [the CEO] and I saying is that individual pieces will become viable at different times. Not the same time. So CET is viable today, maybe cargo, I'm just guessing in 3 years. Maybe self drive in ,five years. I'm not sure I'm just guessing here. So LUT's quest is to keep finding viable market segments in which the new status-quo can be established. And obstacles are vehicle should be available, price, financing, routes should be known and manageable, ideally contracts should be available.

Here, three important key words were given: vehicle availability, when to become viable (timing) and keep finding. They imply that product (un)availability is a major challenge while they company needs to keep learning about the development of EV innovation ecosystems and EM innovation ecosystems so as to track when each market becomes viable.

The co-founder stated that:

So the point that I make here is to say, LUT began with the realization that multiple markets and services, mobility market and services using different vehicles are viable

today, with petrol, diesel and gasoline as their fuels. At ten - fifteen years from now, the same markets would be viable using clean fuels including electric vehicles. The business opportunity therefore is in identifying when each of these market segments would be viable using clean fuels. And entering these markets as they hit the point of viability. LUT has discovered that the CET is a market that is viable today. And therefore, it is an appropriate entry point.

LUT can potentially diversify its business to encompass a goods delivery service. Managers already have this idea in their mind. LUT started developing its business in other geographical areas (= Delhi). LUT started exploring options of developing EV charging infrastructure in the city of Delhi. LUT started testing other types of EVs such as e-Verito, ZOE and e-rickshaws.

#### ■ *List of constraints and mitigation actions*

The following seven points are mentioned by the co-founder as challenges that LUT faces as of June 2018:

- Vehicle availability
- Price of vehicles,
- Power infrastructure,
- Service infrastructure,
- Organization,
- Competition, and
- Driver engagement.

These are detailed and analysed below (p. 219).

### *III) The vision and challenges*

During the three years of observation, the vision - strategic intentions, constraints and mitigation actions - formulated by the managers was observed. The managers of LUT sometime use the words “constraints” and “challenges” interchangeably. The author identified three layers within the vision of the managers towards the future business development.

*1) 1<sup>st</sup> layer of vision: eventual business target to become an “e-mobility service platform”*

The CEO and co-founder of the company mentioned identification of a “new business model” for the company during a meeting held in 2015. On the 11<sup>th</sup> of November 2019, a head of external relations of the company Vikash Mishra stated that “We want to try and test with multiple form factors. Right now, the viable business model is four-wheelers. Eventually, we will move to bus and start the logistics business as well.”

This indicates that the identification of a new viable “business model” is considered as an important aim of the company. What can this new viable BM be?

Through a series of discussions with the CEO and the co-founder, the word “mobility platform” was raised several times, indicating its intention to become a “mobility platform” by developing its business beyond CET service. The signification of “platform” is not clearly specified or defined by the managers, but the author observed that the managers sometimes use the term in a technological sense, such as to indicate a digital fleet management platform (Unreasonable group, 2020; Vignesh, 2016).

However, sometimes the author observed that the term “mobility platform” meant more than a mere technological fleet management platform.

On the 18<sup>th</sup> of August 2020, the co-founder published a public post on a social-networking-service (: LinkedIn) stating that “EM [Electric Mobility] is where we're going. EV is a part of it, of course, but at Lithium Urban Technologies we think of what we do as the convergence of Energy and Mobility. By bringing together different pieces of this convergence, **a platform** can be built, for ourselves as proof first, and then for a much larger ecosystem” (Mahesh, 2020). Here, he uses the term “platform” to include six different components (1) vehicles leasing, (2) power sources, (3) charging management, (4) data hosting, (5) network operations and (6) reuse and recycling (of batteries or vehicles). This shows that the signification of a “platform” is not only limited to a daily fleet management platform but something wider than that includes at least energy, vehicles, batteries and data.

This is in accord with what the author observed previously. The managers intend to cover not only a CET E-mobility service but also other mobility services such as buses, inter-city taxis, and cargo/goods transports, as well as energy generation and supply such as charging infrastructure deployment.

The author considers this – becoming an “e-mobility service platform” - as the first layer of the vision.

■ *Business Model Change is expected*

The author shows here that the managers of the company have been considering achieving a Business Model Change (BMC), though they do not necessarily have a clear idea about a “new business model”: the managers only have an abstract idea of future business development.

*2) 2<sup>nd</sup> layer of vision: strategic intentions*

Based on the series of interactions and discussion with the CEO and co-founder, the author identified that there are four strategic intentions mentioned. The author calls them intentions since those four are not officially announced nor shared within the organization or amongst stakeholders such as investors, partner companies, clients and employees. However, during the interviews and discussions, those ambitions are clearly mentioned either by CEO or by the co-founder, or by both of them.

*a) Strategic intention 1 - Developing first-mover advantage*

The first strategic intention is to develop First-Mover Advantage (FMA). This was mentioned by the managers from the very beginning of its business development by saying “how can we stay a pioneer and how do we deal with copycat companies?” The same sort of idea was expressed different with words like “keep dominance” or “keep leadership” as well.

What does this really mean? Knowing the strength of LUT’s operation does not lie on ICT or other technologies, “keep dominance” indicates indexes such as vehicle number, trip number, client number or number of services. If LUT keeps a maximum number of vehicles, clients and services among competitors in the mobility service sector, it is natural for LUT to be considered a leader of the EV-based mobility service sector.

As LUT does not possess any technological advantage nor an outstanding business model, the efficient execution of its operation and outstanding sales power are required to achieve the above-mentioned indexes.

Exploitation of the first-mover advantage is one of the strongest managerial interests for the company. It is a top-priority matter for the managers, principally because they recognize LUT’s CET service as easy-to-imitate. LUT’s business model can indeed appear quite simple.



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BM analysis in chapter 6 tells us that LUT holds no unique technology or process that is difficult for follower companies to imitate: LUT does not possess any technological advantage or outstanding business model. The client companies do not have any specificity either: potential entrants can find clients without difficulty, since the CET market is growing along with the cities' development in India. Therefore, managers have been very concerned with the possibility that new entrants — supported by a deep-pocket investor — could overtake the market (c.f. constraint). In this situation, the managers found the uniqueness of LUT in the fact that the company is the first player established as an EV-based CET provider in India, which enabled LUT to secure its initial market.

### ■ *Duality of LUT's business strategy and multiplicity of FMA focus*

LUT envisages developing the business both by geographically expanding CET business and diversifying the service. In this context, building FMA within the current market of current business is of course important. At the same time, entering a new market (Lieberman & Montgomery, 1990) is another way to develop a FMA.

		Geographical expansion	
		Bangalore	Other geographical location
Service diversification	CET service	1	2
	Other services	3	4

The duality of LUT's strategy multiplies the focus of FMA development. At the very least, LUT needs to consider the development of FMA under four different focuses:

- 1) Bangalore – CET service,
- 2) Other cities – CET service,
- 3) Bangalore – Other services,
- 4) Other cities – Other services.

Where "other cities" and "other services" are as diverse as multiple: other cities can be Delhi, Mumbai, Chennai, Pune etc. and other services can be delivery services, bus services, infrastructure services etc.

### *b) Strategic intention 2 - Sequential service diversification*

LUT envisages diversifying its service sequentially by replacing existing ICE-based mobility services once they become financially viable by using EVs. In order to do so, LUT needs to identify a market opportunity. Thus, each ICE vehicle-based mobility service should be analysed and “evaluated” regularly so as to determine when to enter the market. This part is currently mainly carried by the CEO and the co-founder. Through they sometimes work in coordination, sometimes independently on this regard, the lack of organization causes the activity not to be systematic. This “evaluation” process should be defined clearly in the organization as an important business activity. Finally, the co-founder explained that not every investor supports LUT to diversify its service. It is probable that the company will thus continue developing without new market exploration for a certain period.

However, if LUT believes that the business expansion is limited with the current service and has the intention of varying its service line-up, the “evaluation” process should be clearly defined in the organization so as to obtain the desired result. At the same time, external players such as investors and clients should be notified or informed of this intention so as to maybe offer their support. It is also related to the creation of a client club as described below. For that, the service diversification strategy should be clearer and more concrete, to be shared among actors.

LUT envisages diversifying its service sequentially by replacing existing ICE-based mobility services once they become financially viable by using EVs. The main idea is to replace the fleets of existing mobility services from ICE vehicles to EVs.

#### ■ *Motivation behind this strategic intention*

The formulation of this strategic intention can be understood from different perspectives. Firstly, it should be mentioned that this intention was clear from the very early stage of LUT’s business development. The market development of EV-based CET service was not that evident since the first client considered the operation as one of Corporate Social Responsibility (CSR) activity (c.f. chapter 5 section CHAPTER 4 - 1)2). The founders are also interested in developing other services such as a taxi service and a bus service. In 2016, intra-city taxis (including airport taxis), intercity taxis, cargo, delivery, intra-city buses and inter-city buses are central ideas of service diversification.

#### ■ *Variant possibilities and identification of new opportunities*

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LUT identified a new electric bus project and an EV charging project that could expand the business ecosystem of the company, which is very positive. However, as mentioned above, the synergy among those projects and the current operation is unclear.

The identification of new business opportunities is critical.

The service diversification is not only limited to mobility services. LUT also considers developing other related services which include an EV charging business and monetizing the fleet management application as a platform. EV charging and the fleet management application are partially internalized. Also, the vehicles' maintenance and the EVs' production are also being considered. Those are not internalized, and as they require a large investment, their internally realization is very improbable. The EV charging business also requires a large investment. The "platformization" of the fleet application is highly realizable while the development of the application is mostly outsourced, and other early-entrants exist as competitors.

### ■ *Products needed for service diversification is missing*

While the managers of the company aim at diversifying the company's service, products – especially EVs – required to diversify the service are missing. This point is listed at the top of the list of "constraints and mitigation actions". This implies that the managers perceive this issue as a critical challenge. The development of the innovation ecosystem of EVs remains uncertain and the level of the uncertainty is NOT *clear-enough future* (Courtney, Kirkland, & Viguerie, 1997) (four types of uncertainties are explained in chapter 2). In this context, the managers face difficulties in detailing the strategic actions of the company for future business development, especially for potential service diversification. This issue is critical since the service diversification, along with geographical expansion, is necessary to become an "e-mobility service platform," that is the ultimate strategic aim for the managers.

### *c) Strategic intention 3 - Establishing LUT as a brand*

To establish LUT as a well-settled brand in the EV-based mobility sector, the question is what sort of brand image LUT aims to build. Once decided, that concrete message should be diffused in and out of the organization. It is currently true that some locals in Bangalore recognise "Lithium" as an EV brand, but this does not mean that LUT is yet established as an EV-based mobility service provider brand. A brand image is not accurately recognised to attract clients. Communication tools such as mobile applications or branded products like EV chargers are not developed for an efficient establishment of the brand.

### ■ *Creation of client club*

Along with the establishment of the brand, since 2017, the managers started talking about the “creation of client club”.

The creation of a client club is a result of a strong sales power and an efficient diversification of service. For that, the managers intend to enforce the company’s communication with existing clients and potential clients.

### *3) 3<sup>rd</sup> layer of vision: list of constraints (challenges) and mitigation action*

Given the above-mentioned strategic intentions, in August 2018, the co-founder and the CEO listed challenges for future business development of LUT. Each challenge is followed by mitigation actions that the company can potentially take to circumvent the challenge.

The list concretely expresses the company’s challenges in the perspective of the managers. These challenges were put into seven different categories labelled by the co-founder. The mitigation actions were, in August 2018, still to be developed.

This subsection presents the challenges as written by the managers and explains their significance. (In this subsection, the word “the managers” indicates the CEO and the co-founder that developed this list.) The co-founder reviews the explanation for each challenge orally to the author. Therefore, the explanation should be considered as his perspective interpreted by the author based on the continuous interviews and discussions led during the fourth survey.

Though the original document is an excel sheet, the “challenges” expressed by the managers are presented in detail in this subsection. Each challenge mentioned here will be assessed in chapter 7. The label of each categorisation is based on the original document. Each category has several challenges. The author labelled each challenge with a number and a short phrase in quotation marks so as to facilitate the understanding. A short phrase *in italics* is the phrase expressed by the managers in the original document to explain each challenge.

#### *a) Challenge category A: Vehicle availability<sup>46</sup>*

The first category is about EV availability in Indian market.

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<sup>46</sup> In 2015 when LUT started its business, only one model of EV was available in India. Later, Mahindra-Electric introduced an electric sedan and an electric van on the Indian market by *WHEN (?)*. Some electric buses became available by *WHEN(?)*. Those include buses introduced by a Chinese company and some Indian companies such as BYD and TATA.

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### *Category A-1: “Timing”: OEMs plan to introduce EVs only after 2019*

A concern of the managers about vehicle availability is the timing of the market introduction of new EVs. While some local and foreign automobile manufacturers publicly announced their intention of EV market introduction, most of them remained mere plans, with an unclear realisation time-period.

### *Category A-2: “Robustness”: Early prototypes are built for retail and not fleet suitable*

Another concern of the managers about vehicle availability is the robustness of EVs. Since OEMs announced that EV manufacturing plans are mainly focusing on individual users, the vehicles are not designed with the robustness required for commercial use with relatively longer usage hours and longer driving distance than individual use.

### *Category A-3: “Features”: Vehicle designs are retail-led when it comes to cars*

Adding to the robustness of the car, the managers consider other features that also need to be suitable for commercial use. For example, large and comfortable passenger space is preferable for a taxi service whereas a large and practical cargo bed is required for a delivery service. The required features are different for each mobility service, and a majority of OEMs announced that they manufacture EVs for individual users. This mismatching appears to be a challenge for LUT’s future development of new services.

### *Category A-4: “Mode of charging”: Approaches vary between battery swapping and charging*

Another aspect of EVs that concerns managers is its charging method. There are different methodologies and technologies available for EV charging, such as battery swapping, remote charging and charging with a cable. Moreover, for each of them, different standardizations are possible. This mode of EV charging impacts the business operation of the mobility service. For example, once battery swapping becomes a standard, LUT does not need to consider charging time within its trip scheduling process.

### *Category A-5: “Entrepreneurs”: Entrepreneurs ready to produce EVs lack speed and reliability*

The last concern of managers on vehicle availability is about the individuals who have the knowledge and willingness to develop and manufacture their own EVs. The managers have identified several such individuals. However, the managers assess that those entrepreneurs lack speed and reliability in order to be able to provide EVs to LUT.

### *b) Challenge category B: Price of vehicle<sup>47</sup>*

The second category in the list is about the price of the EVs.

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<sup>47</sup> Car makers from foreign countries announce to develop several EV models. Even if they become available on India market, they are still too expensive to run a viable business. Indeed, the initial price as well as import tax are high.

***Category B-1: "Price of local EVs": Initial prices are high for locally manufactured vehicles in the absence of volume***

The managers perceive the price of locally manufactured EVs as a challenge for LUT's future business development since the viability (or more precisely, the time-period until the break-even point) of an EV-based mobility service largely depends on the initial price of the EVs. According to the managers' perspective, the main reason of this high price is due to the small size of a manufactured lot.

***Category B-2: "Price of imported EVs": Import tariffs are high***

The managers also perceive that the expected market prices of foreign OEMs' EVs are also high. This is a managerial concern of LUT for the same reason as the previous challenge. The managers think that the high import tariff is the reason of the high market price of foreign EVs.

***Category B-3: "EV resale value": Banks are uncertain about the resale value of vehicles***

The third challenge for the managers concerning the "price of vehicles" is about the reselling price of used EVs. The managers consider that if the used EVs can be sold, the price of the vehicle becomes virtually low. For this reason, how to ensure the resale value of EVs and how to convince stakeholders of this resale value are challenges for LUT.

*c) Challenge category C: Power infrastructure<sup>48</sup>*

***Category C-1: "Diffusion is limited": Reliable supply remains limited to certain environment***

The managers mentioned that the power infrastructure for EVs is not sufficiently deployed. Even if power infrastructure is available, it is not reliable enough for LUT to use it for its services. It is a challenge for LUT's future business development.

*d) Challenge category D: Service infrastructure*

Service infrastructure is a critical component for commercial users. If no vehicle maintenance is available, commercial users cannot operate the service, or the service provider needs to take care of the maintenance itself. In 2018, LUT depended on Mahindra-Electric's service centres for its vehicle maintenance.

***Category D-1: "Less geographic coverage": Only a few geographies are supported by OEMs***

The managers point out that the current service infrastructure covers only some major cities. Since the fleets require regular maintenance as well as urgent repairs, the geographical coverage of service infrastructure (service centres) is an indispensable condition to operate a

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<sup>48</sup> There is practically almost no EV charging infrastructure publicly available in Indian cities. This is a challenge for commercial users while at the same time it can be considered as an opportunity.

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mobility service in a region. Less geographical coverage of service infrastructure hinders LUT in the further expansion of its service and development of new services in new cities.

### *Category D-2: “Less engineers (maintenance)”: Very few skilled EV maintenance engineers available*

Related to the previous challenge, the managers point out that trained EV maintenance engineers are in few in number. Since the maintenance of EVs is a critical component for the commercial use of EVs, it is a challenge for LUT for further business development.

### *e) Challenge category E: Organization*

This aspect becomes important when LUT expands the geographical coverage of its service, the current business, or operates multiple services.

### *Category E-1: “Talent supply”: Bandwidths are considerably constrained*

Securing the supply of talented human resources such as data analysts, ICT engineers or managerial candidates is a great concern as well. This factor is considered important, as much for business expansion as for potential service diversification.

### *f) Challenge category F: Driver engagement*

The critical component of LUT’s operation is drivers’ management. More precisely, the driver engagement is the principal focus of drivers’ management. ICT oriented companies cannot, or are not willing to, compete with LUT because of this factor.

### *Category F-1: “Driver recruitment”: Number of finance-able individuals is peaking, Competition for the services of the best will be rough*

The managers mentioned that the demand for drivers is hiking. It is becoming difficult to hire good drivers and keep them working for LUT.

### *g) Challenge category G: Competition*

Competition is a concern in both in the market on which the current business takes place, and in the markets in which LUT will potentially develop in the future.

### *Category G-1: “Deeper-pocketed competitor”: There is a risk of deeper-pocketed investors trying to acquire market shares by dropping prices*

The managers are aware of the possibility of the emergence of direct competitors with larger financial capabilities. Those competitors potentially lower the price of the service so as to dominate the market. This is a potential challenge for LUT’s current and future service development.

*Category G-2: “OEMs as competitors”: Mahindra-Electric itself considers fleet operation*

The managers are aware of the possibility of OEMs becoming competitors as mobility service providers. Since OEMs can use their own EVs, the cost of that service can lower.

*4) Summary (Vision and challenges)*

This chapter examined the case company’s vision and challenges. The vision of the company and recognized challenges are explained by three layers: the eventual business target to become an “e-mobility service platform”, strategic intentions and the list of C&MA. While envisaging to change its BM, the managers of the company set three strategic intentions: FMA development, service diversification and brand establishment and client club creation. Through business development, the managers accumulated knowledge on electric mobility relevant innovation ecosystems and started formulating the list of C&MA based on the learnings from past business operations. The vision of the company and its realisation will be analysed in chapters 5 and 6.

■ *The company envisages to attain a BMI*

BMI in this research is defined (in CHAPTER 2 - ) as **a modification or an addition of business activities that changes value network so as to improve business performance.**

The company considers the establishment of FMA (or more generally competitive advantage) important while aiming at becoming an electric mobility “platform”. Becoming an electric mobility “platform” requires changes of its value network.

Altogether, the author considers that the company envisages achieving a business model innovation, targeting to become an electric mobility “platform” beyond providing solely a CET service or providing other mobility services.

*IV) Summary (Business development and vision)*

In this chapter, the author described the business development of the case company and its vision. The business development was presented by phases. The first phase – initiation phase – is characterized by the foundation of the company and the first pilot project. The company identified BPO companies as target clients since they operate 24 hours a day. The company identified a business model that enhances the advantages of EVs while diminishing the disadvantages of EVs. The second phase – establishment phase - is characterised by the official beginning of its operation for the client companies. The company formulated the value



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propositions of the service and executed the daily operation to provide the values to the client companies. The company also developed a fleet management system to better manage the daily trip, while some clients keep using paper-based systems. The third phase – development and exploration phase – is characterised by steady business development and different test pilot projects to explore the possibilities for diversifying its service. The company also started a pilot project in Delhi that, later, become an official operation. The fourth phase – development and replication phase – is characterised by the geographical expansion of the operation. The company started operating in Delhi and Hyderabad. A branch office was opened in Delhi as well. One enabler of this geographical replication (from Bangalore to Delhi) is explained later (in p. 305) as organizational stabilisation and positive operation profit.

This chapter also presented the vision of the company. The author identified three strategic intentions of the company: developing FMA (e.g., Kerin et al., 1992), service diversification and branding and creation of client club. These three strategic intentions are formulated by the managers envisaging to eventually turn the company into an abstractly defined “e-mobility service platform”. As the company envisages to add new services to the existing business activities, the author considers that the company aims at a BMC. Since the company tries to develop FMA along with this BMC, the author qualifies that the managers are aiming at achieving a BMI.

This chapter also presented a list of “Constraints and Mitigation Actions (C&MA)” developed by the managers. By looking at the list, the author found that the (un)availability of the products – EVs - is a major constraint for the company’s business development, especially for service diversification. This is the situation pointed out as an important phase for experimentation and learning by Cavalcante (2014), namely the pre-stage of BMC. The identified challenges and the list will be analysed in chapter 6 (analysis) so as to identify organizational gaps in achieving its strategic intentions.

## Recapitulation – Key takeaways

Chapter 4 describes the business development of the case company - Lithium Urban Technologies – that provides a Corporate Employee Transport (CET) service in Indian cities. The company started its first pilot project in April 2015 in Bangalore, after being officially registered as a company back in October 2014. The author divides the business development into four phases: initiation, establishment, development and exploration, and development and replication in order to facilitate the comprehension of the dynamism of its business development. Based on field observations and interviews as primary empirical data, the chapter presents information that answers, for example, why the company started its operation first in Bangalore, and what value propositions the company offers.

The company started its operation first in Bangalore – a city recognised as the Silicon Valley of India. Its modest climate and the fact that English is widely spoken in the city attract international companies to set up their outsourcing campuses. The city is the fifth largest in India, and the population and the economy are steadily growing. The most critical element is that the local public transport does not answer the local citizens' demand towards commuting transport. Because of these reasons, the company started the first operation of CET service in Bangalore. The company mixes EVs and a mobile-based application so as to provide value propositions by circumventing the weak points of EVs as compared to ICE vehicles, such as a short autonomy range per charge, and by taking advantage of stable EV running costs.

After chronologically describing its business development, the chapter presents the vision of the company and its recognised challenges to attain the vision. The managers of the company try to develop a first-mover advantage while they envisage to change the business model of the company. The identified challenges are summarised in a list of “constraint and mitigation actions” drawn by the managers with different labellings. The list was used as a managerial tool to clarify the challenges for the achievements of its three strategic intentions: establishment of first-mover advantage, diversifying the service, and formulating brand and creating a client club.

As mentioned, this chapter also presented a list of “constraints and mitigation actions” developed by the managers. By looking at the list, the author found that the (un)availability of the products – EVs - is a major constraint for the company's business development, especially for service diversification. The identified challenges and the list will be analysed in chapter 6 (analysis) so as to identify organizational gaps in achieving the company's strategic intentions.



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*CHAPTER 5 - Case description: Organizational structure and business environment*

The previous chapter presents the business development of the case company and the transition of the vision of the managers. The business development was described chronologically, and it was explained that the transition of the vision highlights managerial concerns. Two global directions of market expansions – market expansion within the current target market of CET services and new service development - are explained. At the end of the last chapter, a list of “constraints and mitigation actions” was presented. This list was developed by the co-founder and CEO to prepare the future business development of the company.

This chapter presents the three following points to explain the internal and external business environment of the company:

- organizational structure (section I),
- business model (section II), and
- scalability within the current target market and new service development (section III and IV).

Before describing these points, the following part explains the analytical framework of the chapter.

■ *Structure of the chapter and analytical framework*

This chapter aims at providing objective analysis about the business development of the company. The company gave access to the operational data answering two managerial questions to the author (= social demand in chapter 4). In this way, the company cooperated with the research of the author.

The chapter firstly presents organizational structure and the business model to understand how the company provides different values to clients. The author identified that the literature of business models suggests four principal components to be observed: value proposition, revenue model, value network, and leadership. Before analytically presenting the Business Model of the company, organizational structure is explained since the understanding of the organizational structure is indispensable to better describe the business model.

The chapter then presents the external business environment so as to understand the scalability of the company's current CET business and the potential markets for new service development.

This chapter aims at summarizing the status quo of LUT's business and past business development so as to firstly understand **how and why the company came to develop this list** on the third year of its business operation, and secondly to prefigure potential challenges for future business development.

## *1) Organizational structure*

### *1) Organizational structure (2016 - 2018)*

This section describes the organizational structure of the company along with the daily business activities of each department. Some operations are described in detail in this section so as to build a better understanding of the business activities. This helps to understand the business model of the company: how the company creates value for values to be provided to the client companies. The Headquarter (HQ) of the company is located in Whitefield, Bangalore. At the HQ, the five *office teams* and the management team work. Most office team members work in the HQ office. Apart from the office teams, there are *operational site teams* that work at the client campus and *drivers* on duty.

#### *a) Office teams*

Employees working in the HQ in Whitefield constitute office teams. About 30 people work at the headquarter office. Office teams work between 9:30 and 18:00. To illustrate the ambiance of the HQ office, the office space is a single floor, open-plan office. Since the number of employees working doesn't exceed 30 people, the communication among employees is quite fluid. According to the COO, the office space is designed so as to facilitate the communication among the employees. Lunch is delivered to the office and served and shared among employees, for example.



Figure 16 Open office

The five office teams are as follows, as of 2016:

- Operation team,
- Analysis and technologies team,
- Vehicle maintenance & driver training team,
- Billing & account (or finance) team,
- Human resources, and
- Management.

Each team has a manager that is in charge.

The following parts explain the activity of each office team.

One of the important operational components of LUT is its fleet management. It is taken care of by the operation team.

■ *Operation team*

The work of the operation team is composed of the following:

- Schedule a weekly trip execution plan,
- Monitor daily trip executions, and
- Adjust the trip execution schedule, if necessary.



Figure 17 Drivers and COO at a parking of a client

Every weekend (either on Friday or on Saturday), the company receives roster data (with a list of passengers' names, departure places, destinations and timings) from client companies. Based on this roster data, the operation team plans the trips of the coming week by allocating vehicles and drivers to each scheduled trip and optimally planning the charging timing of each vehicle. A Microsoft Excel-based scheduler helps to allocate these elements automatically. However, the schedule needs to be fine-tuned manually to increase the occupancy rate of each vehicle. The roster data of the week is provided and confirmed on Friday or Saturday of the previous week, depending on the client. The scheduling process takes place on Friday afternoon or on Saturday. The analyst team also supports this process.

Conventionally, the trip plan is shared manually with drivers with paper sheets and/or over the phone. LUT developed its own cloud-based Fleet Managing System (FMS) that facilitates sharing the plan with drivers: once the trip plan is registered on the FMS, the data is transferred to the smartphone of the drivers through a mobile application. This mobile application notifies each driver of the allocated vehicle and the place and timing of departure, passengers' pick-up and passengers' drop-off.

Once drivers are on duty, each trip can be monitored in Node of Control (NOC) room in the office. NOC room has several computers and monitoring screens, and the data provided by the FMS is displayed on the screens. The FMS provides data such as vehicle location, battery charge percentile, charging status (i.e., fast charging or normal charging), and occupancy. This status data is transferred to the FMS via a data server of EV manufacture that in turn collects the data from EVs through a telecommunications network. LUT receives this status data of e2o every two minutes.

GPS tracking allows the site managers to locate the vehicle and drivers. The conventional way of location verification over mobile phones allows some drivers to give a wrong location so as to diminish the workload and have some extra break time. Thanks to this technology, the company can improve the performance of its trips.

Later, the data on charging status, location, speed, room temperature and odometer are analysed to improve the energy efficiency of driving and to optimize the routing by analysis and technologies team.

#### ■ *Analysis and technologies team*

The analysis and technologies team handles two related jobs: data analysis and technology development. The data analysis is about the analysis of data obtained from daily trips. The



## Chapter 5 – Case description: Organizational structure and business environment

main focus of the analysis is to provide SLA evaluation every fortnight. The team examines the average number of trips conducted for each client so as to compare it with the SLA. If the SLA is not fulfilled, the team inspects its reasons to report to the client. The reasons can be heavy traffic, passenger delays and vehicle problems, for example. This ensures the accountability and transparency of the service.

The team analyses different data so as to find useful insights for business performance improvement. For example, trip route and trip time data are analysed to understand the traffic trend of the city. It is used to calculate the optimal route for each hours of the day. It helps LUT to schedule better. LUT can reduce delay or idle fleet time of for future trip plans.

### *Battery performance analysis*

The team also analyses the relationship with battery life cycle and different parameters such as the ratio of fast charging and normal charging. Since battery replacement costs a lot for LUT, it is an important parameter to be considered for LUT's business performance.

### *Battery autonomy analysis*

Also, the manner of driving, including acceleration and braking, is analysed so as to understand how to run longer with less consumption of energy. The team examined other parameters that impact the battery autonomy, such as temperature. Since it impacts the scheduling of the plan and optimal vehicle usage that potentially increases trip number per vehicle per a day, it is an important parameter.

In terms of technology development, the team develops the extensions of FMS. As the initial FMS is primitive and trip data is stored separately, they cannot be referenced or searched for retrospectively. Therefore, the centralisation of data references is required to increase analytical efficiency. Since LUT envisages to expand its business geographically and to increase client numbers, the trip data will augment and accumulate rapidly. This development is mostly outsourced to a third-party ICT developer.

### ■ *Vehicle maintenance and driver training team*

This team takes care of vehicle maintenance and driver training: two issues that directly relate to daily operation.

#### *Maintenance*

Vehicle maintenance is critical for safety issues. Depending on the model of EV, the car needs to pass regular vehicle inspections (e.g., each 60,000km for eVerito). The battery health also depends on how it is charged.

The maintenance team takes charge of five duties:

- Regular maintenance,
- Running repair,
- Break-downs,
- Insurance,
- Monthly report.

The know-how of how to charge the car properly is analysed by analysis team.

#### *Driver training*

The other job of the maintenance team is driver training. Since EVs are new vehicles to most drivers, LUT provides courses to the drivers about their mechanisms, as well as their battery maintenance and efficient ways of driving. The course is obligatory for every driver. Two main specificities of EVs are their ease of acceleration and the regeneration of energy while braking. Unlike manual driving cars, EVs can be driven like automatic transmission cars. This enables drivers to accelerate quickly. The regeneration of energy while braking is related to the mileage autonomy of the vehicle. It is important for the company to make drivers aware of this function so as to lengthen the mileage per charge. This increases the performance of the vehicle.

Apart from technical training, LUT also provides a course on the manner to interact with client passengers: a code of conduct<sup>49</sup>.

Mixing normal charging and fast charging in the right proportion increases the battery lifecycle.

#### ■ *Billing and accounting team*

The accounting team has two different jobs. One is for internal operation: employees and drivers. The other is for external operations: clients, suppliers and maintenance.

Internal operations are basically for the salary of drivers and employees. Also, equipment purchase is taken care of. As there are more than 500 registered drivers, it requires careful work. This is partially taken care of by human resources. The financial accounting is supervised by external accountants.

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<sup>49</sup> This includes knowledge on safety, manner, application use etc. The professionalism is requested to the drivers.

## Chapter 5 – Case description: Organizational structure and business environment

### ■ *Human resources team*

The work of human resources is divided in two: one role concerns office employees, and the other concerns drivers. Each job is composed of three parts: recruiting, attendance management and payroll. Attendance management differs largely between office employees and drivers. Office employees' attendance is recorded by a digital timecard installed at the office, while the drivers' attendance management is based on the mobile application.

#### *Recruitment*

Recruiting of the employees and drivers is done by human resources. Employee's recruitment and driver's recruitment have different channels of communications: advertisement leaflets are principally used, as well as word-of-mouth communication for drivers, and recruitment seminars, at universities for example, for most new graduate employee recruitment, as well as word-of-mouth communication for experienced employee recruitment.

#### *Collection of trip data*

Trip data is collected by the human resources team so as calculate the salary of drivers. The information is then passed on to the accounting team.

#### *Driver education*

Some of the driver education initially done by the maintenance team is now taken care of by the human resources team since mid-2016.

### ■ *Management*

The management can be divided into three parts. The first is daily operation management. Vehicle maintenance and daily operation of each client site is mainly supervised by the COO and the CEO. The second is the work of CEO. It involves client identification, client communication, financial management and organizational management.

The third is vision planning. This is mainly taken care by the co-founder and CEO. It involves future business development such as expansion of the service area and diversification of services.

The previous parts briefly explained the work of office teams. The following section explains the role of operational site teams.

#### *b) Operational site team*

The second type of employees work at operation sites on the premises of each client company. They are site managers and site officers. They take care of charging of the vehicle

and executing of trips (fleet allocation and driver allocation). An operation site has two main activity spaces. One is a room with computers, displays and telephones. The other is the parking with a drivers' waiting space, charging infrastructure and a LUT fleet. Site officers monitor the dispatch of each fleet in the monitor room and supervise the trips according to the pre-planned schedule. This means that they monitor if a fleet with a driver is heading to a departure point as scheduled, and if the fleet makes the right trip to taxi passengers to their destination. This simple operation requires first that the EV should be properly charged and ready, and second that the driver should pick up his allocated fleet to head to the departure point. Once any change of schedule occurs, many of the subsequent scheduled trips are affected. Handling this schedule change is also one of the main jobs of site officers. The schedule change occurs for many reasons such as heavy traffic, the breakdown of a fleet, road accidents, late passenger arrivals, late driver arrivals and insufficient fleet charge. Once a fleet comes back late to the operation site, it shortens the charging time of the fleet, as the next trip is already scheduled. While the schedule is planned with a margin, a single modification of a trip schedule requires modifications to several following trips. Once modifications accumulate, the operation site becomes very busy in order to bring the entire operation back to normal. This happens at the peak hours in the morning (going to work) and in the evening (leaving work) when traffic becomes heavy.

### *c) Drivers, their management*

The third type of employees are drivers. Drivers are the most important personnel for LUT's daily operation. Most of the drivers are not directly hired by LUT, but they are registered to LUT as service providers. They earn a salary based on their performance, and there are incentive structures for them to work for LUT steadily and continuously. Drivers directly go to the operation site for the work. Every several months, drivers take a course to learn about EV fleets and the code of conduct.

### **Driver shifts (Example of Tesco)**

The working shift of LUT's drivers consists of four shifts. Each shift last 12 hours. Shift-1 starts from 6 am, shift-2 starts from 8 am, shift-3 starts from 6 pm, and shift-4 starts from 8 pm.

### Ownership model and employee model

LUT's drivers can choose two different working model: ownership model and employee

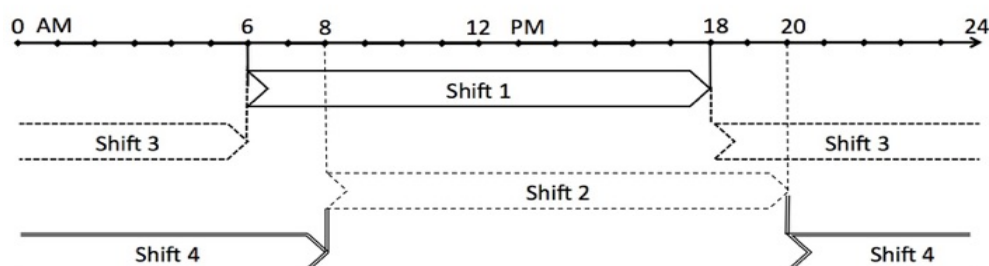


Figure 18 Four working shifts of drivers

model. Ownership model allows drivers to own the vehicle after three years of work at LUT, while employee model does not. However, the salary of the employee model is higher than that of the ownership model.

This section describes the detail of LUT's operation by describing three different teams. This structure enables LUT to provide CET service. Further analysis is given in CHAPTER 6 - by describing value network.

The daily operation of LUT is maintained by the above-mentioned organizational structure, and LUT claims that using EVs as fleets is more cost-efficient than using ICE vehicles as fleets. To what extent is it beneficial to use EVs in terms of running costs rather than using ICE vehicles? The following section analysis this question.

This is the organizational structure of the company. Different teams play different roles. For the business of the company, scheduling, EV maintenance and management, application development and driver management are major tasks.

## 2) Organizational changes so far

### ■ Bangalore office

In 2018, the office team arrangement has changed and is as follows:

- Maintenance and operation,
- Data and analysis,
- NOC room (is now decentralized: to be centralized again.)
- Human resources,
- Driver recruitment,

- Accounting,
- Management and sales.

About 30 people are working at the headquarter office in Bangalore and this number has not changed much since 2016.

#### ■ *Delhi office*

The office in Delhi is designed in the same manner as the office in Bangalore, using the same materials so as to have the same shared ambiance. As of 2018, about 10 people were working in the Delhi branch office for a total of 80 vehicles and 4 clients. The configuration is as follows:

- 2 analysts,
- 2 driver recruitment,
- 2 maintenance,
- 1 sales (city head)
- 1 operation head (city head)
- 2 HR

In addition to those office workers, there are fleet managers at the client sites. As of 2018, the Hyderabad office has been under preparation with 1 client. The activity of each team is detailed in the following parts. It is a necessary and sufficient organizational structure in order to offer the CET service.

#### ■ *Why is NOC room not in use?*

The NOC room was not in use as of 2018 since the work supposed to be done at the NOC room, such as immediate rearrangement of trips and other emergency issues, are practically taken care of by on-site operators at each client site. The function of the NOC room is replaced by operational site teams. By the improvement of FMS, this work will be taken care of by the NOC room again.

#### ■ *Foundation members left the company*

By July 2019, two other foundation members had left the company, and there remained up to six employees (excluding the CEO and the co-founder) that had been in the company since the very early stages of business development. This signifies that there are up to six employees that experienced and know about the initiation phase of the first service, which was the period of its business development with the dynamism of initiation of a new service.

## *II) Business model*

This section presents four points on the operation of the company: 1) value propositions, 2) value network, 3) cost & revenue structure, and 4) leadership. These are four key elements of business models identified by the author through literature review. By describing the four components, this section describes how the company creates and delivers to the client companies and how to capture the created value

### *a) Business Model component 1: Value propositions*

Firstly, its value propositions are reviewed. What are the value propositions of the company?

Value propositions that LUT claims are presented in chapter 4. However, **CO2 reduction**, **convenience** and **transparency in billing** are three value propositions clearly mentioned and confirmed by client companies. As the number of interviews is limited, this fact cannot be generalised, but other value propositions that the company claims apart from compliance can be questioned: cost efficiency, employees' satisfaction and safety. Cost efficiency is questioned in an analysis in subsection CHAPTER 5 - II)d). Employees' satisfaction is not evident in terms of passenger comfort as the EV fleets are smaller than sedan cars. Safety is also questioned as a value proposition, as it is a primary condition for each mobility service provider.

### *b) Business Model component 2: Value network*

The second is on its value network. How does the company create these values? Mariotti (2002) defines a value network as “an interactive combination of information machines, and people.” Value network is described as internal and external value exchanges of a company that are essential to creating values, defined as value propositions, and delivering them to the customers. Revenue and cost streams are not described in a graph: they are described later as revenue and cost structure.

This section reveals that LUT does not necessarily build a complex value network. The internal operation has its own complexity, but it is not necessarily novel. Evaluated imitability is relatively high.

Through describing the value network, the author clarifies value sources of each value proposition. This information is later used to discuss the competitive advantages later.

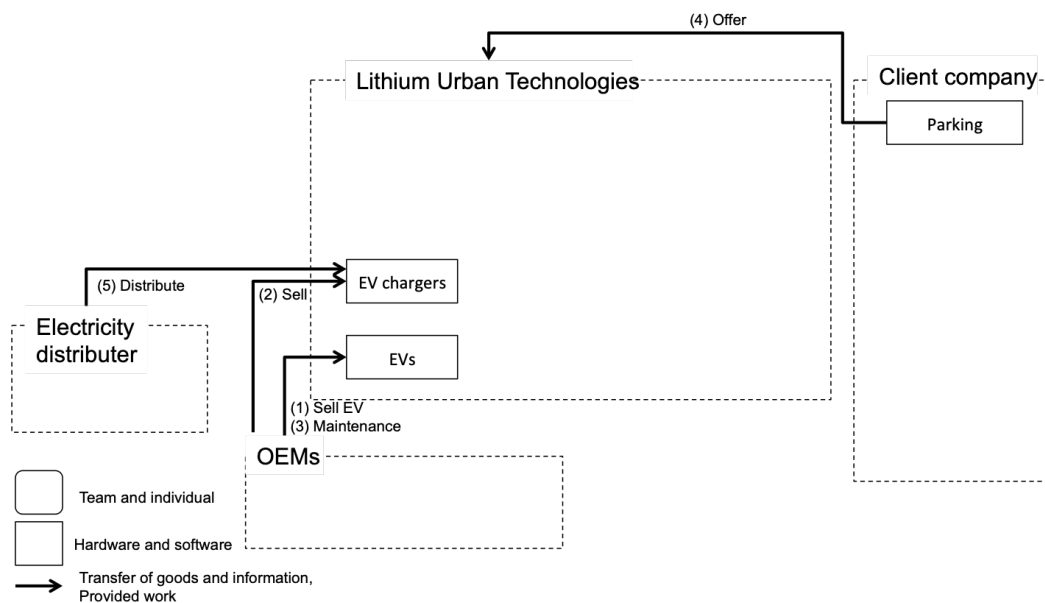
The essential elements of value creation are well summarised by the co-founder as following:

It's not simply the matter of running the vehicles, it's the matter of saying I've got to do five hundred and 70 trips with 35 cars (for example) and pick-up all of these people (passengers), what is the optimization of that? So that is one.

Managing of drivers and maintenance of the electric vehicles. And execution of the trips. And here again, the execution of the trips to meet the matrix that are set. That are agreed so here I would say as per SLA: Service Level Agreement with client, right? So this is the core propositions.

How is this process concretely done? The concrete process is explained here with a graph.

First of all, LUT buys EVs from OEM (1), as well as EV chargers (2). EVs get maintenance by the OEM for regular check-ups, for sudden breakdowns and for accidents (3). The maintenance is available for a fee if there is a service centre. The EV chargers are installed at the clients' parking. The parking area is offered to LUT by the client company (4). The electricity for the EV chargers is distributed by a local electricity distributor (BESCOM) (5) through the electricity connection of the client company. These are the physical (hardware) configurations before the initiation of daily operation.

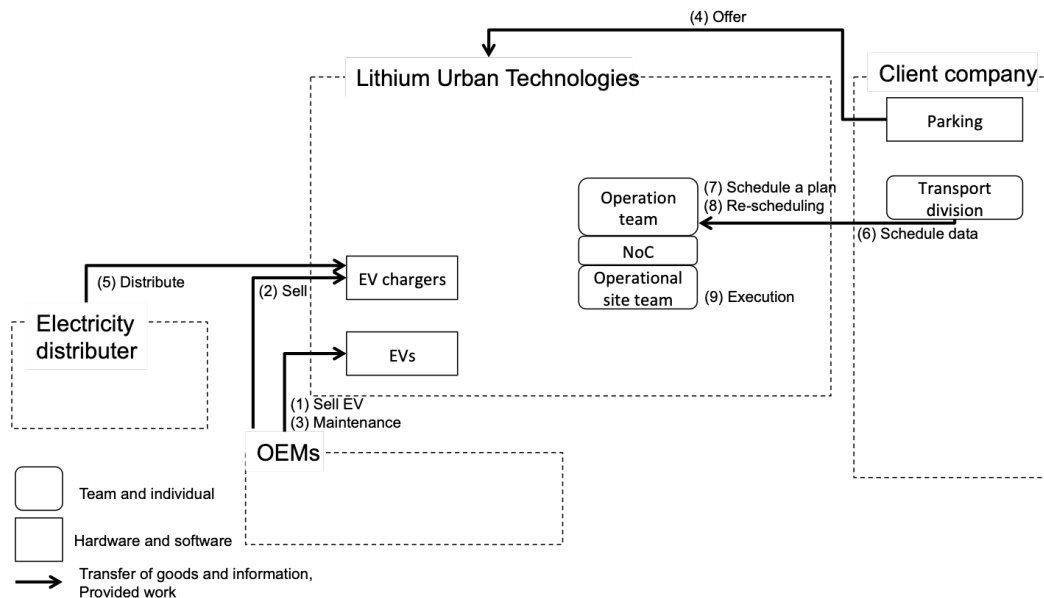


For daily operation, the transport division of the client company provides the schedule of all required trips for its employees to LUT several days in advance (6). According to the schedule data provided by the client company, the analyst team plans fleet allocations and driver allocations to each trip (7). This plan can be modified on the day of the execution due to last

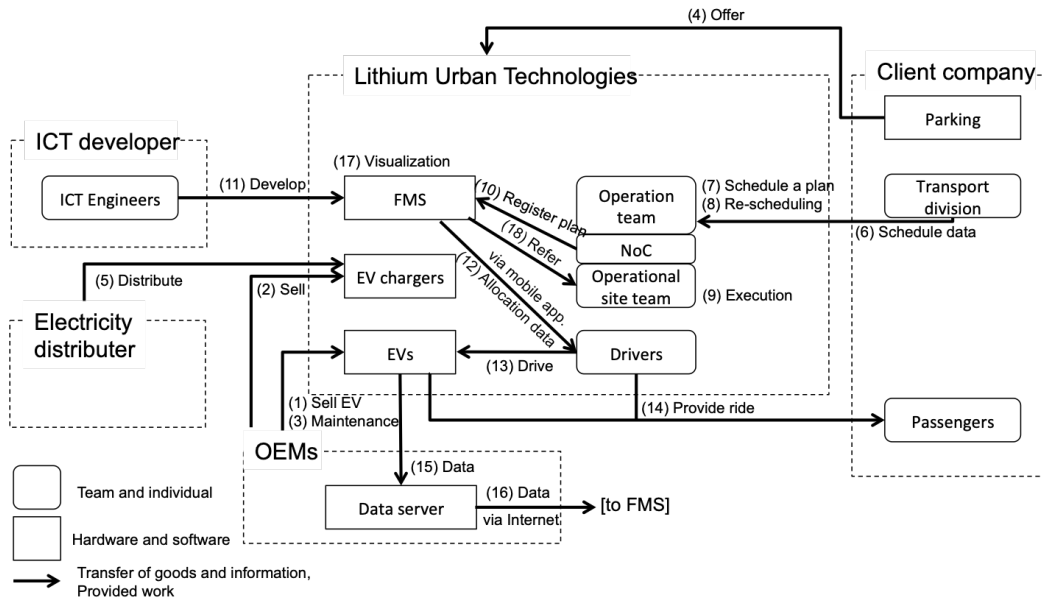


## Chapter 5 – Case description: Organizational structure and business environment

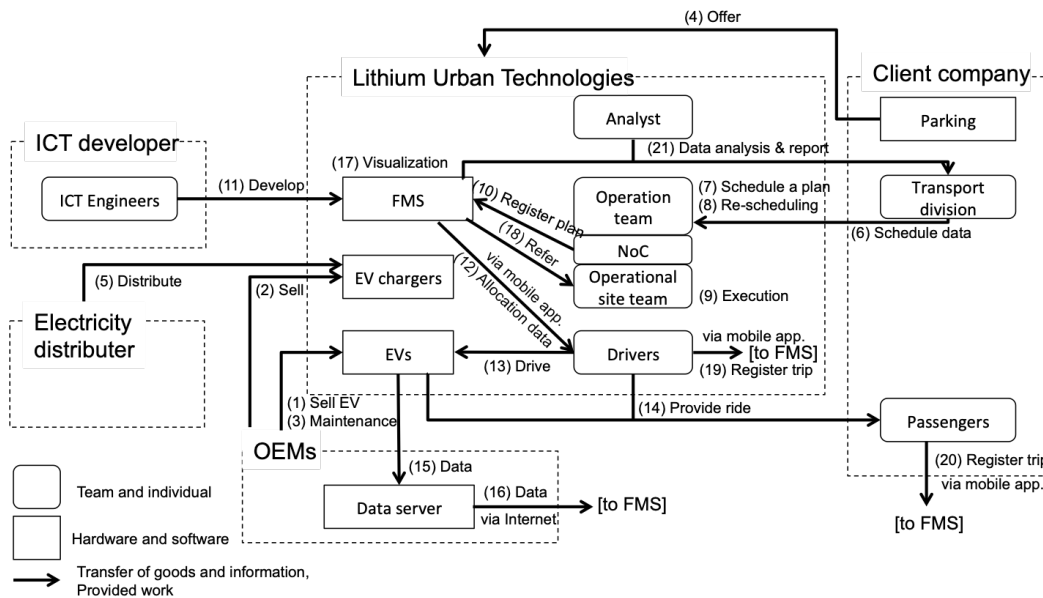
minute trip schedule changes or any other possible reasons (8: rescheduling). Based on the final plan of daily operation execution, the operation team and operational site team execute the trips, along with the NOC team that monitors and operates FMS (9).



The execution of the trips is as follows. The trip plan is registered to the Fleet Management System (FMS) (10). FMS is developed with an ICT company (11). From the registered trip plan, the FMS sends drivers the trip allocation information (12). This includes the itinerary of the trip, timing and allocation of the fleets. Based on this information, the driver drives EVs (13) and provides trips to passengers (= employees of the client company) (14). The location, along with other information, is transferred automatically to the data server of the OEM of the fleet EV (15). The information is transferred to LUT based on the agreement between the OEM and registered to the FMS (16). The location data is visualized on the FMS (17) and referenced by the operation team and operational site team (18). Based on the updated location data, the site manager makes last minute modifications so as to execute the trips with minimum delay (9).



All the executed trips are registered to the FMS via a mobile application for drivers and passengers (19 & 20). Every fortnight, the executed trip data is extracted so as to provide a report to the client company (21). The report examines if the number of trips exceeds a certain number agreed in SLA. LUT provides its service for a fixed monthly fee. Based on the executed trip data, the salary of each driver is paid (rf. Revenue and cost structure).



The above diagram explains the value network of LUT to create the values explained as value propositions. Through this, value source of each value proposition can be identified.

### CO2 reduction

CO2 reduction is achieved by using EVs in place of ICE vehicles. To operate EVs as fleets, LUT needs to purchase EVs and fast chargers in advance and install EV chargers in appropriate

## Chapter 5 – Case description: Organizational structure and business environment

locations. For daily operation, LUT uses electricity to charge EVs. Here, an electricity supplier appears to be in the value network. Those three elements: EVs, EV chargers and electricity supply can be identified as value sources of CO<sub>2</sub> reduction: CO<sub>2</sub> reduction is enabled thanks to the use of EVs as fleets, whereas electricity supply and EV chargers are also essential components. The value is delivered when LUT's drivers provide its taxi service to the client's employees. This value of CO<sub>2</sub> reduction can be enhanced by four means.

Firstly, by using electricity generated with less CO<sub>2</sub> emission. Secondly, by using more energy-efficient EVs. Thirdly, by optimizing the routing. Fourthly, by driving EVs in a more energy-efficient way. Two enhancing elements (electricity with less CO<sub>2</sub> and more efficient EVs) are out-sourced for the moment. As EVs, EV chargers and electricity are available on market, in order for LUT to be competitive in the current CET market it must pursue the maximum optimisation of the routing and find energy-efficient ways of driving. Setting up electricity sources with less CO<sub>2</sub> emissions, such as solar photovoltaic and wind power generators, or buying electricity from such energy sources can enhance the value proposition while these are also available on market.

For those reasons, CO<sub>2</sub> reduction through EV use can be relatively easily imitated and offered by potential new entrants.

### *Convenience*

This value proposition is characterised by a personally optimized taxi routing. Optimization is done both according to timing and location: on-time service and door-to-door operation. For on-time service, tele-communicable vehicles and a (re)scheduling process are required. For door-to-door operation, small vehicles and a (re)scheduling process are essential. Those three elements – small vehicles, tele-communicable vehicles and a (re)scheduling process – are identified as value sources. Its value is delivered by LUT's drivers providing a taxi service to the client's employees.

The value is delivered by providing a taxi service to employees. The timeliness is secured by before-hand scheduling and real-time vehicle location management. Door-to-door operation is enabled due to the smallness of the EVs, making them appropriate for small local lanes in the city. These existing characteristics of convenience, timeliness and door-to-door operation, may not be improved as far as they are already achieved. Rather, other characteristics of convenience might be added, such as a modification of destination on the way home. Two of the value sources are from outside of the company: the small size & tele-communicability of

vehicle. The other value source that is (re)scheduling is in-sourced and could potentially be fully automated. For the given time, it is a semi-automated process.

#### *Cost efficiency*

This value proposition is accomplished in two ways: by using EVs as fleets and by optimizing the routing of trips. Using EVs enables the company to diminish the running cost per mileage, as it uses a relatively cheaper energy source: electricity. Optimizing routes allows it to reduce the total mileage required to complete a trip.

The value is delivered in the form of reduction of the monthly fee in comparison to other equivalent services using ICE vehicles. The value sources of cost efficiency are identified as tele-communicable and electric vehicles, fast charging, the electricity supply and a (re)scheduling process. Cost efficiency would be improved once the price of the electricity supply goes down. Improvement in the charging time / driving time ratio of the vehicle may also contribute to decrease the cost. Of course, the price reduction of EVs and fast charging impacts the cost, but it remains a temporal phenomenon.

The impact of cost reduction by optimizing routes is quite limited. The price of electricity is then under the control of the electricity supplier. In-sourcing the electricity supply (i.e., electricity generation) can be a way to further reduce the electricity cost, but then the stability of the supply would be a challenge.

#### *Transparency in billing*

Transparency in billing has nothing to do with the electrification of vehicles. It is provided thanks to ICT: tele-communication of location and vehicle status data. This value is provided in the form of a monthly report that details certain aspects of the service, such as average trip time per fleet and the driving / idling ratio of a fleet. The value sources are first the tele-communicable vehicles and second the data server (and the related system) to collect the data. The value of transparency in billing seems to be a constant value and cannot be improved. Both value sources are provided by the EV manufacturer and not LUT's unique source.

#### *Employees' satisfaction*

Employees' satisfaction is a value based on two value propositions mentioned above: CO2 reduction and convenience. The value delivery can be defined as "the moment of providing a taxi service to employees". The value source is the use of EVs as fleets. An enhancing element would be a public relation. By disseminating the results of the business activities, the

## Chapter 5 – Case description: Organizational structure and business environment

employee' satisfaction may increase. This value proposition is dependent to other value propositions such as CO2 reduction and convenience.

### *Safety*

This value proposition is realised by three means. Firstly, by educating drivers, secondly by installing a panic button and thirdly by scheduling the route so as to ensure women passengers will not be sole passengers during the night. Drivers' education programs, mobile application development and scheduling are corresponding activities of the company. Those values can be imitated by potential entrants who would also execute these corresponding activities.

### *Compliance*

To ensure the compliance, drivers' education sessions take place once in a while. This includes basic safety education and compliance education. This value proposition can be imitated by potential entrants who would execute similar education programs.

This section showed the value network of LUT. The value network of LUT's business does not have eye-catching structures. One minor specificity is that the client pays the cost of electricity used by LUT's fleets. The following section overviews other mobility services in India so as to understand different value propositions and their trend.

### ■ *Reality of LUT seen through value network*

#### *External network*

LUT cooperates with a software company to outsource the development of mobile-based application development as well as internal operations support software. The geo-locational data is provided by EVs through a cloud database of EV manufacture. GPS technology is dependent on EV manufacturers. Electricity tariff is dependent on client companies.

#### *Internal network*

LUT executes complicated scheduling, rescheduling and execution of trips manually with the help of software.

This configuration of value network is expected to be optimal for cost-effectiveness of its operation. However, for LUT to claim that it is a technology-oriented company, 1) its own GPS tracking system, 2) full automation of scheduling and rescheduling, 3) charging infrastructure based on renewable energy sources such as solar PV are favourable to possess as its own strengths.

### *c) Business Model component 3: Leadership (organizational issues)*

The previous sections analysed external factors, revenue models and value sources. This section analyses organizational issues such as leadership, drivers' engagement and organization.

#### ***Leadership***

How does LUT maintain its value network?

"Clean transport" is a shared value between client companies and LUT.

The relationship between client companies and LUT is special (such as CSR budget).

In the relationship between EV manufacturers and LUT, there is a common benefit in analysing the fleet usage data and trip data so as to evaluate and optimise the performance of EVs.

Leadership within the organization increases as LUT starts to open branches in other cities. Cooperation between branch offices and HQ will be important.

#### ***Drivers' engagement***

Drivers' engagement is one managerial issue, as it happens regularly that drivers take a day off or days off without permission. It impacts the quality of LUT's operation. In order to give drivers incentives to come for work regularly, LUT develops its own scheme and programs for drivers.

#### ***Organization***

More data from last interviews are available.

The organization had not been a managerial focus of LUT until recently. This focus emerged through discussions with the author.

This part analyses organizational readiness for LUT's potential expansion and changes.

### *d) Business Model component 4: Cost and revenue structure*

One of the value propositions that LUT claims is the economies of EV fleets. LUT uses two facts to support this claim: 1) stable tariffs and 2) cost efficiency. The CEO and co-founder claim that using EVs as fleets is more cost-effective than using ICE vehicles when operating a CET service<sup>50</sup>. The reasons LUT claims are as follows.

1. Stable tariffs are due to a stable low price of electricity as compared to petrol and diesel.

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<sup>50</sup> [Insert a news source]

2. Cost efficiency is due to low running costs.

However, the prices of EVs are more expensive than ICE vehicles and a regular, costly renewal of batteries is required.

This section analyses the running cost of EVs as compared to ICE vehicles. For more simplicity, maintenance costs and insurance costs are ignored.

This section also examines LUT's revenue model so as to identify its specificity if any. This helps to identify business competitiveness of LUT.

■ *Cost efficiency of an EV fleet*

This part examines the cost efficiency of an EV fleet as compared to an ICE-based fleet. LUT mainly uses Mahindra-Electric's e2o as its fleets. This 5-door hatchback car is often compared to TATA's Indica for its size and passenger capacity.

This part shows the running cost comparison between a fuel vehicle and an EV, taking TATA Indica and Mahindra-Electric's e2o as examples, so as to understand the financial advantage of EVs. The information is based on the data available as of October 2016.

According to the following comparative analysis, the cost difference is too small to make a significant impact on its business performance.

*Estimated running cost comparison: TATA Indica v. Mahindra-Electric e2o*

This part describes a running cost difference estimation between TATA's Indica and Mahindra-Electric's e2o. TATA motor's Indica is a car that is commonly used for taxi purposes in Indian cities. Thus, it is an ideal benchmark vehicle to which compare the running cost so as to assess the financial advantage and disadvantage of the e2o. Using Indica as a benchmark vehicle, this section assesses the financial advantages and disadvantages of e2o, the principal model of EV used by LUT. This analysis is based on the data as of October 2016, one year after the initiation of LUT's operation.

The price of Indica is cheaper than e2o by around one lakh rupees. However, its fuel cost required to run 1 km counts 5.65 Rs. while the electricity cost required to run e2o for 1 km counts only 0.65 Rs. On the other hand, e2o requires a battery change every 36 000 km or 60 000 km based on battery guarantee schemes of Mahindra-Electric. The guarantee of 36 000 km is applied when you buy and own its battery. The battery costs 1.8 lakh Rupees. The guarantee of 60 000 km is applied when you rent the battery from Mahindra-Electric. It costs 3 000 Rs. every month.

	Indica	e2o (Own battery)	e2o (Battery lease)
Vehicle price (Rs.)*	5.74 lakh	6.79 lakh	6.79 lakh
Energy cost** (Rs/km)	5.65	0.65	0.65
Battery cost (Rs.)	-	1.8 lakh	1.8 lakh
Battery lifecycle (km)	-	36 000	60 000
Monthly rental fee (Rs.)	-	-	3 000
* The prices shown are based on the data in Bangalore as in October 2016.			
** Sample cost in Bangalore with diesel cost = 56.5 (Rs./litre), fuel efficiency = 0.1 (litre/km)			

Table 18 Vehicle cost and running costs of Indica and e2o

■ *Indica v. e2o Battery own v. e2o battery lease comparison*

Figure 24 shows the estimated running cost of each vehicle. When the *own battery* option is adopted, the total running cost of an e2o becomes less than that of Indica when it exceeds 21 000 km of driving. However, the total running cost of an e2o becomes surpasses that of Indica when it reaches 30 000 km of driving, due to its battery cost. The total running cost of an e2o remains at the same level as Indica at least until 400 000 km of driving. When the *battery lease* option is adopted, the running cost of e2o is less than that of Indica from the beginning and the cost growth rate is lesser than that of Indica.

Refer to the annex 2 for the detailed analysis.

■ *Conclusion of running cost analysis*

As a conclusion of cost comparisons, the use of e2o may increase cost efficiency while the availability of the vehicle because of its charging requirements and lesser seat capacity (e2o only accommodate three passengers) should be considered in order to assess the financial advantage of using e2os. Initial investment requires the purchase and the installation of EV chargers as well. The cost of a charger is estimated around 500,000 INR.

This analysis shows that:

- 1) the total running cost of an e2o is as same as that of Indica,
- 2) the *battery lease* option permanently enables the running cost of e2o to be less important than that of Indica,



- 3) even with the *own battery* option, the running cost can be less than that of Indica after the 5<sup>th</sup> battery life cycle (around 180,000 km), if the electricity cost is excluded.

■ *The total running cost of e2o is as same as that of Indica*

It is possible that Mahindra-Electric decides the product prices and battery prices based on this fact. The running cost become less important in the middle of the battery life cycle so as to be able to declare that e2o's running costs are less than that of other similar vehicles such as Indica. In the long term, this price configuration maximises the profitability of e2o.

■ *Battery lease option permanently enables the running cost of e2o to be smaller than that of Indica*

The battery purchase option contains a possibility that the buyer does not re-purchase the battery after the first battery life cycle. The leasing option enables the buyer to have permanent financial benefits from a running cost perspective while Mahindra-Electric can sustain a close relationship with the buyer.

■ *Even with the own battery option, the running cost can be less than that of Indica after the 5<sup>th</sup> battery life cycle (around 180,000 km), if electricity cost is excluded*

The reduction of electricity costs becomes effective after 180,000 km of driving. This corresponds to 9000 20km trips. If a vehicle makes 10 trips per day, it takes 900 days to reach this point. 900 days is equivalent to about 2 years and 6 months. This analysis shows that, theoretically, the estimated running cost of an e2o is not that competitive as compared to that of Indica. This implies that the service of LUT does not offer significant financial value to the client companies. It becomes evident when considering that the investment on charging infrastructures is also required. However, the own battery option has another passage. If the battery lifecycle is somehow extended (by using the battery with full attention when charging and driving, for example), the running cost can be below that of Indica from the first battery replacement. In any case, this can only be achieved after running a certain number of kilometres, so it cannot be reflected as the reduction of a service fee. Since the service of LUT does not really have price competitiveness, it mixes different additional value propositions so as to be appealing to clients.

This section revealed the running cost comparison between EVs and ICE vehicle as fleets. The following section describes the revenue model of LUT. Considering the results of the running cost analysis, the benefits of using EV fleets appear to be minimal for significant business development by increasing the number of clients.

■ *LUT doesn't have special revenue model*

The revenue model of LUT is simple. All revenue and cost are paid in exchange of provided goods or services except for the electricity fee. The electricity fee is paid by the client company while the supplied electricity is used by LUT. Here is the revenue and cost structure of the company (Figure 19). LUT buys EVs and fast chargers from EV manufacturers, as an initial investment (1). LUT pays the service fee to ICT developers for FMS (2). The client company pays the monthly operation fee (3). The client company pays the monthly electricity bill to the electricity supply company (4). LUT pays a monthly salary to office employees and operation site employees (5). LUT pays a monthly salary to drivers (6). It should be mentioned that most of the drivers are not the employees of the company but rather self-employed persons. LUT pays a maintenance fee to the EV manufacture service centre (7). LUT pays an insurance fee for EV insurance to an insurance company (8).

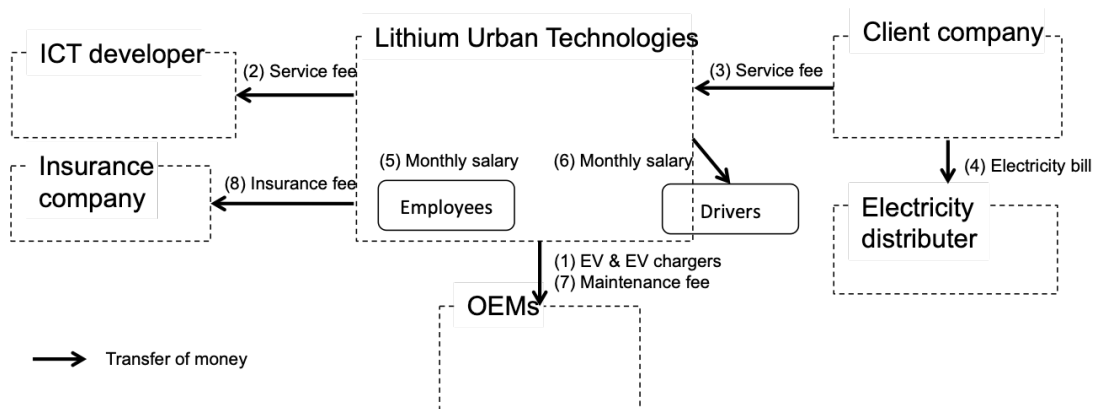


Figure 19 Revenue and cost structure of LUT

A contrivance is seen in who pays the electricity bill and who pays the cost of the vehicle. Most vehicles are owned by the company, while some vehicles are to be handed over to the drivers, depending on the contract with the drivers.

This section explains the revenue model of LUT. The revenue model of LUT does not present any novelty except for the fact that the electricity bill is paid by the client company.

It should also be mentioned that LUT's service initially targets the CSR budget of the client companies. In fact, the reduction of environmental load attracts CSR budget.

*e) Summary of the business model of Lithium Urban Technologies*

Are the company's business model and value propositions supported by advanced technologies that the company possesses?

■ *Technological advantage*

This section analyses LUT's capability of technological development. The technological advantage can be considered as LUT's strength if there is any. As a result, LUT does not possess any technological advantage. LUT developed a mobile-based application for drivers, passengers and managers, but its development is out-sourced. LUT once has a Node of Control Room at the headquarters where the location and status of each vehicles could be monitored. As of 2018, the function of the NOC room was suspended. The information available at the Node of Control room was fully dependent on GPS and other data collection software developed by Mahindra-Electric. The mobile-based application is not developed by LUT but is rather outsourced. The application itself does not have any novelty. EVs are not developed by LUT. LUT does not have know-how on repairing EVs.

■ *Without technological competency*

LUT uses EVs to provides an employee transport service. However, LUT does not possess any business competency based on a specific technology. The fleet EVs are available on the market and purchasable to every actor. The ICT-based application is out-sourced to its partner ICT developer.

From the beginning of its operation, the company has been aware of the thread of potential business competitors. The company mainly supposes copycats as potential competitors: other start-up companies starting the same business have access to larger capital so as to dominate the market. It has been a main operational quest: how should they prepare the emergence of copycats? The reason is mainly because the company does not possess any technological background as its business competency. Nevertheless, the company has survived in the market for more than three years.

■ *Social Corporate Responsibility budget*

LUT's service initially targets CSR budget of client companies. The novelties of the service such as EVs being used as fleets and the reduction of environmental load attract CSR budget. This is one side of LUT's service. LUT's service stays partial for CET of each client company. Client companies mix different CET service vendors. If LUT intends to target CSR budget to expand

its business, it is important to pursue reducing the environmental load of the service by optimizing routes and mixing different energy sources.

In order to compete with potential direct competitors, the level of CO2 reduction, as well as cost efficiency are two main value propositions that can allow LUT to differentiate itself from new entrants by leveraging the first-mover advantage.

#### ■ *Accumulation of data / know-how*

This section revealed that LUT does not possess any technological advantage. LUT does not have any particular talents such as ICT engineers or other EV-related technology. There are no EV maintenance engineers either. There is only a certain accumulation of data and know-how on planning daily schedules and executing trips with EV fleets.

Even if the technological advantage is not there, if the operation process is hard to imitate, that can be a barrier to entry for other companies. The following section then describes the value network of LUT's operation to analyse this point.

### *III) External market situation 1: scalability within current target segment*

The previous two sections presented the organizational structure and business model of the company.

This section analytically studies possible market expansion by the case company within the current target market segment: Corporate Employee Transport (CET) service for ICT and ICT-enabled service companies. For daily commuting, people can take either public or private transport services. Public services would cost less than that of private ones, while the public services do not always provide sufficient geographical coverage for every person. The providers of the following two services could potentially become direct competitors for LUT's EV-based CET service: an ICE vehicle-based employee transport service and ICT-based route optimization service. Here a direct competitor means an employee transport service provider providing the service with an EV fleet.

Also, there are transport services that potentially reduce the market size of employee transport services: public metro, public buses and private taxi services. Up-gradation of the public transport system would decrease companies' incentive to pay for private transport services. Also, the increase of vehicle/motorcycle ownership ratio impacts in the long run the market size of employee transport services. However, considering the traffic situation in

## Chapter 5 – Case description: Organizational structure and business environment

Indian cities, commuting with self-owned car is not pleasant for people living in the city centre, which is the case for the passengers of LUT's service. All these elements taken into consideration, this section assesses the scalability of the current CET service of the company.

The following sections analyse LUT's market development of current CET service by looking into past market development, competition and alternative services.

### 1) Past market development

The first section analytically reviews the business environment through its past market development of LUT with current CET service. This part starts by describing the **characteristics of the client companies** of LUT as well as the **size of LUT's operation**, such as fleet size so as to assess the scalability of current business within other cities. Then, the socio-geographical aspect of other cities is analysed to examine the existence of potential client companies.

This section reveals that LUT's current business remains within a niche market.

#### ■ Client characteristics

What are the characteristics of LUT'S client companies? The initial major client companies of LUT are Business Process Outsourcing (BPO) companies in Bangalore that operate 24 hours a day, 7 days a week. These BPO companies get Information Technology Enabled Services outsourced/subcontracted as third-party service providers to help the back-office operations of other companies. These companies need to provide a means of transportation to its employees as its office is located in the peri-urban area of the city, where public transport systems are scarce.

LUT operates a different number of vehicles for each client company, ranging from five to 60 vehicles. Accordingly, fast chargers are installed in the premises of client companies where the fleets of LUT stand by. LUT developed a mobile-based application for drivers and passengers. This application, also referred to as *technologies* in LUT's office, is designed to simplify the trip management with elements such as check-in/check-out time management, trip sheet management, and monthly billing of the service. The minimum number of trips that LUT needs to fulfil is defined by Service Level Agreement (SLA) with each client company since LUT adopts monthly fixed charges to provide the services<sup>51</sup>. In addition to current client

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<sup>51</sup> Another pricing model of employee transport service can be charge by travel distance per month.

companies: T1, U, A1, T2 and A2, LUT is in negotiation with three other companies: A2 in NRC (I), I, and V for its initiation of its service.

■ *Size of operation*

The size of each provided service as of 2016 and potential client companies are presented in Table 19. Three years later, as of January 2019, LUT operated 750 vehicles (mostly in Bangalore and in NCR (National Capital Region: Delhi and its peripheric districts) and planned to deploy another 100 vehicles. LUT operates in Bangalore, in NCR (more specifically Noida and Gurgaon), in Pune and in Hyderabad.

The operation of LUT is relatively small as compared to the largest CET service providers in Bangalore, such as Janani Tour. Janani Tour operates more than 4,500 fleets and provides more than 10,000 trips per a day (Janani Tours, 2019). However, at the same time, managing 750 vehicles is not negligible in terms of number. For example, a Delhi-based CET service provider VTS services (VTS service, 2019) founded in 2007 operates 323 vehicles. LUT in 2019 can be considered as a middle-size player in the CET market.

Table 19 Business stats of the case company (As in May 2016)

<b>Client</b>	<b>Technologies*</b>	<b># of fleet</b>	<b># of fast charger</b>	<b># of trips/day</b>
<b>Tesco</b>	Available	38	5	180 – 200
<b>U (a)</b>	NA	40	4	Approx. 250
<b>U (b)</b>	NA	20	2	Approx. 100
<b>A1</b>	Available	5	2	30 – 40
<b>T2</b>	NA	5	-	-
<b>A2</b>	NA	5	-	-
<b>A2 (Delhi)</b>			Planned	
<b>I</b>			Planned	
<b>V</b>			Planned	

\* Drivers' app and passengers' app to monitor the real time operation and for easy trip management

■ *Cities for potential market expansion*

What are the cities where the company can potentially expand its service to? One indicator is Mahindra-Electric's EV charging infrastructure deployment. Bangalore, Delhi, Chennai, Hyderabad, Jaipur, Kolkata, Pune and Mumbai, have more than five charging stations. As of 2017, at least more than 10 EV charging points were deployed by Mahindra-Electric in Bangalore, NCR (New Delhi), Pune and Kolkata. Adding to those 4 cities, Hyderabad and

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Mumbai, where LUT starts its operation, are also analysed. (Data is relevant as of 9<sup>th</sup> February 2017. Data is to be presented in Annex.)

Delhi, Hyderabad and Kolkata resemble Bangalore in terms of size of urban extension (around 15km diameter of city expansion). Pune and Mumbai are smaller than Bangalore. As one of principal reasons for the needs toward CET service is daily heavy traffic: if there is no heavy traffic, employees can choose to use public buses or own vehicle for hassle-free commute, LUT is expected to find similar needs to those of Bangalore in Delhi, Hyderabad and Kolkata. As LUT enters NCR, Pune and Hyderabad, there are EV-based CET needs in cities smaller than Bangalore.

### ■ *B2B as target (niche) market*

This company sets corporate clients as a target segment. This choice was made principally because the use of EVs is pre-fixed: taxi routes are planned in advance. This enables LUT to avoid the running-out of the battery charging during the operation. Avoiding the running-out of the battery charging is difficult if LUT operates a city taxi service for which the usage of the vehicle is not pre-fixed. However, as the market of its firstly developed business (CET service) is confined, the company aims at potentially developing new business that leads business model innovation to the company.

As LUT currently has around 10 clients in Bangalore, it can increase the number of clients similarly in Delhi, Hyderabad and in Kolkata. The business development in Pune and Mumbai is unknown, but the company supposes that it can obtain half the clients in terms of number as compared to in Bangalore. Then it is probable to obtain 50 clients with four big cities (Bangalore, Delhi, Hyderabad and Kolkata) and with two smaller cities (Pune and Mumbai), if no specific reasons hinder or boost the business development of LUT. With this knowledge, the following section analyses potential competitors and alternatives of LUT's service.

LUT grows steadily. It operates 550 fleets in Bangalore. If LUT deploys same number of EVs in other 1st tier and 2nd tier cities such as Delhi, Hyderabad, Pune, Mumbai, Kolkata, and Chennai, LUT can operate more than 4000 fleets within another three years.

## *2) Business competition environment*

### *a) Direct competition as a CET service provider*

The previous section analysed the potential market development of LUT's CET service. The development of client number and size of operation, as well as cities of potential market entry, are presented. This section then analyses competition within the CET market. The author considers that potential competitors can be identified by two parameters: market (client/needs) proximity and operational knowledge similarity.

The author identifies three types of companies that potentially compete with LUT's market development: 1) ICE-vehicle based CET service operators, 2) ICT-based route optimization services, and 3) new entrants such as start-ups and new ventures by existing companies. The author takes several existing companies as examples so as to analyse (potential) business competition. Their operations are reviewed focusing on their core value propositions, size of operation and geographic coverage.

Concerning market competition, LUT initially (in 2016) considered itself as a unique player in the market (a pioneer), and any copycat companies that could replicate the operation of LUT with larger capital are potential threats for LUT's market development. As of 2018, in addition to those potential EV-based service providers, LUT mentions ICE-based service providers as competitors as well. This change can be explained differently. One possible interpretation is due to the emergence of route optimization services for EVs, such as one developed by Mahindra-Electric. Any ICE-based service operator can use this route optimization service to start operating EV fleets. Another possible interpretation is that LUT faces difficulties in valorising EV fleets. The value propositions of LUT may not be very attractive for CET clients as compared to the value proposition offered by ICE-based operators.

The service of LUT is unique in terms of the application of EV to transport service: the equivalent service did not exist before its foundation in 2015 until at least in September 2018.

#### ■ *ICE vehicle based corporate employee transport service*

In Indian cities, there exist employee transport service providers based on the conventional ICE vehicles. Those service providers use mini buses. There are approximately 1500 such companies (E. K. Sharma, 2015) in India without ICT solutions. They can be potential competitors once they learn to use EVs as its fleet, since by using ICT-based route tracking systems, they will easily achieve transparency in billing. LUT does not have any technological



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advantage over them to prevent them to become LUT's rival. Though operation of the business can be more complicated if they mix both ICE vehicles and EVs, it is also possible for them to use ICE vehicles as complementary vehicles so as to also cover long-range driving or provide unscheduled services.

Examples of such companies are Janani Tour, that operates more than 4,500 fleets and provides more than 10,000 trips per a day (Janani Tours, 2019). A Delhi-based CET service provider VTS services (VTS service, 2019) founded in 2007 operates 323 vehicles.

### ■ *Other start-ups and new service development*

Like LUT, start-ups can develop the same type of business. If that new start-up obtains more capital than LUT, the start-up company may obtain the majority of the market. It is then important for LUT to have a financial buffer to prepare for potential sales power competition.

In September 2018, Mahindra Logistics announced that it was starting an employee transport service in Kerala with eVerito in the fiscal year of 2019-2020. This movement should not be neglected.

Mahsh Babu, CEO of Mahindra Electric, says:

We believe that the transition to EVs will be led by the fleet segment, and today's announcement marks an important milestone in that. We are confident that this step will go a long way towards contributing in the state's mission of sustainable living. (Economic Times Auto, 2018)

This indicates that EV manufacturers recognizes that mobility service providers can be the target clients of EVs.

### *Example – Mahindra-Electric's NEMO*

In 2018, Mahindra-Electric launches a cloud-based platform NEMO (an abbreviation of Next Generation Mobility). This application enables "fleet owners to focus on fleet operations and adopt EV fleet in a seamless manner" (MahindraElectric, 2021). This application includes trip planning, optimum navigation, digital trip sheets and remote vehicle control as well as vehicle tracking, live notifications, estimated time of arrival and SOS for its users. Mahindra-Electric claims that these features help service providers of such as corporate mobility, car rental, ride failing and shuttle services.

The launch of this application diminished the strength of the fact that LUT develops its own fleet management application specialized in EV fleet management. It should be mentioned that all the data of Mahindra-Electric's EVs that LUT uses is automatically transferred to Mahindra-Electric's cloud database.

*b) Competition as ICT service provider*

■ *ICT based route optimization service*

Route optimization and scheduling are one of the core business processes of LUT. As LUT purchases EVs from Mahindra-Reva, route optimization service operators are potential rival. By purchasing EVs, route optimization service operators can start the same business that LUT develops. LUT does not have any business advantage over them to prevent them from becoming LUT's rivals except for its own business experience. An ICT-based solution for employee transport that is similar to LUT's service can be found in Indian cities, for example, Routematic, MoveInSysc, and Cubito. This section describes the business development of those companies to better understand the current market situation of employee transport services.

*Example A - RouteMatic by Nivaata Systems (Bangalore)*

Nivaata was founded in 2007 by Kannan, a computer science engineer. Prior to setting up Nivaata, he had worked at i2i TeleSolutions and Texas Instruments. Nivaata mainly works in areas of route planning and tracking. In addition, it helps organizations automate and optimize distribution and planning, transportation, asset monitoring, logistics and sales force effectiveness. The app is used by employees of various business process outsourcing (BPO) firms and cab drivers to find each other's location. The system can also be programmed to send out text message alerts to families of employees about their locations. Nivaata also offers a GPS tracking device called Yantra.

*Example B - Cubito by Neocube Technology Solutions (Bangalore)*

Launch in 2012, the company digitalizes all employee information and geo-codes data so as to allocate the fleet by avoiding unnecessary paperwork and reducing the time spent in planning to a matter of seconds. The value added by ETAT varies from safety, ease of use, carbon footprint reduction to the time & cost savings. In September 2014, Cubito was operational in two cities, Pune and Bangalore. The company obtained 1 crore seed fund in March 2015. The company defines itself as a transport software provider that offers Employee Transportation Automation Tool (ETAT). As of March 2015, with Air India SATS as its first client and working to bring in 4-5 more clients by month, Cubito was planning to close at-least 15 clients by

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September 2015. The start-up further plans to go after the e-commerce and third-party logistics space focusing on the last mile delivery optimization, truck route planning and others. Cubito, also plans to rollout certain smaller products targeting to the consumers. In March 2015, Cubito was additionally operational in Mumbai and Delhi. In July 2015, the team added 12 clients to its database and had over 5000 vehicles running across Bangalore, Delhi, Gurgaon, Mumbai, Pune and Jamshedpur. "There are around 40 pilots we have in our pipeline and growing as we speak," added Yash. Their vision is to build a brand on focus and transparency. The team plans to enter South-East Asia in the coming months. While one might be comfortable using an office cab, sharing one with a bunch of people in an unknown cabbie's car is viewed with scepticism.

### *Example C - MoveInSync (Hyderabad)*

MoveInSync is a start-up company that provides an employee transport solution with features of routing, employee cab usage records, live vehicle tracking, automated billing and women's security. MoveInSync was founded in 2009. It was incubated by the Indian School of Business, Hyderabad (MoveInSync, n.d.). It claims that its SAAS based system is used in 3,500 cabs to service over 30,000 employees (as in August 2014). The company charges a licensing fee and also generates revenues by leasing hardware.

### *Example D - Agiledge (Bangalore)*

There is a new start-up company claiming that it uses advanced Artificial Intelligence technology for route optimization (Agiledge Process Solutions Pvt Ltd, 2019).

### ■ *City coverage of above-mentioned services*

Table 26 in Annex summarizes the cities that above-mentioned ICT-based employee transport solution providers operate in as of 2016. MoveInSync and Cubito's city coverage is higher than that of LUT. This can be explained by the fact that they started their business some years earlier than LUT, and they only provide ICT solutions. Here, it should be pointed out that those service operators may benefit from first-mover advantage by adapting the platform for EV use. It would then be difficult for LUT to catch up with in terms of the number of clients.

★ signifies the city where the headquarter of the company are located, and ✓ signifies the cities where their services are in operation. Be aware that the list is not the comprehensive list of all ICT-based employee transport solution providers.

From a city coverage perspective, knowing that their service is different from that of LUT, LUT's service geographic coverage is less than those of other service providers. It should be

mentioned that as of 2016, none of above-mentioned potential competitors announced any partnership aiming to start EV-based employee transport services.

Geographical coverage was smaller than other route optimization services, but LUT gradually expanded its coverage up to five cities. In order to take advantage of this geographical coverage, how to strategically deploy its charging infrastructure is important as well. Different ways of charging EVs, such as battery swapping and wireless charging, should also be considered.

### *3) Alternative services*

Apart from potential competitors, alternative services also impacted the business development of LUT. Here alternative private services and alternative public services are analysed.

As of 2018, LUT considers that the impact of such services to LUT's operation is minimal. The co-founder stated that:

Ola and Uber are not big deal. Ola and Uber don't even operate in B2B segment.

LUT considers that ICE vehicle-based CET service providers are much more probable to be the first competitors.

#### ■ *Alternative private services*

Private companies also provide options for employees' daily commuting such as Ola and Uber. Users can book a cab through mobile-based applications from point A to point B. This service costs around Rs. 50 to Rs. 300 depending on the distance of the run and size of the vehicle. If a user chooses an option of sharing the cab with other passengers, the user can benefit from cheaper prices. As potential competitors to LUT's business, four different business operators are identified. Uber and Ola are mobile-based taxi dispatch service providers. As they have know-how on how to allocate different fleets to users, they can start the same business as LUT. For example, Uber in New York City offered a commuter's fare reduction for Uber pool. By using this program, some people can commute less expensively than using the subway (Griswold, 2016).

The ICT-based taxi dispatch services are not considered as (potential) competitors by LUT. This implies that LUT recognizes that its ICT service development capability is not able to catch up with those companies. ICT is not a central strength of LUT.

### *Quick Ride*

One such example is Quick Ride. This is a peer-to-peer taxi service. Whoever registered to the mobile application can provide a ride to other registered users. For example, if a person is going to work in the morning and if there is another person going in the same direction, the first person provides a ride share with the second person. Some reward will be paid to the first person from the second person via the mobile application (QuickRide, 2021).

### ■ *Alternative public services*

**Public bus system and Metro lines can provide daily means of commute.**

For example, recently in Bangalore, Bengaluru Metropolitan Transport Corporation (BMTC) started providing a mobile-based application called Travel Information Planner. This enables users to find the route information, transfer information and timing information in advance. Real-time information on the service encourages people to use public buses whenever it is possible, as it offers relatively cheaper prices. Metro lines are also being developed in Bangalore. In April 2016, new stations of the second metro line in Bangalore (i.e., purple line) became open to public. Though the number of stations and geographical coverage are still limited, congestion-free means of mobility with air-conditioned carriages provide comfortable intra-city travel to people. The extension of further metro lines and stations would make more people choose this public service.

This section reviewed potential competitors and alternatives. Geographical coverage seems to be improving, though this factor is for the moment not sufficient to get ahead of competitors and alternatives. In that case, what kind of technological advantages does LUT possess? The following section analyses this question.

### ■ *Impact on LUT's operation*

The development of the public transport system such as an extension of the metro reduces the demand for CET services that provide trips from home to office. The extension of the metro replaces the demand toward CET service by last-mile connectivity needs from home to station and from station to office. The improvement of public transport-related services has the same effect. For example, the Travel Information Planner makes it easier for people to shift from home-to-office commute to home-to-bus-to-office commute. Private taxi-related services such as Ola, Uber and Quick Ride as well reduce the demand for CET service, especially once it becomes a cost-effective option both for passengers (corporate employee) and the company (user of CET service). The extension of urban area and the development of corporate activities support the demand growth for CET service. However, alternative

services, even those that have share-ride options, can diminish the attractiveness of LUT's value propositions.

#### ***4) Summary - Scalability within current target market***

There are a number of ICE-based services and ICT-based services in the CET service sector. The emergence of direct competitors using EVs as fleets is predicted. In this situation, maintaining steady growth requires effort for LUT, by for example providing differentiated values from other both ICE-based and EV-based CET service providers.

It is important to obtain first-mover advantage. If LUT achieves the same growth as in Bangalore in different cities, LUT can catch up to major CET player Janani Tour with over 4000 EV fleets. However, geographical expansion can increase fixed costs and management costs. The reader must remain aware that Janani Tour operates more than 4000 vehicles only in Mangalore and Bangalore.

##### **■ *Competitive situation for LUT***

As of the end of 2018, there was no direct competitor using EVs as fleets for CET service. However, these analyses show that there are several potential competitors that are currently active in the ICT-based fleet management service sector and ICE-based CET service sector. In particular, the emergence of an EV-specialised platform developed by an EV manufacturer largely harms the strength of LUT, which resided in the development of its own EV-specialised fleet management system.

At least one initiative led by EV manufacturers that could potentially become a direct competitor is observed. In this situation, it should be reconfirmed that a top priority of LUT is to preserve a steady growth within the current target market.

Since the EV manufacturer obtains more data than LUT the vehicle usage, including other service operators' data, LUT did not have any advantage in terms of data accumulation against the EV manufacture. In this situation, the uniqueness of LUT's operation only lies on the actual operation of EVs as fleets.

#### ***IV) External market situation 2: new service development***

This section describes different local trends related to the business of the company.

A vision of LUT is to diversify its service by sequentially electrifying existing mobility services. What are the recent mobility service trend? What are the EVs available and what kind of power infrastructure and service infrastructure are available?

### *1) Trends in mobility services regarding EVs and ICT*

This section shows different EV-based (or related) mobility services.

What kind of trend is observed? And why did those services become popular? Many public e-bus projects and e-rickshaw-based services are being diffused, as well as ICT-based car sharing and ride-sharing services after 2015. In some cities such as Bangalore, NCR and Kolkata, newly extended public transport services (principally metro lines) change the daily movement of people. Also, new information services such as a real-time bus timetable service are being introduced and are improving the convenience of these transport service.

This section focuses on three phenomena: last-mile connectivity, public bus or shuttle projects and rent-a-car project.

#### ■ *Trend 1) Last-mile connectivity*

Last-mile connectivity has been refocused with the recent development of urban transportation networks. New stations are being built to meet the new travel demands created by urban development. The new station changes the flow of many people. Last-mile options connect people from their house to the nearest station, from their offices to the nearest station (schools, hospitals, etc.), from the point A to the destination B, connecting the public transport node and the destination.

#### *What are value propositions of this type of service?*

A representative case is Smart Electric Transport System (Smart-E) in Delhi. It is an electric rickshaw-based ride-share taxi service in Delhi. The company initially started its project in Delhi and recently expanding its service area to Gurgaon and to Faridabad. In Delhi, Smart-E provides the last-mile connectivity service for Delhi metro users with three-wheeler electric rickshaws. It started its operation in October 2015 at Paschim Vihar Metro station in Delhi, and it expanded the service area to other stations. In January 2016, the service started at five metro stations in Gurgaon (Sahni, 2015) with another 50 vehicles (Narayanan, 2016). In order to answer the security concerns towards city taxi services, CCTV cameras and GPSs are planned to be installed in the vehicles. In particular, at several stations such as Paschim Vihar in Delhi, female drivers operate the e-rickshaws so that female passengers feel comfortable

using the service. The vehicle can accommodate four passengers, and the starting price for a shared ride is 10 Rs. Here, apart from last-mile connectivity, security concerns are solved by using technologies and proposing certain drivers as added value. Safety for female passengers is especially well thought.

In terms of revenue model, “The company does not own the asset. Instead, loans are arranged for the e-rickshaw drivers to buy the vehicle, and an operating commission is charged to take care of infrastructure issues such as dedicated parking and charging stations for the vehicles, as well as help with licensing of vehicles.”

The company is preparing to launch a mobile application for booking Smart-E.

In September 2017, 300 e-rickshaws (K. Kumar, 2017) have been deployed on the roads of Gurgaon. Delhi is the capital city located in the north of India with several satellite cities around, such as Gurgaon and Noida (Sindhu, 2016).

It is pointed out that “in small and medium cities they are acting as the public transport system whereas in mega cities they act as a feeder service to the public transport” (Electric Rickshaws in Indian Cities: Status & scope for improvement, 2016)

The deployment of three-wheeler E-rickshaws can be dated back to 2014.

#### *Advantages & disadvantage of e-rickshaws*

Electric Rickshaws in Indian Cities: Status & scope for improvement (2016) points out three benefits of e-rickshaws: economic benefit, social benefit and environmental benefit. Economic benefits include development of industries and employee generation, lower vehicle costs and an increase in driver income. Social benefits are such as less physical effort for drivers as compared to cycle rickshaws, whereas environmental benefits include reduction in air pollution and less energy consumption. On the other hand, some disadvantages are also listed in Indian Cities: Status & scope for improvement (2016), such as safety issues due to poor braking, lighting systems and poor driver training.

#### ■ *Trend 2) Public bus/shuttle projects*

The second trend is an electric bus operation project initiated by regional public transport companies.

#### *Bangalore Metropolitan Transport Corporation*

On 27<sup>th</sup> February 2014, the Bangalore Metropolitan Transport Corporation (BMTTC) launched a public electric bus pilot project in Bangalore (The Indian Express, 2014). This first electric bus



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project in the country (Staff Reporter, 2014) aims at checking the economic advantage of the bus in the city and, if it is advantageous, testing which kind of route is suitable for EV buses. This 32-seated bus can travel 250 km with a full single charge, charged within 4 - 6 hours (= estimated numbers).

After expanding its testing period for a few months to observe the performance under the exhaustive usage, the BMTC shelved the introduction of the electric bus. Though the users of the bus showed positive reactions to its comfort, non-polluting features and ambiances, the cost of the bus became the bottleneck since the financial situation of the BMTC remained in deficit between the fiscal years of 2013 – 2015 (Yadav, 2015).

### *Example of himachal prades and other cities' E-bus projects*

The Himachal Pradesh government, for example, announced a plan to purchase 200 electric buses to be used for public transport by Himachal Road Transport Corporation (Press Trust of India, 2018). This project is the first electric bus project in India under FAME-I scheme. "(...) there was no electric manufacture in India and no State Transport Undertakings had made any such procurement by that time" (Tewari, 2017). In January 2016, no manufacturer or vendor had ability to provide electric buses as they didn't have the technology nor the experience of importing electric buses. "Indian bus manufacturers also informed that it would take more than a year for them to develop any prototype of electric buses in the country" (Tewari, 2017). The commercial operation has started on the 13<sup>th</sup> of November 2017 (Tewari, 2017). Eleven electric buses were deployed and provide nine routes.

### *Agra Development Authority + Mahindra Reva (Taj Mahal zero emission corridor in Agra)*

On 16<sup>th</sup> January 2015, Mahindra & Mahindra handed over four electric vans to the Agra Development Authority that ferry tourist from Shilpgram to Taj Mahal. Since the air pollution harms the monuments of Taj Mahal, conventional cars, trucks and buses are not permitted within 1,5 kilometres from Taj Mahal. These electric vans, Maxximo, can run 100 km on a single charge with the maximum speed of 65km/h (S. Joshi, 2015). This is the first electric pilot project under NEMMP (Press Trust of India, 2015a).

### ■ *Trend 3) Rental car*

The third trend is EV use as rent-a car.

### *Example of Zoom car*

Mahindra Electric has collaborated with Zoomcar, a self-drive car rental company headquartered in Bangalore, to offer 50 e2o Plus electric vehicles in Pune for self-driving as well as renting (BusinessToday.In, 2018).

This is an indication that more and more EVs can be an option of rent-a-car. Since the users do not need to assure vehicle maintenance, the mental and practical barrier for end-user to use EVs can be less constraining than purchasing EVs.

#### ■ *Trend 4) ICT-based services*

##### *The diffusion of smartphone facilitates mobile-based services.*

The other eye-catching trend is the diffusion of ICT-based mobility services such as Uber, Ola and Quick ride. They are a taxi-dispatching service platform that matches the demand and supply of taxi services. The end-users type the destination that he or she wants to reach on the mobile-application-based platform, then the system matches the nearby taxi that is best for the end-users' demand. The price is automatically calculated and the meeting point is also automatically suggested using the GPS data of the end-users and taxi-drivers. This type of platform service facilitates the mobility of local people in the context where public transport is not convenient enough for daily transport use, especially when the weather conditions are bad or during night-time.

#### ■ *Trends in mobility service*

This section described that e-rickshaws are widely used for commercial use and e-buses are used for regional public transport companies on pilot project basis. Most e-bus pilot projects are one shot projects and did not continue due to financial or technical reasons.

Four-wheeler vehicles (apart from buses and vans) or e-scooters are not used for commercial use (apart from CET service). In Bangalore, a rental cycle service in front of the metro station emerged. This service can potentially accommodate e-scooters as a part of rental bikes.

The most notable phenomenon is that Mahindra-Electric now has ties with Smart-E projects after having strategic ties with Ola and LUT. Mahindra-Electric launched e-rickshaws at the same period, as well as a mobility service platform (presented in the following section). Mahindra-Electric is starting to have influence not only as an EV OEM but also as service provider.

Other mobility trends such as the emerging service to answer the needs towards last-mile connectivity are also observed.

LUT wishes to identify some elements in this mobility trend so as to have synergy with its current operation and future service diversification. For example, charging infrastructure deployment to answer growing needs of EV-based last-mile connectivity, EV maintenance,

and operational assistance of electric buses can be potential services that LUT can explore if there is any potential synergy. In terms of value propositions, e-rickshaws do not consider CO2 reduction as a value proposition, but it is simply because it is cheaper with an electrified option.

Those trends have been recognized by the managers of LUT since 2016.

## *2) Vehicle availability and price*

The previous part examined mobility (and related) services that concern EVs. Some trends were found such as the diffusion of ICT-based services and last-mile connectivity services.

This part analyses EV availability and its price. What kinds of EVs are and will be available on the Indian market? Starting from the four-wheelers market, this part reviews three-wheeler and two-wheeler availability as well. Four-wheelers include buses and vans, though both individual and commercial vehicles are rarely available.

Simply put, EV 4-wheelers are scarce in terms of available models, and the only choice are Mahindra-Electric's EV; possible EV-based mobility service development depends strictly on what models an EV manufacturer puts on the Indian market.

There are four types of EVs: cars for individuals, commercial cars, three-wheelers and two-wheelers. The last two categories are available, whereas individual cars and commercial cars are quite scarce. This scarcity of EV availability on the market prevents LUT from diversifying its service. On the other hand, if LUT finds a way to benefit from this scarcity, that can be a business advantage for LUT.

### *a) 4-wheeler*

#### ■ *Reva*

Reva was the first EV manufacturer in India. The company has sold EVs since 2001. This company was acquired by Mahindra & Mahindra on 26<sup>th</sup> May 2010. The current EV OEM Mahindra-Electric is based on the establishment of this company. Reva Electric Car Company (RECC) launched its EV REVA on May 11<sup>th</sup>, 2001 as the first mass-produced consumer electric vehicle in India, and its ex-show room price of the standard model vehicle is Rs. 2.5 lakhs<sup>52</sup>

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<sup>52</sup> US \$5,555 as on December 31, 2004.

(Maini, 2005). In 2008, RECC launched a new model, REVAi. The autonomous range of REVAi is 80km per charge. It accommodates four passengers with two doors for passengers.



Source: The Hindu

This EV model is far from a success. The associated charging infrastructure has not widely been deployed either.

Mahindra & Mahindra (M&M) acquired Reva Electric Car Company in the fiscal year of 2011 for Rs. 1.59 billion, holding 55,2% of its stake (ET Bureau, 2010). M&M renamed the company Mahindra Electric Mobility.

#### ■ *Mahindra-Electric*

Mahindra-Electric was the unique four-wheeler EV manufacturer in India by July 2018. As of July 2018, M&M has invested 6 billion (Modi, 2018) in the electric vehicle business, and it still struggles to make business out of EV sales. In the FY 2017, the company sold 1021 EVs. It sold 4026 EVs, including 1094 four-wheelers and 2932 three-wheelers during the FY 2018 (Mahindra & Mahindra Ltd., 2018). In the FY 2019, it sold 10,276 units, largely supported by the order of Energy Efficiency Service Ltd. for governmental use (Press Trust of India, 2019a). By 2017, the company released four vehicle models on the Indian EV market.

#### *Vehicle types*

The company manufactures three different EVs namely e2o plus, e-Verito and e-Supro.



Source: Mahindra-Electric

e2o is a five-door hatchback EV that costs Rs 4.79 lakh (on road Delhi) in 2015 (Press Trust of India, 2015b). E-Verito is a four-door sedan-type EV that costs Rs. 13.17 lakh (on ex-showroom price in Delhi). E-Supro is an electric van that costs Rs. 8.45 lakh for cargo and Rs. 8.75 lakh as a passenger vehicle (Mukherjee, 2016), after governmental subsidies have been applied. Mahindra-Electric also sells e-rickshaws since 2017: eAlpha mini. The price is Rs. 1.12 lakh (ex-showroom price in Delhi) (ETAUTO, 2017).

### *Partnership*

The company lately collaborated with a commercial EV user, Zoomcar, which offers a self-driving car rental service in Indian cities. An EV rental service takes place in Pune since July 2018. Fifty units of four-wheeler EV, e2o plus, are in operation.

Mahindra Electric, a sub-division of the Mahindra Group, has collaborated with Zoomcar, a self-drive car rental company headquartered in Bangalore, to offer 50 e2oPlus electric vehicles in Pune for self-driving as well as renting. The car will be available at Rs 9,999 per month on the ZAP subscribe program of Zoomcar, which assists in renting a car without the hassles of down-payment, service, and insurance. When not in use, the ZAP program even allows users to rent out these vehicles, allowing car buyers to recover a portion of the monthly cost. The ZAP Program service is being extended to Pune after Mahindra successfully deployed it in Mysuru, Hyderabad, Jaipur, New Delhi, Mumbai, and Kolkata. (BusinessToday.In, 2018)

The company has in the past tied up with China's Tencent Holdings and Japan's SoftBank-backed Indian ride-hailing company Ola to set up an electric mass mobility ecosystem in western India, launching more than 100 EVs on the cab aggregator's platform (News Rise, 2018).

It has also partnered with ride-hailing firm Uber Technologies to deploy a few hundred EVs on its platform in two Indian cities, starting this month, before expanding to other places.”

#### *Pricing of e2o*

When comparing the price of e2o<sup>53</sup> to other ICE vehicles available in India, it is 70 % higher than the cheapest ICE vehicle car<sup>54</sup>. It signifies that e2o (with 2 doors) is not competitive in terms of price in comparison to the cheapest 4-door ICE vehicle. The price of e2o seems stuck in the middle for individual car buyers.

In the fiscal year of 2017-2018, Mahindra & Mahindra, the parent company of Mahindra-Electric, reported financial losses of Rs 1.29 billion in its electric mobility business (Modi, 2018).

The following shows the plans of different OEMs about market introduction of EVs. Most companies announced that they will launch EVs by around 2020.

#### ■ *TATA motor*

##### *TATA motor is into an electric bus segment.*

TATA motor announced that it would provide 80 electric buses to West Bengal Transport Corporation (TATA Motors, 2019). By 3<sup>rd</sup> April, it has already supplied 20 units of electric buses (Ultra Electric 9/9m AC E-bus), and 20 more units of electric buses (9/9m AC E-bus) are planned to be supplied by 31<sup>st</sup> March 2019. They have seats for 31 passengers and are equipped with Li-ion batteries on the rooftop to avoid breakdown from waterlogging. The remaining 40 buses (9/12m AC electric bus) are to be supplied as well. It claims that it will supply 225 electric buses in total to six State Transport Undertakings (STUs) in West Bengal, Lucknow, Indore, Guwahati, Jammu and Jaipur. The range of Ultra Electric buses manufactured in the Dharwad plant is 150 km per full charge. Tata motor has installed charging stations at Nonapukur, Kasba, Newtown and Belghoria, and it has mounted intermediate charging terminals powered with fast charging at Howrah and Santragachi. It

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<sup>53</sup> 571 000 Rs. as in before April 2015 with 3000 Rs. of monthly battery lease fee. After the price revision in April 2015, the price decreased to 480 000 Rs. with the same monthly battery lease fee.

<sup>54</sup> Four-wheeler ICE vehicles are available in India from the price of 338 000 Rs. up to 17 00 000 Rs. of Toyota Carolla Altis and 18 62 000 of Volkswagen Jetta. (Cars over 30 00 000Rs. also exist and they are, for example, Mercedes-Benz A-class, Hyundai Santa Fe, Toyota Camry and BMW 3 series.)

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claims that these electric buses will offer 50 per cent lower fuel costs, 20 per cent better energy consumption and lower maintenance downtime in comparison to diesel buses.

### *Vision*

Tata motor recognises electric vehicles as the future of transportation. Tata motor set 'Connecting Aspirations' as the core of its brand philosophy.

### ■ *BYD*

BYD is a Chinese EV manufacturer and focuses on the electric bus segment in India. Founded in 1995, the company manufactures electronics, batteries, rail transit, passenger electric vehicles and commercial electric vehicles. The company expects to manufacture electric buses in India according to the news article in 2016 (Pal Chauhan, 2016). This is one example that shows that foreign car manufacture is also interested in the Indian commercial EV market.

### ■ *Local entrepreneur in Bangalore*

Apart from the above-mentioned OEMs, some entrepreneurs envisage to develop EVs for manufacturing<sup>55</sup>. As it was so for Reva (the predecessor company of Mahindra-Electric before acquisition), it is possible that a new start-up company develops EVs and start selling on the Indian market. The emergence of a “micro electric vehicle” market has been observed in China since the late 2000s, and these EVs are targeting low-end users with low prices (B. Chen, Midler, & Ruet, 2018). It is possible that in India as well the emergence of this kind of market and vehicles developed by non-conventional automobile OEMs such as local entrepreneurs will be observed in the near future.

Table 20 Projection of EV launches in India by different OEMs, as in April 2019

<b>OEM</b>	<b>Model</b>	<b>Scheduled Launch</b>
Maruti Suzuki	Wagon R -EV	2020
Hyundai	Kona	2019
Tata Motors	Altroz EV	2020
MG Motors	eZS	2019
M&M	eKUV 100	2019
Nissan	Leaf	2019
Tata Motors	Nexon EV	2020

<sup>55</sup> Based on field surveys in Bangalore.

Renault	Zoe	2019
JLR	I-Pace	2020
Audi	E-Tron	2019
Volvo	XC40	2020

Source: Taumar (2019)

#### b) Two-wheelers

The author could identify 11 electric scooter manufacturers offering their products with the prices ranging mostly between 25 000 Rs. and 64 000 Rs<sup>56</sup>. As fuel-based scooter prices range from 28 500 Rs. up to 100 000 Rs., e-scooters are offered with lower prices. The travel range is between 60 km and 100 km per charge.

Table 21 Price range of electric scooters in India

Price range (INR)	# of available e-scooter	# of available ICE scooter
25,000 – 35,000	<b>8</b>	3
35,000 – 45,000	<b>10</b>	1
45,000 – 55,000	<b>5</b>	3
55,000 – 65,000	1	<b>12</b>
65,000 –	2	<b>8</b>

#### ■ GoGreenBOV (2-wheeler EV manufacture) in Bangalore

GoGreenBOV<sup>57</sup> is a company founded in 2007 in Bangalore that manufactures two-wheeler EVs (E-scooter). Using Lead-acid battery, the company targets a lower income segment with low-priced scooter. While the scooter can only go up to 50 – 60 km/h, the company ensures a longer travel distance: 120km. By doing so, their customers need not concern themselves about their daily charging issues: they charge at their house and office. Users can even travel long distances if they wish to. The company started its operation in 2011 and since then, it has sold around 11000-12000 e-scooters (e.g., 2000-3000 units in Bangalore).

<sup>56</sup> As on BikeDekho as in 22<sup>nd</sup> December 2018. Following prices are from the same information source: BikeDekho (2018). 11 identified manufactures are: Hero Electric, Avon, Indus Yo, Lohia, Palatino, Tork, BSA motor, TVS, EKO, GoGreenBOV and BPG.

<sup>57</sup> BOV stands for Battery Operated Vehicle.



■ *Ather (two-wheeler EV manufacture) in Bangalore*

Ather is a smart-up company in Bangalore that designs and manufactures smart electric scooters linked to a mobile application-connected display on the dashboard. The company is planning to launch its product in 2017, targeting relatively high-end users. Using Lithium-ion batteries, the scooter's top speed is 72km/h while the travel distance per full charge is 60km. As the travel distance remains short, the company is planning to deploy charging stations in the city, at places such as cafés and shopping malls. Battery packs can be charged in 50 minutes via fast charging mode (The Hans India, 2016). However, setting up charging stations all over the city requires a big amount of investment. The company is trying to find a solution, such as asking the local electricity supply company to change its regulation for the installation of charging stations for EVs:

1. Getting sub-meter in the name of Ather Energy across the city without being an occupier on the premises,
2. Reducing the prices on the infrastructural charges and additional load,
3. Creating a possible tariff plan specifically for the EV industry, and
4. License of the resale of electricity.

The expected price is around 1 lakh Rs. Other electric scooter companies include Hero Electric, Ampere Auto and Bajaj Auto. For electric two-wheelers, there already exists a certain market. Sufficient supply and demand exist. A smart e-scooter is developed by a smart-up. Electric two-wheelers expect further market development targeting daily mobility of individuals. The following part reviews the deployment of three-wheeler electric rickshaws. E-rickshaws are rented for commercial use, or individuals buy them for commercial use.

*c) Three-wheelers*

Through the diffusion of electric three-wheelers (e-rickshaws) and last-mile connectivity services with e-rickshaws, different insights on the development of Innovation ecosystems can be acquired, such as role of regulation, demands for mobility that drive the use of e-rickshaws and mobility services and charging infrastructure deployment.

■ *What is the definition of an electric rickshaw (three-wheeler)?*

According to Automotive Research Association of India (ARAI India), "E-rickshaw" means a special purpose battery-operated vehicle with three wheels and intended to provide last-mile connectivity for passengers for hire or reward, provided

i) Such vehicle is constructed or adapted to carry not more than four passengers, excluding the driver, and not more than forty kilograms luggage in total;

ii) The net power of its motor is not more than 2000 W;

iii) The maximum speed of the vehicle is not more than 25km/h

“E-cart” means a special purpose battery-operated vehicle with three wheels and intended to provide last-mile connectivity for carrying goods for hire or reward, provided

i) Such vehicle is constructed or adapted for carrying goods by providing a separate load body or compartment with the maximum weight three hundred and ten kilograms in addition to driver;

ii) The net power of its motor is not more than 2000 W;

iii) The maximum speed of the vehicle is not more than 25 km/h

The definition given by the government of India in 2015, The Motor Vehicle (Amendment) Act 2015 (Ministry of Law and Justice (Legislative Department), 2015) is the following:

“e-cart or e-rickshaw” means a special purpose battery powered vehicle of power not exceeding 4000 watts, having three wheels for carrying goods or passengers, as the case may be, for hire or reward, manufactured, constructed or adapted, equipped and maintained in accordance with such specifications, as may be prescribed in this behalf.

#### ■ *Mahindra-Electric*

e-Alfa Mini is an E-rickshaw designed for last-mile connectivity in cities. e-Alfa Mini is designed intended to have robust body, a large cabin space for comfort for both driver and passengers (Mahindra, 2017). e-Alfa Mini is powered by a 120Ah battery, a motor and controller of 1kW.

#### ■ *DLF Place Saket mall × Clean Motion’s Zbee*

To improve the last-mile connectivity in Delhi, Clean Motion Pvt. Ltd. introduced 25 electric three-wheelers to provide a taxi service between DLF Place Saket mall and Malviya Nagar station. These vehicles that cost Rs. 3 lakh can go up to 45 km/h and run up to 50 km with a full charge. They can be charged within 20 min. with a special rapid charger while it takes 2 hours with a normal electric point (Pandey, 2015). The Clean Motion received requests from other cities such as Gurgaon, Mumbai, Chennai and Pune (Rajkamal, 2014).

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*Note* that a similar project led by Green Wheels Pvt. Ltd. once existed (Press Trust of India, 2012). The local government's contribution to this new project remains unclear, while some contributions may have existed for the previous projects in 2012 (Bagga, 2012).

### ■ *Krishna E-rickshaw (three-wheeler EV assembler) in Delhi*

Krishna E-Rickshaw is a brand of three-wheeler EVs sold by Jain Power Corporation in Delhi (Krishna, 2021). This local company started selling three-wheeler EVs (E-rickshaws) in 2011. Initially the company imported e-rickshaws from China. Five years later, the company manufactured E-rickshaws in India while the battery component was still imported from China. The Krishna E-rickshaw has more than 150 dealers all over India and 100 dealers are located in Delhi. Kolkata is the 2<sup>nd</sup> largest market of the company. In 2015, the company sold approximately 4000 units of E-rickshaws, including both passenger vehicles and cargo vehicles. The passenger vehicles cost around 45000 Rs. without battery chargers. The customers can benefit 15000 Rs. of governmental subsidies at the time of purchase. The vehicles are mainly used for taxi purpose in cities. The travel distance ranges around 70-80 km per full charge (i.e. the drivers can operate the vehicle around 8-9 hours per full charge depending on the frequency of trips and the traffic.) Those vehicles are charged at night when the grid electricity supply is stable, so that the electricity outages in the daytime do not disturb their taxi business.

### *3) Power infrastructure for electric mobility*

This section describes the latest projects on EV charging infrastructure deployment. This section shows representative cases so as to analyse how LUT can mobilise those fragmented projects to develop its own business.

#### *a) Change in number of EV Charging infrastructure between 2015 – 2017*

### ■ *EV charging points deployed by Mahindra-Electric*

Mahindra-Electric (formerly known as Mahindra-Reva or Reva Electric Car Company) is the only major EV manufacturer in India. The company deploys EV charging points for its EV users. Those charging points are mostly free of cost for users. Mahindra-Electric provided location information of EV charging points on its website until early 2017. The company hasn't provided this information since then<sup>58</sup>.

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<sup>58</sup> In the same period of time, M-Reva reveals "EV charging infrastructure manager" from its company organization.

Figure 20 shows the transition of the number of charging stations installed in Indian cities from May 2015 to January 2017. It is noteworthy that the numbers are decreasing in the largest cities such as Delhi, Bangalore and Mumbai. On the other hand, those numbers are increasing in cities such as Kolkata and Pune.

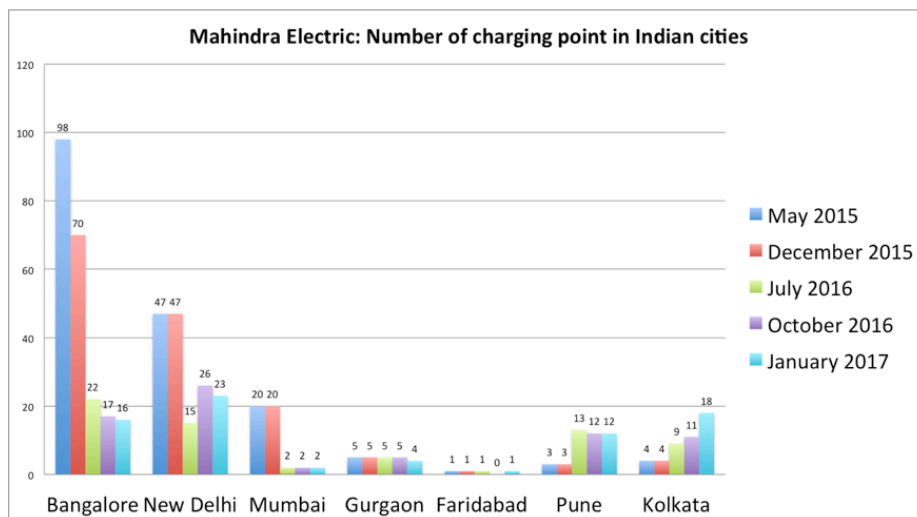


Figure 20 Mahindra Electric: Number of charging point in Indian cities

(Source: Mahindra-Electric, Graph by author)

(The data is only available till January 2017. After January 2017, the data is no longer available on the official website of Mahindra-Electric.)

Figures in annex show the location of charging points in cities that have more than 10 charging points.

#### ■ Bangalore

Bangalore has 16 charging points. All of them exist within a radius of 15 km from the city centre except for the one at the international airport. Most charging points are located in southeast part of the city.

#### *Bangalore International Airport (Kempegowda international airport)*

ICT development and building development are briefly reviewed in relation with EV deployment. Subordinate influence is expected. It is important to deploy charging infrastructure, that is key for long-range travel, to locations such as at the airport and inter-city service stations for both commercial and individual use of EVs. The deployment of ICTs such as GPS-based real-time geo-localisation and navigation are progressing. Pier-to-Pier services such as Uber and Ola can be replicated to food and goods delivery services. In fact, Uber eats and Zomato are pioneering it. Along with the development of such mobility services, holding relevant software development ability or keeping access to such ability is expected to be critical.

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### ■ *Delhi and NCR*

Delhi has 23 charging points. When we count charging points in nearby cities such as Noida, Gurgaon, Faridabad and Ghaziabad, this area (NCR) has 30 charging points. Most charging points are located within a radius of 20 km from the city centre (defined at around Central Secretariat metro station) and farthest one is at around 30 km.

### ■ *Other cities*

#### *Pune*

Pune is a city of the state of Maharashtra. Its city limits from the central area are about 10 km (see figure in annex). Many charging points of this area exist outside of the city limits. Four charging points are within the city limits while the other seven are located out of it.

#### *Kolkata*

Kolkata is the capital city of the state of West Bengal. The city stretches from North to South. Eight charging points in this area are located beyond 20 km from the city centre. Those eight charging points are scattered north, south, west and east of the city. One charging point in the north is located 130 km away from the city centre. It is beyond the autonomy of Mahindra-Electric's e2o.

Keeping these points in mind, the following section examines potential growth drivers of the EV market and EV-based mobility service market.

### ■ *BESCOM - Smart grid project*

Bangalore Electricity Supply Company (BESCOM) is planning a smart grid pilot project in Indiranagar. This project is starting its implementation in November 2016 (provisional plan). The main objective of this project is to implement smart meters to test a demand-respond system. As a part of the project, BESCOM is planning to implement 2 EV charging facilities. The public procurement has been done and a company will be in charge of this installation of charging points.

### ■ *Ather - Infrastructure development within BESCOM's distribution line*

Ather is a start-up company that develops electric scooters in Bangalore. The first product will be launched in 2017 (provisional plan). Its e-scooter has a display on the dashboard, and several applications, such as a navigation system, will be implemented. As the company is trying to reach city users, it tried to deploy electric charging stands in places such as restaurants, cafes and shopping malls. However, regulations on electric tariffs and on the

installation of extra electricity supply facilities on the premises by a third party are barriers for the company to deploy charging facilities.

Above is the charging infrastructure deployment strategy of each company and institution. Each actor adopts a different strategy.

Clearly, public initiatives are slow and small. They do not allocate sufficient human resources and capitals. This is due to the fact that it is not their main business, and also many public electricity distribution companies are in deficit. On the other hand, subsidiaries from public institutions exist, such as FAME India (Government of India et al., 2015). Similar policies are initiated at state level, as well by the state government. This is explained in the following section.

This section reviewed charging infrastructure projects by different actors. Previous sections described the trends in mobility services, the development of ICT-based services and building development for EV diffusion, and different EV charging infrastructure projects. In this context, it is important for LUT to identify potential business opportunity, but for that, vehicle availability is not negligible. What kind of vehicles are available on the market? The following section answers this question.

#### *4) Service infrastructure and talent supply*

Service infrastructure is necessary for the maintenance of vehicles. The maintenance of EVs is currently dependent on the service infrastructure of EV manufacturers: there is no generic automobile repair shop for EVs in India (except for electric rickshaws). LUT's operation is therefore geographically limited to the cities in which EV manufacturers provide maintenance services. (In this case, the maintenance includes both regular car inspections and irregular repairs due to accidents and breakdowns.)

In order to expand the geographical coverage beyond the diffusion of EV manufacturers' service centres, LUT needs either to internalise the maintenance or to outsource it to third party companies. For both options, the know-how of EV repair should be assimilated so as to develop an important human resource: EV repair engineers. Moreover, the EV parts supply is limited. As a consequence, setting up a maintenance centre is only possible with the cooperation of EV manufacturers.

In terms of human resource development, EV drivers are also scarce on the market. LUT needs to educate each driver on how to drive and do the daily maintenance of EVs.

## Chapter 5 – Case description: Organizational structure and business environment

Securing a sufficient number of EV-knowledgeable drivers as well as assuring that they come for work regularly are critical for LUT'S operation. It happens regularly that drivers take a day off without permission in Indian cities. To prevent this from happening, LUT develops its own incentive schemes as well as family aids for drivers, such as scholarship for children.

Talent supply also includes other type of human resources, especially ICT engineers.

### *5) Summary – Potential market for new service development*

The deployment of electric rickshaws<sup>59</sup> and the development of their ecosystem can influence the development of the EV ecosystem as (1) charging infrastructures can be compatible, (2) batteries can be compatible (modularity) and (3) similar E-mobility service can be developed with EVs.

### *V) Conclusive summary on the internal and external business environment analysis*

This chapter presented the internal and external business environments of the company through by describing the organization, business model and potential market expansions (current market expansion and service diversification).

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<sup>59</sup> In Electric Rickshaws in Indian Cities: Status & scope for improvement (2016), it is explained as follows:

Electric rickshaw as an IPT mode is a very recent phenomenon of Urban mobility and started gaining popularity since 2011. These are three-wheeler vehicles, propelled by an electric motor with a capacity ranging from 650-1400 Watts. The mode is emerging as an alternative to auto rickshaws and hand pulled/cycle rickshaw because of their low cost as compared to auto rickshaw and less human effort required vis-a-vis hand pulled rickshaws. Though the e-rickshaw is new in Indian transport system, it has been in Bangladesh, Philippines and in some other Asian cities for quite some time, plying under different name and style. Besides providing last mile connectivity it is also a source of livelihood to many lower income group people in above areas.

With the existing structure, design, power and mechanics, the e-rickshaws being applied in some cities in India could neither be categorised as motorised vehicle under the Motor Vehicle Act, 1988 nor be considered fully as non-motorised vehicles and hence could not be regulated. As such, the e-rickshaws were banned temporarily in Delhi in July 214 by the Delhi High Court due to safety concerns raised through public interest litigation. The High Court order emphasized the need for regularization of e-rickshaws in cities and accordingly in March, 2015 the Indian Parliament passed the Motor Vehicles (Amendment) Act, 2015 to further amend the Motor Vehicle Act, 1988 legalizing e-carts or e-rickshaws with a vehicles power not exceeding 4,000 watts.

E-rickshaws have emerged as an environmentally friendly, convenient and affordable mode of transport providing first and last-mile connectivity to the Metro and bus users. It promotes inclusive growth in urban areas by providing mass transport facility to urban poor. (...) The e-rickshaws are popular as a means of last my connectivity in large cities like Delhi and as a means of public transport in small cities like Roorkee and Agartala. In July 2014 the e-rickshaws were banned in Delhi by the Delhi High Court over safety concerns raised through public interest litigation later on with the change of policy, the High court issued an order emphasizing the need for regularization of e-rickshaws in cities. Subsequently, in March 2015, Indian parliament passed on online amendment to the Motor Vehicle Ac 1988 in the form of The Motor Vehicles (Amendment) Act, 2015 legalizing e-carts or e-rickshaws with a vehicle power not exceeding 4000 watts.

### *a) Organization*

The company has three different types of employees: office teams, operation site teams and drivers. The office teams are constituted of six different teams in the HQ in Whitefield, Bangalore: operation, analytics and technology, vehicle maintenance and driver training, billing and accounting, human resources and management teams. The first section gave work descriptions of each type of employee and each team. This basic understanding of the organizational structure and work process helps to better understand the business model of the company

#### ■ *Driver engagement*

LUT's own scheme and program are developed in order to attract drivers and assure regular contribution to LUT's operation.

### *b) Business model*

The second section presented the business model of the company. The business model of the company was described covering four main components of business models: value proposition, value network, revenue model and leadership. Those four components were identified through the literature review in section CHAPTER 2 - I).

By analysing the business of LUT using the framework of a business model, the current business of LUT does not have any specificity. As compared to potential competitors' business, the current business of LUT does not possess or develop any particular strength that can last long in a competition with other business players. From a business model analysis, it is therefore necessary for LUT to develop a potential competitive advantage.

The current business provides values to the company that requires a means of commuting for its employees. The main target client companies are situated in the suburban area of a city. For the moment, only one of the client companies' campuses is located in the city centre.

The novelty of LUT's business model is in its value propositions. The other three components of its business model lack originality, so the entrance barrier is not high.

From the business model point of view, the uniqueness of LUT's business only lies on the novelty of its value propositions such as CO2 reduction and transparency in billing. Those value propositions can also be offered by potential entrants, as the value creation does not



## Chapter 5 – Case description: Organizational structure and business environment

show any specificity. CO2 reduction can be achieved just by using EVs as fleets and transparency in billing can just be achieved by tracking the route of each fleet.

The company has several novelties in its value propositions, but its value creation process does not show any eye-catching specificity. The company found a niche market in offering employee-commuting services in Indian cities. However, the market potential of the same category of clients is limited. As a result, exploring potential markets that the company can use to leverage its existing business is critical, along with developing its own competitive advantages so as to expand the business while conserving its own profitability. Its adaptation to the ecosystem and its transformability to the ecosystems in other regions are also essential.

### ■ *Cost and revenue structure*

The running cost is currently not a major differentiation factor, though LUT claims that their clients reduce up to 40% of their transport costs by using EVs. LUT does not possess any specificity apart from the fact that electricity tariff is paid by the clients.

### ■ *Technologies not as its own strength*

The technologies that the company uses are not necessarily outstanding. The cost benefit of the EV use is minimal. However, no other companies mimic the business model of the company. The process of scheduling and the execution of the daily trips are a quite primitive process and depend largely on human effort. The exploration of new business opportunity is not organized or systematized: the information collection and evaluation process of the innovation ecosystem development are not systematized. The vision of the CEO and the co-founder is not necessarily shared in the organization. There is a gap between the public statements of the company and reality, especially regarding the importance of the technology in the process, which is not maximized. These points are to be discussed in chapter 7.

### ■ *Still as a top runner*

While the company does not possess extraordinary strength within its business model, the company, as of the end of 2019, is the only major CET service provider using EVs as its fleet.

### *c) Market developments: current market and new service development*

For the current target market, the company achieved steady growth since its foundation. The number of clients counts 25 companies covering four different cities by January 2019 as is

mentioned in CHAPTER 4 - . Yet, there are several anxiety factors. While some new EV-based CET providers emerge, it is not clear if the company is building competitive advantages. It is favourable that the company has started offering services in other cities such as in Delhi (and in NCR) and Mumbai in advance of other competitors. However, the company needs to stay efficient in each region and to build competitive advantage.

The competition in each region can rush into a price competition once more vendors start offering the same kind of EV-based service. In order to avoid being involved in a mere price reduction competition, LUT needs to consider the differentiation of its service from other vendors. One way can be by pursuing the most reduction of CO<sub>2</sub> emission amongst competitors. Providing other types of added values can also be a way of differentiation. This needs to be well considered.

It cannot be guaranteed that the company's business expansion in the CET market continues favourably. Geographical expansion is limited to certain cities where suitable types of client companies exist.

In this context, it is natural for the company to seek a business opportunity beyond the current targeted market. As a spinout business from the current operation, providing fleet management system for EVs is one possible orientation. However, there are pioneering competitors in the market of ICT-based applications. In particular, the emergence of the EV fleet management service, provided NEMO by Mahindra-electric, is a robust pioneering competitor.

There exist different market opportunities for new market development due to a potential transition of the mobility service industry and the convergence of different industries.

#### ■ *Direct competition*

Direct competitors are about to emerge. There are enough competitors both in ICE-based CET service markets and ICT-based route optimization service markets. LUT's priority lies on staying competitive in the current market as an EV-based CET service provider. LUT does not possess any technological advantage apart from the fact that it possesses accumulated data of trips made by their fleets. However, the accumulated data is also shared with the EV manufacturer by default. LUT uses its own mobile-based application, though the development of the application is out-sourced. It remains a possibility to become a major player among CET service providers including ICE-based service providers by keeping steady growth within and across cities.

## Chapter 5 – Case description: Organizational structure and business environment

### ■ *Trends in transport/mobility service and ICT*

Last-mile connectivity services are emerging and electrified. Buses and rent-a-car services are starting to be electrified as well. ICT-based services such as online taxi platforms and information services are being developed to increase the convenience of mobility users.

Intra-city services and goods transport services that LUT has the intention to explore are not yet electrified.

### ■ *Vehicle availability and prices*

EV availability stays low, though many EV manufacturers announced upcoming launches of EVs on Indian market. Available electric two-wheelers and three-wheelers can be exploited. However, there are limited options for commercial EVs and electric buses. The development of EV-based mobility services is currently highly dependent on the vehicle availability and prices.

### ■ *Power infrastructure for EV and electric mobility*

Power infrastructure is basically not available. Possible partnerships can be made with other EV manufacturers, electricity supply companies, local governments or commercial (or public) building owners.

### ■ *Service infrastructure and talent supply*

The company has difficulties in creating its own service infrastructure or subcontracting it to third-party players since EV repair engineers and EV parts supplies are highly limited. Drivers should continuously be hired and educated so as to ensure a sufficient number of EV drivers. LUT needs to stay accessible to human resources of ICT engineers or other types of engineers, depending on the direction of LUT's current market development and service diversification

### ■ *Business ecosystems and relevant innovation ecosystems*

In terms of the company's business ecosystem, on the supplier side, EV manufacturers, charging station manufacturers, charging infrastructure developers and operators, and ICT vendors exist as major suppliers required for the company's business activities. On the beneficiary side, BPO and other client companies exist.

Relevant innovation ecosystems that the company needs to keep observing include that of EVs, electric mobility services, EV charging infrastructure, EV chargers and ICTs such as fleet management systems, GPS and Artificial intelligence for trip optimization and efficient asset

management. The innovation ecosystem of EVs is a critical component for the company since it envisages to diversify its service with other types of EVs. The innovation ecosystems of charging infrastructure and EV chargers are subordinate to the EV ecosystem and do not have a major influence, though the company is willing to enter into the charging service as well. The development of innovation ecosystems of different ICTs is not that relevant since there are a number of vendors that the company can choose from, while there are some technological components such as advanced machine learning and artificial intelligence technologies that can be rare in local context.

#### ■ *Vehicle availability as a major constraint*

Too little choice of EV types in the Indian market is one of the barriers to LUT's service development. As LUT is willing to expand the market, a variety of choice of EVs allows the company to vary the service option based on the client's request. For the given moment, as only one type of EV (Mahindra-Reva's e2o) is available as a cost-efficient option, LUT solely provides service based on e2o. LUT envisages future competition of EV-based services. One of the co-founders mentioned that the know-how of EV fleet operation can be a strength of the company; however, it does not give a rigid competency to the company. As seen in the value network analysis of business model, no specificity has been found in the business model of LUT. It is required for the company to develop a competency.

LUT is developing the business with its novelty such as its novel value propositions, novel vehicles and novel service with ICT and a mobile application. Basically, the client companies try LUT's service as a part of its entire employee transportation. In this sense, LUT has found a niche market in the larger employee transportation market.

#### ■ *Managerial concerns*

These are managerial concerns expressed in the list of constraints and mitigation actions.

- Vehicle availability & price of vehicles,
- Power infrastructure,
- Service infrastructure,
- Organization,
- Competition, and
- Driver engagement.

## Chapter 5 – Case description: Organizational structure and business environment

Some success factors of LUT so far are explained as follows. First of all, founders of LUT identified an appropriate niche market where the needs of clients can be fulfilled by combining different technological products and services: **EVs and ICT**. Along with that, the **identification of clients** and the creation of a “**clients club**” is also important as the destination of its value proposition. The development of its business gives positive impact to reducing the city pollution and fits in with the central government policies; therefore, LUT stands in a business environment where positive support from different actors (both from public sector and private sector) is expected. It is the only eye-catching service provider among others based on ICE fleets.

So far, the market is protected by bidding and tender as is confirmed by the co-founder. According to the co-founder:

Whoever wins the bid is going to run doing electric vehicles. So far our knowledge, nobody has won any bit to run the electric vehicles. But it would happen, I’m sure.

As for now, since LUT is the only service provider and as the number of tenders that accommodate EV operations is limited, no other EV-based service provider could start its operation.

Existing clients of LUT were attracted by some differentiated values of LUT’s service such as the fact that EVs are used as fleets. Financial benefits in terms of service price are not a principal reason as if it were the case, other companies would also enter the market.

In reality, the running cost is lower while the initial investment is higher than that of an ICE-vehicle operation. The scheduling, re-scheduling and execution of trips become more complicated while retrospective analysis using operation data helps to improve the efficiency of trip scheduling and the credibility of the service.

LUT adds professional performance and fixes the monthly fee. The price level is expected to be almost the same as ICE-vehicle based services.

Then, what is innovative?

LUT is different from ICE-vehicle based operations. LUT provides the core value of “providing a means of transport for corporate employees” with some additional value propositions such as CO2 reduction. This is accomplished by combining EVs and ICT.

## Recapitulation – Key takeaways

Chapter 5 explains the business environment of the company. Understanding the business environment helps analyse three strategic intentions and to what extent the company has achieved these strategic intentions (or not) in chapter 6.

The chapter first reviews the organizational structure of the company. The company has three main bodies of organization: office teams that work at headquarters in Whitefield, Bangalore; operation site teams that work at each client's site; and drivers. The office teams are composed of operation, analytics & technologies, vehicle maintenance & driver training, billing & account, human resources, and management teams.

Secondly, the chapter analytically presents the business model of the company's CET service. The four critical components of business models identified in the literature review are used as analytical framework: value propositions, value network, leadership, and cost and revenue structure. The author points out that the case company does not have any specific novelty in the latter three components. The novelty of the business model of the company encompasses solely the value proposition.

The chapter thirdly reviews the business environment for the potential development of CET service: market expansion. The author describes the (potential) market situation of direct competition and substitute services. Then the (potential) market situation of an ICT-based route optimization service is also described. The author points out that, while there were no direct competitors as of the end of 2018, potential new entrants exist in the ICT-based fleet management service sector and ICE-based CET service sector. The author points out that even in the accumulation of fleet usage data, the case company does not necessarily have an advantage against other (potential) competitors.

The chapter fourthly reviews the business environment for the potential development of other e-mobility services and e-mobility related services such as power infrastructure and service infrastructure: service diversification. While there are trends of the emergence of new mobility services in urban India, the availability (considering the form factor and the price) of EVs hinders the company from developing new services.

The chapter gives some analytical perspective on the business development of the company. While the company applies newly developed technology-based products to commercial use, the advanced technology itself is not considered a strength of the company's CET service development. The vehicle (non-)availability is a critical constraint for the company's new service development. Still, the company stays as a (unique) top runner company of CET service providers mobilizing EVs as fleets.

Based on the understanding of the business model of the company and the business environment of the company, the following chapter (chapter 6) analyses the gaps between the vision of the managers and the business achievements of the company since its foundation in 2015.



## CHATER 6 - ANALYSIS

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*CHAPTER 6 - Analyses: Gaps between vision of managers and business achievements*

This chapter analyses the gaps between the vision of the company — especially on the strategic intentions and the list of constraints and mitigation actions — and the reality.

■ *Introduction to three analyses*

The first section analyses the declared strategic intentions of the company from the perspective of **First-Mover Advantage** (FMA) defined as “a special case of competitive advantage resulting from market entry timing” (Kerin et al., 1992, p39), and from the perspective of **Business Model Innovation** defined as “a modification or an addition of business activities that changes value network so as to improve business performance” (p.72 in Chapter 2). The first analysis concludes that none of their intentions have been fully achieved. The author then brings the focus on the “list of constraints and mitigation actions” formulated by the CEO and co-founder that is analysed in the second analysis. The second analysis points out that the managers should classify the constraints with various labels so as to better formulate the corresponding mitigation actions. One important classification is to distinguish ecosystem constraints that exist at the level of the “innovation ecosystem” - “the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution” (Adner, 2006, p. 2) and business constraints that exist at the level of its business ecosystem – “the value network<sup>60</sup> of a company to provide services/products” (p. 83 in Chapter 2). The author claims that it is important to distinguish ecosystem constraints and business constraints since the solution of ecosystem constraints can benefit all actor in the innovation ecosystem, including competitors, while the solution of business constraints in principle only benefit the company. The author also points out that organizational aspect is less mentioned in the “list of constraints and mitigation actions” that corresponds to study Rasmussen (2015) that says “firms emphasize strategic fit in discussions prior to conducting BMI, while neglecting considerations of organizational fit (p.38).” The third section then analyses the organizational gaps of the company. The focus on organizational changes during the process of a Business Model Innovation (BMI) is an important focus in recent business model studies (Rasmussen, 2015).

At the end of the analysis, the author points out important organizational issues identified through the field observations and the analyses through which the author concludes that the

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<sup>60</sup> Value network is an expanded concept of value chain. Value network is the “internal and external value exchanges of a company that are essential to create values defined as value propositions and deliver them to the customers (p. 223 in Chapter 6).”

company needs to develop some non-dynamic capabilities in order to achieve the declared strategic intentions of the company: the author claims that the several capability developments are important prerequisites for the company so as to exploit FMA to transform its business model to become an “e-mobility service platform” under the context where the development of relevant innovation ecosystems remains uncertain, especially in terms of product availability. This situation is equivalent to the pre-stage of a BMC (and BMI) suggested by Cavalcante (2014); however, while his pre-stage concept is defined with the unavailability of technology, product unavailability is a major constraint for the case company.

**Analysis 1. Strategic intentions:** the first analysis is about the gaps between strategic intentions and their realization. Gaps between three strategic intentions – the establishment of First Mover Advantage, sequential service diversification, and establishing LUT as a brand and the creation of a client club – and the results are qualified. To what extent was each strategic intention achieved and what are the remaining gaps to fill before the ideal state that managers aim for?

The first strategic intention is the establishment of a First-Mover Advantage (FMA): the managers (CEO and co-founder) of the company consider that the company has an FMA. Is it really the case? An FMA in literature is defined as “*a special case of competitive advantage resulting from market entry timing*” (Kerin et al., 1992, p.39), whereas, on the one hand from organizational view, Barney (1991) lists four essential requirements for a resource or skill to become a source of a sustainable competitive advantage: it must be **valuable**, be **rare** among a firm’s current and potential competitors, be **imperfectly imitable**, and **not** have any strategically **equivalent substitutes** for this resource/skill. Considering those two definitions, an FMA is a valuable, rare and imperfectly imitable resource or skill that does not have any strategically equivalent substitutes, and it results from market entry timing. On the other hand, Liebermann & Montgomery (1988) give some examples of the source of FMA: “*first-mover advantages arise from three primary sources: technological leadership (1), pre-emption of assets (2), and buyer switching costs (3).*” They claim that these three can be a source of FMA. The author observed, at the establishment phase of the case company when the managers claimed that the company possessed an FMA, that the company did not really have these types of resources or skills that are equivalent to FMAs, nor those suggested by Liebermann & Montgomery (1988). It is true that the company surely had a status of “a first-mover” when it started the business at its establishment phase, since the company identified a niche market in Bangalore earlier than anyone else. However, being a first-mover does not ensure that a company possesses a first-mover advantage, and the managers do not

clearly distinguish between these two concepts. Nevertheless, it is true that Lieberman & Montgomery (1990) give three example actions for a firm to build FMA: (1) produce a new product, (2) use a new process, or (3) enter a new market. It signifies that, since the company uses a new process to provide a mobility service and enters into a new market, though it is a niche, the company satisfies some pre-conditions to build FMA.

Two other strategic intentions of the company are sequential service diversification and the establishment of LUT as a brand and creation of client club.

These two intentions are also to be analysed in this section. Through a series of interviews and field observations, the author finds that these two intentions pertain to the first strategic intention: these two intentions are subordinate to FMA establishment, which is the primary strategic intention of the company. The second and third intentions are concrete and realistic business actions that came to managers' minds to take advantage of the company's position as a first-mover<sup>61</sup>. At the same time, those two intentions are linked to the ultimate goal of the company to attain a Business Model Change (BMC) to become an "e-mobility service platform". An "e-mobility service platform" is explained as a potential form of the company's business that integrates different e-mobility services and e-mobility related services.

These three pillars of strategic intentions have not changed in their core in three years since the foundation of the company, except for a minor addition. Only the client club creation is an idea that came later: the creation of a client club is an idea mentioned by the co-founder in 2017. This idea is in the continuity of LUT's brand establishment intention that has been mentioned by managers since 2016.

In order to facilitate the analysis, the author analyses the business development of the company by putting its focus on the primary strategic intention (FMA establishment). This analysis therefore addresses following questions:

Does the company establish FMA,

- through current (CET) market development?
- by diversifying its service?
- by formulating branding and creating a client club?

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<sup>61</sup> Service diversification enables the company to obtain new clients prior to potential competitors. Brand establishment and client club creation enable the company to enforce its marketing capability prior to potential competitors.

Based on these reformulated strategic intentions, the author evaluates to what extent the company succeeded in developing FMA through its business developments, based on three pillars of strategic intentions.

In analysis 1, the author analyses if, at first during the establishment phase, the company had any FMA (or not) for CET service development. Then, the author qualifies if, over a period of time, the company develops any FMA (or not) for CET service development. Followed by the analysis on FMA within CET service, the author repeats the same analysis on the diversification of service and on the branding and client club.

Through the analysis, the author concludes that LUT has had no established FMA since its foundation till the end of the fourth phase: “exploration and replication phase”. Nevertheless, the company has always been a first-mover as an EV-based CET service provider. The company eventually succeeded in expanding its geographical coverage to major Indian cities while making the business profitable (in terms of operation profit) in an “exploration and replication phase”. This was achieved while there were no direct competitors in the market, and this is a situation that can lead the company to establish a competitive advantage. The company has now built a value network active in major Indian cities as a very first-mover. The company is a first-mover in each city in which the company operates. Knowing that the demand for CET service is higher in major cities than in smaller cities, the company positions itself better than when it was only operating in one city (= Bangalore).

It is true that the author could not definitively evaluate if the company developed any competitive advantage or not since there was no direct competitor providing CET service using EV fleets. However, based on the definition of a competitive advantage: rare, valuable, imperfectly imitable and with no substitution, the author concludes that the company did not possess FMA and did not establish an FMA that is equivalent to any competitive advantage.

While the company did not establish an FMA, the author observed that the company took advantage of the fact that it was a first-mover company. Using the status of first-mover as an advantage, the company developed some prerequisites to obtain FMA. A major example is the expansion of geographical coverage of the service. The company started offering CET service in major Indian cities like Delhi and Mumbai prior to any other company doing so. The author evaluates that if the company can make the business profitable in all these cities, the company can establish a competitive advantage and therefore an FMA.

The author qualifies that the company benefits from “first mover position as an advantage” since the company does not possess any FMA, which must be **valuable**, be **rare** among a firm’s current and potential competitors, be **imperfectly imitable**, and **not** have any strategically **equivalent substitutes** for this resource/skill (Barney, 1991) such as “*technological leadership (1), pre-emption of assets (2), and buyer switching costs (3)*” (Liebermann & Montgomery, 1988)”. Even so, the company still succeeded to expand its market to major cities and created a situation (in terms of information collection and credibility on service quality) favourable to the company and “unpleasant/bothersome” for new entrants (= potential competitors). Here, the advantage is not necessarily competitive and it merely means something favourable for the business development.

The author concludes that none of the three strategic intentions was fully attained. Nonetheless, the effort to achieve the strategic intentions helps the company to identify and clarify the constraints to solve (or to circumvent) so as to attain their three non-achieved intentions. The second analysis analyses the “list of constraints and mitigation actions” formulated by the managers in mid-2018 as an outcome of their three-years business activities.

**Analysis 2. List of “Constraints and Mitigation Action”:** the second analysis is on the list of “Constraints and Mitigation Actions (C&MA)” formulated by the managers (refer to Chapter 5), aiming to identify business challenges and their solutions. The name of the list, “constraints and mitigation actions,” is given by the managers (CEO and a co-founder). Here, mitigation means “to reduce bad influences” or “to circumvent a problem” by the co-founder. This list is formulated so as to clarify the constraints that hinder the company from achieving the strategic intentions and plan mitigation actions corresponding to each constraint.

In this analysis, the author qualifies how relevant the constraints mentioned by the managers are to the achievement of the strategic intentions, and their progresses will be analysed in Analysis 1.

In the first place, it is noteworthy that vehicle availability and vehicle prices come on top of the list. This reflects the major concern of the managers: unavailability of the products required for service diversification. This shows that the company is at the pre-stage situation (Cavalcante, 2014) with the unavailability of the product required for a BMC.

About the content of constraints mentioned in the list, the author did not identify major issues except for the fact that nothing had been mentioned about the “organizational aspect”

in 2018, when the author received the list from the managers. (The category of “organization” and corresponding mitigation actions presented in the list was added after several discussions with the author.) After receiving the list, the author went through the list and noticed that the distinction between business constraints and ecosystem constraints can help better clarify the nature of each constraint.

The author identified two types of constraints: **ecosystem constraints** and **business constraints**. Ecosystem constraints are the constraints at the level of the innovation ecosystem, meaning “the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution” (Adner, 2006, p. 2); therefore, the solution of the constraints is sometimes out of the control of the company. Business constraints are organization-specific constraints, at the level of the business ecosystem, while ecosystem constraints are universal for all other actors. For example, LUT recognizes the availability of vehicles as a key constraint. This is a constraint for all other potential players. To solve it, LUT has worked to push OEMs. Not only did LUT benefit from this effort, but so did every other actor. Another important characteristic of a constraint is if it disappears after the development of innovation ecosystems or remains despite the development of the ecosystem.

This distinction helps the managers prioritize each action and clarify required mitigation actions. This point was confirmed during a discussion with the co-founder of the company. Since the company’s focal markets for further business development have a wide range, the treatment of ecosystem constraints can be organized in a systemized manner. For example, ecosystem constraints on the upper stream supply side and downstream demand side can be treated differently since they address different innovation ecosystems: the electric mobility ecosystem and the mobility service ecosystem.

As a result, business constraints and ecosystem constraints require different considerations on order to establish an FMA (or a competitive advantage). Especially, solving ecosystem constraints leads competitors to free-ride the effort of the company. Giving insights on EV-fleet operation to a potential EV manufacturer is a good example: this effort automatically benefits competitors. In such a case, how much of a resource shall be allocated and what kind of deal the company seals while solving ecosystem constraints are the keys to avoid merely benefiting the competitors.

## Chapter 6 – Analysis

Upon that, the second analysis points out that the managers list only a few constraints from organization aspect and the organizational aspect is important to accumulate learnings so as to transform the learnings into a competitive advantage (or a FMA).

In the following analysis, the author analyses the organizational change aspect of the company through the perspective of BMI. It is pointed out by Rasmussen (2015) and Björkdahl & Holmén (2013) that organizational design and capability aspects shall be addressed so as to deepen the understanding of the BMI process. Since the core of the research lies in contributing to BMI study by giving empirical data and analyses, the third analysis tries to address the organizational gap of the company at the stage before engaging itself to attain BMI.

**Analysis 3. Organizational gap:** the third analysis focuses on the organizational gaps of the company. The observed company was envisaging to achieve a BMI. The managers set strategic intentions and formulated the list of constraints and mitigation actions for that. In order to pursue a BMI, what are required organizational changes? When considering the achievement of BMI, an important change of its business activity is the transformation of its service: geographic expansion, service diversification and becoming an “e-mobility platform,” providing different mobility and mobility-related services in different cities. Literature suggests, for example, Dynamic Capabilities (Teece, 2018), capacity for experimentations and learnings, and capacity to assess risks on uncertainty (Adner, 2006) as important organizational capabilities.

### ■ *To end the introduction for three analyses*

By analysing the organizational change management for geographical expansion, for service diversification, and for identification of a new business model, the following three components appear to be important to be addressed by LUT:

- transcribing the vision as well as materialization of the vision (Kaplan, Norton, David, & Barrows Jr., 2008),
- continuous learning on the development of business ecosystems (Cavalcante, 2014),
- organization and organizational capability that permanently enables the above two processes.

Through the three above-mentioned analyses that focus on 1) the strategic intentions of the company, 2) the list of C&MA that clarifies different types of constraints and corresponding mitigation actions, and 3) organizational gaps, the author qualifies:

- to what extent the strategic intentions were accomplished,
- whether the company possessed an FMA from the beginning or not,
- whether the company developed any FMAs or not,
- the missing gaps to fill to accomplish the strategic intentions, and
- whether the company developed an appropriate action plan for future business development envisaging BMI or not.

At the end of this chapter (chapter 6), by combining the results of three analyses, the author concludes whether a BMI has happened (or not) and qualifies how much closer the company could come to achieving a BMI. This leads to the discussion and conclusion in the next chapter (chapter 7).

Below is the main content of the analysis.

### *1) Analysis (1) Strategic intentions and their realisations*

This section chronologically analyses LUT's three strategic intentions<sup>62</sup> and its realization: the execution of LUT's business development is evaluated based on these three strategic intentions so as to analyse the gaps between the realisation and the intentions.

Through a series of interviews and field observations, the author finds that the primary strategic intention of the company is establishing FMA, and the two other intentions are subordinate to it. In order to facilitate the analysis, the author reformulates the strategic intentions of LUT as follows and evaluates the extent to which the company has succeeded in developing FMA through its business development, based on the three pillars of original strategic intentions.

- Establishing FMA by current CET market development<sup>63</sup>,
- Diversifying its service to exploit or establish FMA, and
- Formulating branding and creating a client club to exploit or establish FMA.

Through chronological analyses of the business development of LUT, the author aims at clarifying whether, at the establishment phase, the company had any FMA (or not). Then, the author qualifies whether, over a period of time, the company developed any FMA (or not).

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<sup>62</sup> These three strategic intentions influence each other. For example, the first-mover advantage can be explored in two directions: within the "current market" and in "new service development". The new service development is included in sequential service diversification.

<sup>63</sup> The managers do not emphasise the development of CET market as a factor related to FMA establishment. The managers rather consider that service diversification is a way of establishing FMA. Still, the CET service constitutes the principal business of LUT as of late 2019. The development of CET service cannot be neglected to follow LUT's FMA development.



*1) First strategic intention: establishing FMA through existing CET service development*

Establishing FMA is the first and main strategic intention of LUT. To what extent has LUT achieved this strategic intention over time and established FMA against potential competitors<sup>64</sup> through current Corporate Employee Transport (CET) market development?

Given the interviews with managers, the author found out that the CET service development was not strongly connected with LUT's "stay a pioneer" intention for the managers. The managers' strategic intention rather emphasised the importance of the service diversification. Still, the managers repeatedly mentioned "scale economics" and "copycat measures" so as not to be caught by followers.

The term "scale economics" was used during an interview in 2016, illustrating the managers' recognition of the steady development of the CET business as a way to improve the profitability and keep followers away. Nonetheless, the emergence of "copy-cat" companies remains a critical concern for the CEO and the co-founder. During an interview at the same period, they evoked the issue of "how could LUT prepare for copy-cats with deeper pocket". The term "deeper pocket" means a large investment capacity here. Managers were considering that LUT's vantage points of vantage (in 2016) could easily be replaced by followers with larger investment capacities. This concern towards "deeper pocket investors" was repeated in the constraint-mitigation list developed in 2018: the managers' perspective on this has therefore not changed over three years.

The author analyses this.

The managers (CEO and co-founder) consider, since its foundation through its business development, that the company possesses FMA. Therefore, their interest rather addresses "how to exploit this advantage". By definition, FMA is "a special case of competitive advantage resulting from market entry timing (Kerin et al., 1992, p39). (Be aware that FMA is a narrow concept of a competitive advantage.) This analysis reveals that while the company stays a first-mover in the CET market by using EVs as its fleet, the company does not possess nor is developing a distinguishable FMA (or competitive advantage).

The company has taken several actions to develop FMA, but the author assesses that the company has not established a competitive advantage strong enough to defend itself from the entry of potential competitors into the market. Nevertheless, it is true that there is

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<sup>64</sup> Potential competitors are companies providing (only) fleet management system, companies providing CET service with ICE vehicles and new entrants.

currently no direct competitor that harms the company's pioneering position (in terms of vehicle number, client number and geographical coverage of the service). The company maintains its number-one (first-mover) position.

Since available resources (such as product, service, human resource) are scarce, as a first-mover, LUT may have attracted most of them, such as talented human resources and investors.

In terms of its business performance, the company finally succeeded in making the business profitable in 2018 in terms of operating profit<sup>65</sup>. According to an accountant of the company, credit goes to the fact that *"the number of clients in Bangalore crossed a certain number required to make the business profitable."*<sup>66</sup> This explains that LUT was able to make the business profitable after the obtention of a certain threshold number of clients, corresponding to ten clients in Bangalore. Since it took three years for LUT to obtain the current number of clients, one can consider that the company has a three-year advantage in terms of client number against potential followers: other companies may not be profitable before gathering the same number of clients, which took LUT three years. Then again, as recognised by the CEO and the co-founder, this client number advantage could easily be overtaken by a new entrant who would be backed-up by a "deeper pocket investor" with large capital and abundant human resources. To this effect, the increase in the number of clients cannot be considered an FMA. The author points out here that this three-year experience could have been transformed into a concrete asset, such as a far more improved version of a fleet management system, which could be a competitive advantage.

Below is the analysis of LUT's CET service development from its foundation. The author evaluates its business development at each stage, focusing on its FMA.

*a) Initiation phase (2014 October – 2015 April)*

■ *Identification of business idea*

What kind of FMA (or more widely competitive advantage), if any, has the company developed during its initiation phase (between the foundation and the first pilot project)?

First of all, LUT's founders came up with **a novel business model idea**. The idea was novel as it encompassed a new combination of market and technologies: CET service as a market, EVs

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<sup>65</sup> Its net profit – profit after tax – remains negative.

<sup>66</sup> The number is about 10 based on the observation.

and a GPS-enabled fleet management system as technologies. The author considers that it was an innovative business model idea, since it was a new combination of a new marketplace and new products/processes. This in turn enabled the company to have a different cost/revenue structure from the services operators using ICE vehicles as fleets.

The company was in advance on other players in the identification of this innovative business model idea and in the trial of developing the business<sup>67</sup>. However, since the idea itself is not imperfectly imitable nor a unique resource or skill without any strategically equivalent substitutes, the author estimates that there was no competitive advantage at this stage. At this point, if any group of people with the same idea and equivalent resources existed, it is possible that LUT would not have been able to establish the company.

■ *Identification of initial staff and potential clients*

Based on the business idea, the founders started preparing the first pilot project. The founders discovered that companies operating 24 hours a day were appropriate clients for the service. It is true that the same CET service already existed with ICE vehicles; however, the value here was the business model that combines EV fleets and an ICT fleet management system so as to operate the fleet with performance. This combination enables the company to circumvent the disadvantage of EVs: EVs need to be charged more frequently than ICE vehicles. The author evaluates that these achievements led LUT to initiate the first pilot project.

The author deduces that this **team building and client negotiation** can be considered as an exploitation of its position as a first mover, while this factor is not necessarily a definitive competitive advantage. Based on the business idea, the founders recruited initial staff and identified potential clients. For the author, it was a critical process to identify the talents willing to contribute to the foundation of a company, while the success of the business was still uncertain. The value here lies on the effort deployed to identify and hire those human resources.

The author assesses that the fact that the founders chose Bangalore as the first target market was also important, since Bangalore is one of best cities in which to start a new business. LUT could potentially have started its business first in Delhi, since there was the demand and the clients for CET service (as of 2018 at least). However, in that case, the market (= the clients) in

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<sup>67</sup> “For a given firm, a specific first-mover opportunity may arise as the result of unique product or process development by the firm, because the firm has the vision to see a new market opportunity not yet perceived by others, or because the firm chooses to be the first to act upon an opportunity perceived by many (Lieberman & Montgomery, 1990, p1)”.

Bangalore could have been taken by other players. Knowing that LUT's CET business was only profitable in Bangalore as of the end of 2019, the author deduces that it was a critical decision that LUT chose Bangalore as the first target market in India to establish its current position in EV-based CET services. It could also have been a natural choice for founders since the founders were based in Bangalore when they initiated the project (c.f. CHAPTER 4 - I)1)a) "Why in Bangalore?" and CHAPTER 4 - I)1)c) "Founders and identification of business opportunity by pivoting").

The author considers that the identification of potential clients is as critical as talent recruitment. Though this is a classic idea to be recognised for business development, the author emphasises that those two factors are quite crucial to the business development of a *new service that offers novel value propositions*. At a very early stage of market development, while the number of **potential** clients can be significant, the number of *clients willing to pay and become the very first users even before seeing the stability of an offer* can be limited. This is due to an uncertainty concerning the quality of the service and in the appropriate realisation of the service. Since LUT identified these very early adopters, limited in number, before anyone else, followers faced difficulties in identifying the other clients ready to be very early adopters. In addition to this factor of limited early adopters, talents (human resources) as well are limited in number. LUT harvested the talents that matched the requirements for the new service development and that were willing to work in a start-up with uncertainty as to business development. Potential followers need to identify this type of talent in the rest of the recruitment market.

*b) Establishment phase (May 2015 – April 2016)*

LUT possessed two concrete FMAs (very early adopter clients and talents) and one abstract FMA (a novel business idea) at the initiation phase. The company, however, soon loses the property of these FMAs, and thus their advantage. In this case, an idea of a novel business model is realised by a company (= LUT) and becomes a good example. Followers can thus be confident in its feasibility. Regarding talent recruitment as well, follower companies easily understand what kind of human resources are required to realise the business. Moreover, since there is a good example company (LUT), follower companies can hire free from risk averse talents that were not interested in joining a very first start-up company with a lot of uncertainty. A temporary FMA during initiation phase, therefore, disappears during this establishment phase.

What are, then, the new business developments that can relate to the development of FMAs during the establishment phase?

■ *Identification of clients and concretizing business model*

The identification of potential clients already happened during the previous phase. In the establishment phase, the company started working with its five clients to provide its service officially. This enabled LUT to secure the **revenue source**, to **test the business processes and optimise them**, and to have a **demonstrative case** to display in order to attract more clients in the future.

During the establishment phase, the details of the business model were developed and concretised through operations<sup>68</sup>. Core business procedures were developed in such a manner, such as fleet management and EV-related facility management. The author assesses that the internal value network became a **short-term competitive advantage** that followers will take time to copy. A value network is an expanded concept of a value chain; a network of people and information machines (Mariotti, 2002) that not only transforms objects but also mediates value creation (Fjeldstad & Haan, 2001). The value network regroups the streams of value mediated by people, goods and information so as to provide a valuable offer to clients. LUT's CET service became feasible in Bangalore, thanks to the installation and the daily management of charging infrastructure, daily fleet management, daily EV maintenance, driver recruitment and daily driver management, the development and the operation of the fleet management system, the management of people, money and information required for daily operation to offer value propositions. The organization and employees learn to optimize these business processes by doing them, as well as both the internal business processes and business processes with actors outside of the organization, such as clients and EV maintenance centres. The development, stabilization and optimization of the value network requires a learning curve that ensures that followers cannot copy the optimized process immediately. The accumulation of learnings (know-hows) is only possible when there is a concrete value network built and when employees and systems work. Since LUT is the only company building a value network to offer CET service with EV fleets, it is the only company that is accumulating learnings (know-hows) to optimize the value network.

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<sup>68</sup> All following components to operate a business and concretise its business model are developed:

What kinds of human resources are required?

How is the salary scheme for drivers?

What is the required equipment (e.g., EV chargers, fleet management system)?

Where to install the equipment?

What is the procedure to schedule the routing?

What is the software to use to calculate the optimal routing?

#### ■ *Accumulation of know-hows and improvement of the Fleet Management System*

The establishment phase was marked by the start of business operation know-hows accumulation. Know-hows include any business process and are not limited to daily fleet management, such as maintenance, driving skills and scheduling processes. The author assesses that a part of these know-hows could indeed contribute to the development of FMA/SCA by improving the business performance. All the more, these know-hows were exclusively detained by LUT, not by any other players. For example, LUT did not start using the fleet management system for several clients because LUT's scheduling process was not adapted to frequent and sudden schedule changes of these clients. The author estimates that improving this aspect (further automation and optimisation of fleet management) could have led LUT to develop a competitive advantage. LUT integrates a Fleet Management System (FMS) specialised for EV fleets that takes EV charging time and EV battery autonomous range into its value network. The optimization of this FMS with a certain learning curve forms a competitive advantage against followers that have capital and resources equivalent to the initiation phase of LUT; but the author assesses that a mere optimization of the system does not form a competitive advantage against followers that have more capital and resources that can accelerate this learning process. In order to form a competitive advantage, the FMS needs to be a more advanced system with extensibility and flexibility that follows the potential BMI of the company: a more advanced FMS that can integrate (or can be applied to) different EV fleet services such as an electric bus operation could have been a competitive advantage even against "deep-pocket" followers with larger capital and resources.

The core of fleet management is the optimisation problem algorithm. For a CET service with EV fleets, the fleet management system (FMS) is the combination of the optimal path problem of all the trips and a dispatchment algorithm for vehicles and drivers according to the trips. The optimisation of these algorithms directly impacts the business performance. Adding to that for EV fleets, EV charging time appears as an additional important parameter. The development of such FMS, taking into consideration different parameters such as the congestion of the roads according to each hour of the day, the delay of users' arrival and the unpredicted changes of trip routes is an important project of the company. If the company could have been able to develop an FMS that is flexible and extensible, it could have been a rare and not easily imitable asset, building a competitive advantage. In reality, the company did not succeed in developing such an elaborated FMS at this point in time: some processes of planning were not totally automated and are still taken care of manually.

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The author evaluates that the development and optimisation of a concrete value network were important steps for further market development in Bangalore and in other cities by giving credibility to the company. The development and optimisation of a value network is not a competitive advantage; however, this was an important step in its business development. This steady business development led the company to take another important step during the development and replication phase: the geographical expansion of CET service to major Indian cities.

### ■ *Fund raising*

During this phase, LUT raised the fund twice in total by 26 crore rupees<sup>69</sup>: first, it raised 3 crore rupees (September 2015), and secondly 23 crore rupees (February 2016). The capital was dedicated to purchasing vehicles and fast charging facilities (c.f. chapter 6, section I-B). The author associates this with the fact that the company continued its business and entered into the next phase (May 2016 – June 2016) when it obtained more clients and increased the number of fleets in operation. For the author, LUT possessed a sort of FMA during the establishment phase since it secured the human resources and clients (as lead users of the service) required to concretise its business idea and business processes. Moreover, different knowledge on daily operation was developed. The author estimates that potential competitors might have relative difficulties identifying appropriate human resources and clients since LUT addressed them before those competitors. In reality, there was no successful follower during this phase. From a technical perspective, the author assesses that the development of the fleet management system is directly linked to the establishment of FMA, since LUT is the only company in operation using an EV fleet management system. However, the strength of this FMA depends on the performance and maturity of the software and, as was previously mentioned, the company only marginally improved the system. The quality of its fleet management software remains immature and not completely performative for all clients: it remains easy for competitors to imitate.

The managers (CEO and co-founder) repeatedly evoked the thread of new entrants with “deep pocket” (= huge investment capacity). Raising funds enabled LUT to prepare for this, but the unique advantage against new entrants with investment capacity could have been LUT’s operational advantage. To prepare for the emergence of such new entrants, preparing a larger investment capacity or accumulating advantages based on the operation of the service are both possible. Huge investment enables LUT to overcome the number of vehicles,

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<sup>69</sup> Equivalent to about 3,500,000 USD as in 11<sup>th</sup> August 2020. Crore is a unit in India that signifies ten million.

number of charging infrastructures and number of clients easily, whereas money cannot buy time: developing an elaborated FMS takes time since the optimization of the algorithm takes time. LUT should have transformed its operational advantage into a competitive advantage. The company did manage to do so and rather expanded its geographical coverage. This was a choice, and the expansion of geographical coverage to major cities is also an important step, though it would have been ideal if the company had also improved the FMS significantly during this phase so as to establish an FMA.

*c) Development and exploration (May 2016 – June 2018)*

■ *Participation of the ancient founder of Reva-Electric in managing board*

The author estimates that welcoming the ancient founder of Reva-Electric improved the brand image of LUT, since he is a famous talent and one of the leaders of innovation ecosystems of EVs in India. This enabled the company to benefit from his experiences and insights on the characteristics of EVs and their battery, leading to more efficient daily and long-term vehicle management planning. This mostly concerns daily battery range extension and battery lifetime extension based on the insights on battery characteristics and the use of regenerative energy.

In addition, his human network within EV ecosystems and EV-related innovation ecosystems is important and beneficial for the company.

The author deduces that LUT could easily recruit him since LUT was the only mobility service provider using EV. The company exploited its FM position or “only-one position” to take this important step for further business and market development.

The fact that LUT is the only company providing a corporate fleet service in EVs facilitated this recruitment. While the author did not observe any particular outcome of his presence in the company, his expertise could contribute to developing an SCA, such as developing an advanced fleet management system (c.f. Accumulation of know-hows). The company exploited its FM position to hire a precious talent that in turn could help the company to develop an SCA. **It implies that there is an intermediary stage between “being a first mover” and developing “first mover advantage”.**

■ *Driver education and driver incentive mechanism*

For the author, the driver education system is an important business process, while this is not a competitive advantage itself. The author estimates that driver education indirectly



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contributes to the establishment of an SCA, such as brand image, by training highly professional drivers with a pristine code of conduct.

There is, however, a risk of first mover disadvantage: the drain of trained drivers to the companies of potential competitors. This trend, however, can be counterbalanced by the development of driver incentive mechanisms. Here is another aspect of the learning curve. The company developed a driver incentive mechanism by combining daily, weekly, monthly, trimonthly and yearly incentives. These incentives include “punctuality” to daily duty and “no complaint” based on professional manners, for example.

The development of a driver incentive scheme follows a learning curve. It takes months or years to formulate the driver incentive scheme, and other followers are required to go through the same process to formulate one. LUT therefore accumulated this one type of know-hows, maintaining a lead on competitors. The author asserts that this is not necessarily an FMA since it is not rare nor easily imitable. Most CET service providers can have driver education and driver incentive mechanisms, though they are not adapted to EV drivers. Still, some competitors can face the same issue and take time to catch up with LUT’s optimized mechanism.

### ■ *Pilot projects*

Yunus, Moingeon, & Lehmann-Ortega (2010) state that strategic experimentation is essential for the process of BMI: it allows the managers to deal with uncertainty in a controlled manner. More specifically, “launching a series of small experiments helps minimize risk and maximize the firm’s rate of learning, making it possible to identify a [BM’s] potential for success most efficiently” (Yunus et al., 2010, p.315).

Based on its business achievements, LUT negotiated with OEMs to collaborate with LUT to conduct pilot projects. Through these projects, LUT gathered updated information about the latest EV models such as their specifications, robustness and features, as well as deepened the understanding of potential business opportunities using newly available EVs. The author evaluates that it was a way to exploit its advantage as a first mover: with the lack of direct competitors, LUT tests the usability of different EV models to assess feasibility of developing a new service with these EV models. The negotiation for the collaboration with EV manufacturers was simple since LUT is the only mobility service player. These projects are also exploited as a way to advertise its service. Through these pilot projects, the brand image of the company has been enhanced. The author evaluates that LUT could execute pilot

projects relatively freely due to the fact that the company is a first mover and that there has been no equivalent competitor. It is an advantage as a first mover, but it is not a competitive advantage and not an FMA since no concrete asset was developed. Still, it is an important step for the company since the company could collect data and obtain learnings on the development of relevant innovation ecosystems.

#### ■ *Beginning of geographic expansion*

LUT started a pilot project with Adobe in Delhi during this period. This is a consequence of the operation for Adobe in Bangalore. The entry on the Delhi market did not face any difficulty since LUT was already operating the same service in Bangalore, and also because there was no direct competitor in Delhi. The author evaluates that the lack of competitors facilitates new market development.

Increasing geographical coverage can be an FMA since it can generate scale economics, for example. However, the state of its geographical expansion cannot yet be considered as an FMA since the company only started providing its service in Delhi. The author assesses that if the company starts providing its service to more than about 10 clients in several major Indian cities before its competitors, that can be an FMA. This led the company to gain credibility, and the CET service became profitable after acquiring 10 clients. Other fleet management system providers indeed provide fleet management system services. However, they did not start providing fleet management service or any other mobility services using EVs. The author concludes that, in the CET market, LUT still had a chance to build an FMA by further increasing geographical coverage and the number of clients in each city.

#### *d) Development and replication (July 2018 – December 2019)*

##### ■ *Business turning profitable*

During this phase, about three years since its foundation, LUT succeeded in making its business profitable. According to the accountant, the principal reason is the increase of client number (more than 10 clients) in Bangalore. It implies that new entrants may also have difficulties in making their businesses profitable as making clients or finding a certain number of operating vehicles take time. The author evaluates that LUT established an FMA: LUT started operating profitably, and the author estimates that it increased the attractiveness of the company for talented human resources and for potential investors.

##### ■ *Further geographic expansion*

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LUT further expanded its geographic coverage: Pune and Mumbai. The author assesses that it enhanced the presence of the company on the Indian market by covering more cities. Until this stage, no competitor had emerged: at least, no company was providing CET service with an EV fleet. The author assesses that if the company starts providing its service to more than 10 clients in several major Indian cities prior to its competitors doing so, that can be an FMA. The author here evaluates that the company is one step before establishing an FMA.

Three years since the foundation of the company and the beginning of the operation, no direct competitors have yet emerged. The author points out two reasons for this. First, the service fee for an EV fleet cannot be made significantly cheaper than the fee for an ICE fleet, despite additional efforts required to provide the service with EV fleets. This probably makes other player refrain from entering the market with EV fleets since only clients with environmental aspirations are interested in the value proposition. Secondly, concerning the first reason, the clients need to engage into preparing several conditions for the service to be provided. The clients need to spare a space for charging stations in their parking. They also need to adapt to the schedule management for EV fleets: the trip schedule needs to be submitted every week in advance. These required engagements increase the switching cost of the service, and it can be a reason for potential clients not to choose EV-based service; therefore, no direct competitors emerge.

### *e) Summary (Realisation of first strategic intention)*

At the end of 2019, LUT's managers' (the CEO and a co-founder) main strategic intentions were formulated based on the core idea of "staying a pioneer" in the electric mobility service market. While the managers also mentioned "first-mover advantage", being a first mover and possessing first-mover advantage are two different phenomena. The company made different actions so as to establish FMA. The fact that the company increased its presence on the market in terms of number of clients and of number of operational cities leads the company closer to establishing an FMA; if the company further increases these numbers to a certain threshold, this can be considered as an FMA.

LUT effectively used an existing client's network to expand its business to another city, and it also used pilot projects to improve its value proposition. It was possible thanks to continuous efforts to expand geographical coverage and the number of clients. Moreover, LUT's CET business turned out to be profitable.

The managers mentioned scale economics and copycat measures as a way of establishing an FMA.

■ *Scale economics and geographical extensions*

Putting the managers' intentions aside, LUT increased the number of its clients anyway, and the author associates this with the scale economics of its service. However, an accountant highlighted that under the business model of LUT's CET service, the driver cost constitutes almost the half of the entire cost. Therefore, LUT's cost/revenue model does not necessarily increase the cost performance significantly when the number of clients increases. The author deduces that the effect of scale economics is marginal in LUT's operation, and that scale economics could not necessarily be a strong competitive advantage.

Instead, the author evaluates that the geographical coverage can be an important FMA. Geographical expansion had been considered a way to increase the number of clients. It was a natural choice for the managers and the company since the number of potential clients in Bangalore is limited, and demands for CET service also existed in other Indian cities. LUT achieved expanding its service to several major cities while making its business profitable in Bangalore. The existence of LUT in each major city does not determine competitive advantages: it would not prevent potential new entrants from entering the market in the future.

■ *Copycat measures and pilot projects*

Copycat competitors are competitors that copy the basic idea of the pioneer's business model and erode its advantages (Teece, 2010) by diminishing differentiated features of a product (Linder & Cantrell, 2000) and/or a service. It is therefore important for a company that is in advance in terms of business development to prepare copycat measures.

As a copycat measure, LUT tested newly available EVs so as to be able to improve the performance of the business before other players whenever (and if) possible. Apart from new vehicle-type tests, LUT improved its scheduling system, fleet management system, routing analytics and driver engagement scheme. These small business process improvements and optimizations can be, if they are hard for followers to copy for any reason, considered as FMAs. Indeed, the author found out that the essential component of LUT's business model has not changed since its foundation, and the author has not found any clue about LUT developing entry barriers against potential new entrants. The author concludes that LUT exploited a lot from its position as a first mover and executed various business actions. Some

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lead LUT to establish certain FMAs, but none of them are important enough to prevent direct competition with a potential “deeper-pocket” entrant.

### ■ *Did the company develop or possess any FMA?*

This section analysed if the company has developed any FMA through CET service development. The author assesses that the company did not develop any FMA, while some accumulations of learnings and geographic expansion of the business are observed.

In order to establish FMAs that can be a competitive advantage against new “deep-pocket” entrants, time and learning factors are important: new “deep-pocket” entrants can begin with greater capital and resources than the company, but they cannot overcome time or accumulation of learnings.

As of the end of 2019, the company has reached a pre-step to establishing FMA in geographical coverage of the CET business and in the accumulation of learnings in driver incentive mechanisms and the fleet management system. However, the author concludes that no FMA was fully developed.

The author concludes that the company did not develop any FMA through the business development of CET service. The author, however, cannot simply conclude that the company did not establish any FMA only by analysing the business development of CET service since the company was indeed seeking to achieve service diversification as well. For the managers of the company, this is another way to explore the establishment of FMA, and those two orientations of business development – to expand the geographical coverage of CET service and to diversify its service – were parallel processes.

The company’s declared business strategic intention, since the beginning of 2016, includes the service diversification strategy as well; therefore, the author needs to analyse the tentative of service diversification of the company so as to conclude whether the company has developed any FMA. The following section analyses whether the company has developed FMA or not through service diversification.

### *2) 2<sup>nd</sup> strategic intention: diversifying the service to establish FMA, towards a BMI*

This section analyses the reality and organizational relevance of the company’s declared intention, since the beginning of 2016, to diversify its service. The author interprets the reality and assesses organizational relevance to the company’s declared intention.

The diversification of the service is an important step for the company, since the company envisages to become an “e-mobility service platform”, meaning a company providing a combination of different e-mobility-related services such as logistics, fleet management and driver management and infrastructure such as electricity charging stations and a one-stop on-line system that integrates different functions required for providing e-mobility service(s). The core focus of the research is on Business Model Innovation. Björkdahl & Holmén (2013) defines a Business Model Innovation (BMI) as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace” (Björkdahl & Holmén, 2013, p.215). The author therefore considers that the company was at the preparative stage of a BMI, since the company was envisaging to develop new services and to integrate them to the operations so as to become an “e-mobility service platform”. It should nevertheless be mentioned that the concrete business model of the “e-mobility service platform” was not yet identified by the company as of the end of 2019 (refer to p. 203).

The company intends to achieve a BMI through service diversification, while the managers do not know what the eventual business model of an “e-mobility platform” to achieve is. As it was analysed previously, the company did not establish any FMA through the development of CET service. The company’s intention to diversify its service is also and always linked to the principal intention of establishing an FMA. However, the diversification of the service means developing a new e-mobility or e-mobility-related services; therefore, the characteristics of the establishment of FMA by service diversification are different from FMA establishment within the CET market. Despite the company’s efforts to diversify its service, such by a series of pilot projects, the service diversification was not achieved before the end of 2019. At the end of this analysis, the author will point out that the company does not have an organizational process to accumulate the learnings from pilot projects or other types of new market exploration. The “list of constraints and mitigation actions” that the author will analyse in the next section can be considered a result of the company’s learnings. However, the company did not elaborate learnings on the potential modification of its value network. Also, the company does not organize the learning process on relevant innovation ecosystems, while the market focus for service diversification has a wide range; the learning process is indeed neither comprehensive nor systematic. The author will point out that this process shall be organized so as to achieve a BMI to become a “e-mobility service platform”. This organizational aspect will be analysed in the third analysis (from p.325). The learnings will

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increase exponentially for each city and for each service. The establishment of a competitive learning mechanism on the evolution of relevant innovation ecosystems could have been a solid FMA for the company.

The previous sub-section analysed the development of the CET service that the company currently operates. This sub-section analyses the company's attempt to develop new services apart from CET service. Developing new services in advance to other players is a condition to establish FMA. Since only a few companies provide mobility services with EVs in Indian cities, the diversification of the services of the company is an opportunity to establish FMA. The company's intention of service diversification essentially comes from its superior target: identifying a new business model that integrates different types of mobility services. The ultimate goal of developing such new business model for LUT is, according to the managers (CEO and co-founder), to become a "mobility service platform" one day.

What is service diversification and what is a "mobility service platform" for LUT? Based on the interviews, the diversification signifies market development **beyond** (= out of) the CET market. It should nevertheless be pointed out that it is true that the service diversification **within the** CET market and **beyond** the CET market is not clearly dividable. For example, EV charging infrastructure can be developed for the benefit of LUT's CET service development, and at the same time, LUT can use the same infrastructure to provide EV charging services to other EV users (commercial and individual uses). The managers mentioned that LUT can be a "mobility service platform" for different mobility services. A mobility service platform here means, according to the managers, a company that provides different and diverse types of mobility services in a city. By doing so, the managers believe that any company (or institution) willing to get any mobility service can contact the "platform" to receive a desired mobility service. Of course, the managers' intention is to develop diverse mobility services using EVs or other types of environmentally-friendly means of transport. A mobility service platform can optimise the investment on charging infrastructure and the fleet management system since they are common components to offer EV-based mobility services. The reader must remain aware that there are ambiguities in their explanation of a "platform"; this is due to the fact that the managers do not have a clear and concrete business model yet. "Becoming a mobility service platform" is primitive phrasing adopted by the managers as the ultimate target of business model innovation.

Service diversification is linked to the establishment of FMA. For example, the deployment of charging infrastructure by providing an EV charging service can be an FMA since the same

charging infrastructure can be used for other e-mobility services that the company provides. The service diversification is a critical strategic intention that exists between the establishment of FMA and becoming an “e-mobility service platform”: achieving BMI. The company intends to diversify its service while expanding its original service: CET service.

The fact is that with this intention, the company tested several available EVs, but it has not reached to diversify the service<sup>70</sup>. Why? The first explanation can be because there is no such demand. The second explanation can be that the company was not able to identify a business model suitable to answer potential demands. The author assesses that the pilot projects executed by the company have not been elaborated enough to evaluate potential business models of new services: the company could only test the performance of new EVs and not business models, since the company did not work together with potential clients (demand side) to develop pilot projects so far. In order to move forward to service diversification, the company rather needs to better communicate with potential clients as well as EV manufacturers (supply side).

The company executed pilot projects five times. The last two projects were on-going projects as of the end of 2019. This part analyses and evaluates the three previous projects that have already been completed.

The first pilot project was with Renault India, the second pilot project was with Kinetic energy (a three-wheeler assembler) and the third pilot was with Mahindra-Reva.

The first pilot project was with Renault India and tested an EV model: Zoe. The company was envisaging to use Zoe as fleets of CET service as well as to develop an Airport taxi service with Zoe, since it has longer battery autonomy. The company negotiated with Renault India and succeeded to test Zoe while this model was not yet available on Indian market. From the very beginning, the price of the vehicle had been a bottleneck for the company to purchase this EV model in order to develop a new business (or to integrate it to an existing CET service.)

During the test, some communication with potential clients was done, though no concrete action was taken to initiate an Airport taxi service. The price of the vehicle hindered the company in concretising the service for realisation.

This situation was the same for the third pilot project. A new EV model, eVerito, was tested, envisaging to develop an Airport taxi service and/or integrating it to an existing CET service.

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<sup>70</sup> Diversify services: develop new types of services (airport taxis, taxis between cities). Other uses of electric vehicles therefore by extension need to use new vehicles (larger for buses, cargo for deliveries of goods).



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This EV model was integrated into the CET service of the company. However, no new mobility service was developed using this EV model.

The second pilot project was with Kinetic Energy. LUT tested two types of three-wheel EVs: one passenger three-wheeler car and one cargo three-wheeler car. This pilot project had a potential client behind these projects: a foreign delivery service provider. LUT negotiated with the potential client to execute this pilot project with a concrete routing plan so as to evaluate the profitability. Eventually, the foreign delivery service provider did not collaborate with LUT for this pilot project.

Through these three pilot projects, LUT developed a certain type of relationship with EV manufacturers (supply side), but LUT did not execute any pilot project with service recipients (demand side). Hence, the company could present its attractiveness as a major potential buyer of EVs while the company could not present its value propositions as a mobility service provider to service recipients through these pilot projects. LUT outsourced the fleet management system development, and it does not have a capability to develop a flexible fleet management system adapted to delivery service. The author assesses that this fact also makes the company less attractive to potential service recipients: just replacing ICE vehicles with EVs is not enough as a novel service<sup>71</sup>. As a result, as of the end of 2019, no additional mobility service had been developed by the company apart from the CET service. No BMI was observed either. This aspect of BMI will be further discussed later.

As examples of service diversification, already in 2016, “airport taxi”, “bus”, “delivery service” and “intercity transport” were mentioned as potential service diversification by the managers. The CEO said that LUT was ready to start different mobility services with EVs once it became economically reasonable for them to operate as a business.

However, such a new business development has not been simple. A critical factor regarding vehicles availability is the absence of suitable EVs available for commercial uses in terms of form, specification and robustness. This remains an important factor in the list of constraints and mitigation actions obtained in 2018: vehicle availability. For example, there were no available EV buses or EV trucks in 2016, as available EVs on the Indian market were not suitable to operate a bus or an EV cargo service, mainly because the form of the vehicles was not for commercial use. In terms of specification, the autonomy of mileage per charge is not

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<sup>71</sup> There was still a company that asked LUT to continue using paper-based trip sheet (c.f. Chapter 5). It should be reminded that one of value propositions of LUT was the digitalisation of trip management while, according to the autor, the trip management system is not attractive enough for certain (potential) clients.

sufficient either to develop inter-city taxi. In terms of robustness, though LUT was using it for its operation, LUT was not satisfied with the existing EV models, which are not designed for a commercial use.

Renault's Zoe and Mahindra-Reva's eVerito were not suitable for a new service development due to price issue and battery autonomy issue. Kinetic Energy's three-wheeler EVs were not suitable for a new service development due to weak pick-up power and insufficient operability. As consequence, LUT could not even assess a primitive business model for a new service development.

While the company did not diversify its service, did the company develop any FMA?

The applications of EVs in domains such as airport taxi, delivery service or bus operation were not thought through with a concrete idea of a potential business model. This section analyses how the company preceded the efforts of service diversification mainly through a series of pilot projects. Eventually, the company did not diversify its service or establish an FMA through these pilot projects, but the author assesses that those projects gave the managers important knowledge and experiences to formulate a list of constraints and mitigation actions.

Below is the chronological analysis on the company's efforts to diversify its service.

Based on interviews with the managers, the diversification of the service was strongly related to the "stay a pioneer" intention. This section analyses to what extent LUT achieved its strategic intentions of establishing FMA against potential competitors that tried to develop mobility services that use EVs and EV-related services.

As of December 2019, LUT started bus and charging projects on a pilot basis. LUT is one of the first private companies to initiate these projects: some public initiatives exist for both services (e.g., BESCO's EV charging infrastructure project). Like this, the strategic intention was half-way achieved while the company's business model, especially in terms of main revenue source, was not affected; since the company has not yet established synergy among these projects and CET services, the initiation of these projects does not signify that the company established FMA.

Here, the author reviews LUT's efforts and achievements for service diversification, and evaluate its FMA at each phase of business development.

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### *a) Development and exploration (May 2016 – June 2018)*

The first trial of LUT's service diversification during development and exploration phase was a pilot project using Renault's EV, ZOE.

#### ■ *Test pilot project 1: Renault's ZOE*

LUT negotiated with Renault India to test an EV model ZOE that was then not available in India. It was the first commercial user to test the car in this country, prior to other mobility players as it was the only one operating EVs for commercial purpose in India. The author considers that LUT benefitted from its vantage point. The main focus of LUT was to use ZOE for an airport taxi service to diversify its service. Finally, LUT decided not to go further. It did not start using ZOE for its operation nor start a new service, especially due to the vehicle's price, including import tax. Starting an airport taxi operation with ZOE did not match the profitable business criterion: the balance between operation cost and service fee. ZOE was too expensive for an airport taxi service in Bangalore<sup>72</sup>. On the other hand, the author observed the hesitation of Renault India as well against the use of a new EV model as a taxi fleet. The author heard a concern from the side of the manufacturer that the brand image of the new EV can be tarnished due to the taxi use: the local consumers may perceive EVs as banal and ordinary cars. Moreover, the manufacturer was not willing to decrease the price for the same reason. Still LUT negotiated patiently with the manufacturer to start manufacturing the EV model in India. The manufacturer, however, did not react positively to the demand since the estimated number of sales for the first few years is less to start locally manufacturing the EV model. Nonetheless, the author deduces that LUT could obtain this privileged opportunity to test a foreign EV prior to other players, because LUT was the first mover in the market. LUT aimed at conveying a message to an OEM about commercial needs toward EVs. It was mentioned in LUT's list of constraints and mitigation actions though, that Renault India does not have any EV manufacture plans for commercial use so far.

### *b) Development and replication (July 2018 – December 2019)*

#### ■ *Test pilot project 2: Kinetic Green's e-rickshaw*

LUT tried to initiate a logistics service for a delivery service provider with e-rickshaws. On this occasion, LUT tested e-rickshaws for both passengers and cargo. Through this pilot project, LUT found that the lack of routing data is crucial to assess the feasibility and profitability of

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<sup>72</sup> LUT was in operation only in Bangalore at the time of the pilot project.

logistics service: LUT was in negotiation with a delivery service provider, but it could not assess business feasibility due to the lack of data required to predict potential usage of fleets. The author did not observe any concrete use of this learning for the next steps of business development though it is true that the company did not immediately seek to explore developing delivery services. LUT at the same time learnt that the pick-up of e-rickshaws is too weak to deliver heavy goods all over the city; in fact, e-rickshaws had difficulties in passing some flyovers in the city. The author evaluates that these leanings can be counted as valuable knowledge for LUT for the further development of new services. However, this pilot project did not serve to develop any FMA.

It is difficult to design a business model for a "volatile demand" mobility service presently since it is less efficient to use EVs than ICEs for such a type of mobility service. Another difficulty is that LUT needs to communicate potential service recipients while LUT cannot be fully involved in vehicle designing.

The latter difficulty is the key for "ecosystem leadership". There are currently only a few EV manufacturers in the innovation ecosystem of e-mobility services and the choice of the EV model is extremely limited. Service recipients are also less in number and less information is available on demand for e-mobility service. In this situation, "selling vehicle" is the main duty of car manufacturers, and they do not communicate with service recipients of mobility services. Mobility service provider is in the middle of those two actors: the producer and the final value recipient of the product. LUT's position in the innovation ecosystem is ideal to facilitate the communication between those two actors or to mediate exchanges of information on demand in EV design and specification, for example. The possibility of service diversification increases if LUT can perform this role well as that of the mediator.

The author claims that ecosystem leadership can be a capability of a company that facilitates information exchange on existing and potential ecosystem constraints so as to make changes in the value network of the relevant innovation ecosystems. This has great value when these changes enable the company to create new business opportunity.

The author claims that the ecosystem leadership has a significance when the innovation ecosystem is at a "scattered phase": a phase where the number of actors is not enough and the demand towards the relevant product/service is not clear enough to start a new business. The author names the company that expresses its ecosystem leadership as a "phase transition mediator".

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By the end of 2019, LUT was not yet a phase transition mediator since, though the company tries to express its ecosystem leadership capability, it had not succeeded in making any favourable change to develop a new service.

### ■ *Test pilot project 3: Mahindra-Electric's eVerito*

LUT negotiated with Mahindra-Electric to test an EV model eVerito: a sedan-type EV new to the Indian market in terms of its form as an EV. The pilot project with eVerito led LUT to improve the existing CET service: fleets of eVerito were integrated to the service after the completion of the pilot project. However, the project did not lead LUT to develop a new service: the integration of a new model of EV did not impact the existing business model since it was a mere upgradation of the fleet in size and nothing more. LUT was envisaging to develop an airport taxi service for example, but this project was not successful.

This pilot project is a clear example that shows the indivisibility of two orientations of business developments: CET market development and service diversification. The managers were expecting to use this EV model to develop a new service for a new market, like an airport taxi service. The company ended up applying the model to the existing CET service operation. The pilot project shows that it is sometimes impossible to clearly distinguish in advance whether a business activity contributes to merely develop an existing business, or whether it leads to change the business model of the company by creating a new service.

### ■ *Test pilot project 4 and 5: Electric BUS and charging infrastructure*

Pilot project 4 and pilot project 5 were still on-going project. These projects were both executed in Delhi and somehow interrelated. Electric bus projects were done by other actors, such as public bus companies, prior to LUT. Also, deployment of EV charging infrastructure was done by other actors such as public electricity distribution companies and an e-scooter manufacturer. In this regard, LUT is not a first-mover. However, as a mobility service company, LUT is the first-mover operating more than two different projects related to an electric mobility service. In this regard, LUT is still the first-mover in diversifying its service, though it has not yet monetised any of service apart from the CET service.

LUT is still far from its eventual goal of becoming an “e-mobility service platform”. LUT only provides a CET service, while and other services are under development (or still at pilot project level): only the CET service operates as monetised service.

*c) Summary (Realisation of 2<sup>nd</sup> strategic intention)*

The company tested several EV models so as to seek new service development that could eventually lead the company to becoming an “e-mobility service platform”. The author considers that these tests can be a pre-step of a company towards achieving a BMI. LUT conducted these pilot projects while operating an existing CET service and tried to establish a FMA. LUT did not achieve service diversification, though the company succeeded in conducting pilot projects and running tests with new EVs. Three previous pilot projects have been completed, but none of them connect to the next level pilot project or to new service development. LUT could execute these pilot projects by collaborating with EV manufacturers in the innovation ecosystem of EVs relatively easily, since the company is the first mover and a unique mobility service provider. The company obtained certain learnings such as the importance of routing data and the importance of vehicle design and specifications for future service development. The three pilot projects were not successful in the sense that they were not followed by an updated second generation of pilots or scaled-up pilots. However, it is nevertheless true that the company obtained certain learnings from these projects.

These learnings are eventually reflected in the list of constraints and mitigation actions that the following section analyses.

Otherwise, the company lately started two new pilot projects envisaging business model innovation. These latter two pilot projects are different from the previous three pilot projects. The electric bus project is a public initiative, and a concrete client exists for the pilot project, which was not the case for the previous three projects. The charging infrastructure project is not a mobility service project, but rather an e-mobility-related service. An advantage of executing an e-mobility-related service is that the company can potentially combine it with other mobility services and establish a synergy. Since it is a new type of project apart from mobility services, the company can expect to obtain a new type of learnings.

Did LUT develop FMA through these projects, and what are the results of these pilot projects?

The author did not observe any FMA developed through the activities of service diversification. As is mentioned above, the list of constraints and mitigation actions is formulated during this process, though the author points out that it is not an organized process of information collection.

In LUT, as of the end of 2019, there was no team or initiative dedicated to developing a new business model for service development. In 2016, the managers of LUT mentioned the

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development of different mobility services such as buses, intra-city taxis and airport taxis. However, the author found out that the assessment on the demands towards new mobility services is not organized. It is true that this can be a managerial feedback process even without a dedicated team. The author's point is that LUT's focus for new service development has a wide range and is multiple: the combination of the choice of vehicle, service and city varies. Without certain types of organizational process, even without a dedicated team, the knowledge management on the relevant innovation ecosystems shall be exponentially difficult. This shall be so especially if the managers use the list of constraints and mitigation actions for the future business development, as they currently do. Only correct information on the relevant ecosystems leads the managers to form an appropriate list of constraints and mitigation actions.

The goal of the company was to diversify its service by developing new markets with new services. Since the company aims at becoming an "e-mobility platform" that has "a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace (Björkdahl & Holmén, 2013, p.215)", the author considers that the company aims at achieving a BMI by service diversification. However, the company could not find a sustainable business model, as of the end of 2019, for a new mobility or mobility-related service.

The company tried several pilot projects with EV manufacturers to develop new mobility services, where the market focus in large, but it could not identify an appropriate business model. The learnings from the pilot projects lead the managers to formulate the list of constraints and mitigation actions, but the author points out that the learning process can be organised in such a way as to be comprehensive and systematic. In any case, the company did not develop an FMA through the business activities for service diversification. The company could not reach sufficient advancement to reflect upon a potential value network for future business development through pilot projects.

### ■ *New market exploration: service development and test pilot projects (test running)*

LUT has tested four models of EVs (including two models of three-wheeler EVs) by 2018. One of them (Mahindra-Electric's eVerito) was integrated to the existing service. LUT identified a

client for EV<sup>73</sup>-based delivery services, but the lack of daily routing data of the client and the lack of pulling force hindered the company from starting this new service.

LUT tested different EV models prior to other potential competitors. The author found out that pilot projects are the principal means for LUT to assess new EVs for commercial use. LUT uses pilot projects to identify potential clients as well. However, LUT was not able to use pilot projects to identify a new business model for a new mobility service: LUT was not capable of executing proof-of-concept projects for a new business model with a potential client. The author deduced that this is due to the fact that the company communicated more with EV manufacturers and less with potential clients for pilot projects. If the company could play an intermediate role between those two actors, the company could have evaluated the feasibility of business based on a concrete business model. The author points out that communication with potential clients is an important factor to assess or identify a new business model.

In order to convince potential EV manufacturers about the demands towards commercial use of EVs, the author deduces that pilot projects should involve both potential EV manufacturers and potential clients. As a first mover, the company tried to establish an FMA by diversifying service prior to other players. The author evaluates that the company could better communicate with potential clients and business partners by expressing a capability of ecosystem leadership such as ecosystem governance, forging partnerships, platform management and value management (Dedehayir, Mäkinen, & Roland Ortt, 2018). The company faced different constraints in developing new services that will be analysed in the next analysis, and those constraints hindered the company from taking action towards a BMI.

■ *New market exploration: service development and governmental calls for projects*

At the end of 2019, through the latest on-going pilot projects of electric buses and EV charging infrastructure, LUT was communicating with governmental initiatives that are potential clients. The author evaluates that the effort in the last phase is positive since the company is now collaborating with a demand-side actor for pilot projects. The author deduces that LUT will be able to have access to potential business opportunities through the channels developed during these projects.

As of the end of 2019, LUT has not diversified its service as a profitable business. The author concludes that, in order to diversify its service, more pilot projects involving potential clients

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<sup>73</sup> E-rickshaw cargo.



(demand side) shall be done rather than merely collaborating with EV manufacturers and testing new EV models.

On top of that, the pilot projects were limited to verification of vehicle standards for business use, and the company did not verify business models that take a revenue model into consideration. The company tried to involve a potential client (delivery service provider) in a pilot project, but it was abandoned due to the lack of data and incompatibility of the vehicle. Those constraints that prevent the company from diversifying its service will be analysed in the next analysis. Those are the constraints that exist in the innovation ecosystem of e-mobility services and in the innovation ecosystem of EVs; the incompatibility of the vehicle cannot be solved merely by the effort of the company itself. The third analysis will point out that dedicated capabilities shall be developed so as to achieve a service diversification that will lead the company to innovate its business model.

No FMA has been built through the efforts of service diversification, while certain learnings were obtained through pilot projects. The author highlights the importance of the involvement of potential customers in pilot projects and in the effort of service diversification. The latest two on-going pilot projects involve "potential customers". These projects may lead the company to identify a new market for a new service.

The research confirms that continuous pilot projects are conducted by the company that is, according to the author, at the preparative stage of a BMI, while the ability to learn is not explicitly observed.

### ***3) 3<sup>rd</sup> strategic intention: developing brand and create client club***

The third analysis is on the third declared strategic intention of the company: developing brand and creating a client club. During the field observation, the company did not make concrete progress on this area, while the co-founder emphasised the importance of it for the establishment of FMA and for service diversification. Though it is difficult to evaluate the development of these two aspects due to the lack of evidence, the author still tries to analyse them from the perspective of the establishment of FMA and service diversification since brand establishment is an important managerial issue within management studies especially in marketing studies.

As is analysed above, the company was aiming at developing business by the expansion of its current business and by the diversification of service. These are the first and second strategic

intentions. The third strategic intention is about branding and the creation of a client club. The establishment of LUT as a brand is consistent with declared strategic intentions mentioned above. The intention behind it is to become a “platform of e-mobility services” by offering different types of mobility services with environmentally friendly means of transport. To achieve this, the managers consider branding and the creation of a client club to be important. The author considers that the branding for the company was led in order to establish a competitive advantage with a strong brand image, while the creation of a client club was meant to explore different business opportunities for service diversification through existing channels of the clients’ business network. Therefore, this intention to develop the brand and to create a client club is linked to both the establishment of FMA/CA and the target to become an “e-mobility service platform” (and therefore linked to the achievement of a BMI).

First, LUT aimed at establishing a brand. This was eventually to establish a solid brand image as a “e-mobility service platform” that is the eventual goal of its business development. In order to establish a brand image as a service platform, it was important for the company to diversify the service and not stay long as a mere CET service provider.

During the development and replication phase, while the company struggled to diversify its service despite its efforts, the managers came up with another idea of “formulation of a client club” that is closely linked to branding but different. The “client club” for the managers is a way of identifying potential demands towards electric mobility services through the value network of its clients. For example, the co-founder explained that the company can provide CET service for employees of a shopping mall. After establishing a credit with the shopping mall as a client, LUT can start providing a new mobility service for the visitors of the shopping mall. Another example is a hospital as a client of CET service. LUT can provide its CET service to the hospital and then later, it can start a taxi service for the patients, their families and friends, for example. This is the core idea of the managers’ “client club” that aims at diversifying service through the value network of CET service. A client club can function as a small panel to develop a new business idea accordingly. The company has not yet decided the form of the club, and the creation of the client club is still at the intention stage.

Though the company has achieved several important steps to establish branding and to formulate a client club, the author concludes that the company did not establish any FMA through these efforts.

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Below is chronological analysis of key business actions and achievements for branding and the client club. The author evaluates that the company has taken basic actions; however, still more effort to exploit the primary elements is necessary.

Based on the interviews with LUT's managers in 2016, becoming a mobility service platform was one of possible directions of LUT's business development. For that, LUT was considering to offer different mobility services under the same brand.

In late 2017, the co-founder mentioned the creation of a client club as a way of diversifying service and to geographically expand services. The idea was to use clients' business network as a channel to achieve service diversification and geographical expansion of the business. For these reasons, LUT intends to establish its brand.<sup>74</sup>

The concept of Mobility as a Service (MaaS) emerged as an important concept in mobility sector, related to the idea of LUT becoming an "e-mobility service platform". The managers repeatedly mentioned the idea that LUT would become a mobility service company providing multiple services as a platform. The author therefore considers that the establishment of branding and the creation of a client club are an important step to service diversification that could potentially lead BMI to happen. For LUT to establish a brand in the EV-based mobility sector, it is important to be clear about the brand image that the company aims to display. Then, this concrete message can be diffused inside and outside of the organization. Currently, some local people in Bangalore wrongly recognise "Lithium" as an EV model brand or an EV manufacturer brand. This does not mean that LUT has already established a brand as an EV-based mobility service provider since LUT is not envisaging to become an EV manufacturer. A brand image as an e-mobility service provider should be correctly recognised so as to attract target clients. For the efficient establishment of the brand, communication tools such as mobile applications and online platforms, or even branded products such as EV chargers can be developed so as to strengthen its brand as an e-mobility service provider.

While the brand establishment was recognised as important, no proactive action was taken by the company to establish a brand image as an e-mobility service provider by the end of 2019. Since 2015, LUT was not able to establish its brand image. After two years, during the development and exploration phase in 2017, LUT seized an opportunity to start providing CET service to an Adobe branch in Delhi. This is a successful example of LUT expanding its geographical coverage of the business through the existing client network. The managers

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<sup>74</sup> Establishing LUT as a brand & Creation of a client club: building a close relationship with clients

started thinking about the formulation of a client club around this period: the development and exploration phase. The declared intention of the formulation of the client club is to diversify the service among its clients or through the client network by identifying unseen needs of clients. This is a typical relationship marketing approach that “allows service providers to become more knowledgeable about the customer's requirements and needs. Knowledge of the customer combined with social rapport built over a series of service encounters facilitate the tailoring or customizing of service to the customer's specifications (Berry, 1995).”

The idea of forming a client club was to achieve the sequential service diversification through the existing client base. It is considered as one of the possible ways to explore the diversification of LUT's business. This point was first mentioned in November 2017, a period during which the business development of LUT had stabilised. At that time, two pilot projects with potential for the business' development had been completed, whereas the electric bus project and EV charging infrastructure project were not yet concretised. The creation of a client club was thus a means to seek new business opportunities. It was not necessarily a way of escaping from the brand establishment failure, but the author considers that it was rather a learning experience: the necessity of brand establishment is relatively low since LUT is a B2B service provider. According to the author, the managers found the relationship marketing approach more suitable for the service development of the company since service diversification is a preamble condition to establishing a brand as an “e-mobility service platform”.

In order to facilitate the exploration of new business opportunity within its client network, LUT needs to enforce communication with its existing and potential clients. At the same time, a client club has to be beneficial for clients themselves. What advantages can LUT offer to the (potential) clients? Further market research should be done to figure this out.

The author chronologically reviews LUT's efforts and achievements for brand establishment and creation of a client club, and evaluates its FMA at each phase of business development.

*a) Initiation phase (2014 October – 2015 April)*

At the time of the initiation phase, since LUT had the intention to develop its business beyond CET service, the founders decided that the name of the company would be “Lithium Urban Technologies,” indicating that it's not only a mobility company. “Lithium” comes from Lithium-ion batteries that are used as batteries for EVs. Since LUT was the first company to

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start CET service with EVs, it had the advantage of choosing the company's name as freely as it wished as far as it did not match any other company's name in other industries. The author assesses that it was an exploitation of FMA.

### *b) Establishment phase (May 2015 – April 2016)*

LUT recognised that some people call the model of EV used for LUT's service a "Lithium car". The managers expected that the designation of "Lithium car" could be a designation of EV fleets in general; moreover, they expected that mobility service providers could possess superiority against OEMs in terms of designing EVs for commercial use. During this period, LUT enforced its belief that the branding image was important, along with the further development of its business.

### *c) Development and exploration (May 2016 – June 2018)*

LUT expanded its business to Delhi thanks to one of its clients, Adobe. This can be one of the reasons for which the managers noticed the importance of clients' network.

Around this time, the managers started to mention the formation of a client club. This is because of their experience with a client in Bangalore that helped the company expand its service to Delhi. The client in Bangalore was satisfied with the service and asked the company to provide the same service in Delhi for a branch office of the client company. The author does not have information detailing if there was a proposition from LUT's side or from the client side. After some time, the company decided to carry out a pilot project (with the client) in Delhi, provisioning to start providing the official service later.

The author deduces that this entire experience gave the managers an opportunity to start thinking about the formation of a client club and to identify new business opportunities for service diversification within the value network of existing clients. LUT welcomed a new talent and at the same time improved its brand image by welcoming one of the leaders of EV innovation ecosystems in India. LUT won an award and improved its brand image as well during this period. It was possible to win the award because LUT was the first company offering a service with EVs that is environmentally friendly, and this is a form of exploitation of its FMA.

*d) Development and replication (July 2018 – December 2019)*

LUT managed to expand its geographical coverage using an existing client's network. This was the case for Adobe, although there is not yet a client club. If the number of such cases increases, it will function like a client club.

During this phase, while the company struggled to diversify its services despite its efforts, the managers came up with another idea of “formulation of a client club” that is closely linked to branding but different. The “client club” for the managers is a way of identifying potential demands towards electric mobility service through the value network of its clients. For example, the co-founder explained that the company could provide CET service for the employees of a shopping mall. After establishing a credit with the shopping mall as a client, LUT can start providing a new mobility service for the visitors of the shopping mall. Another example is a hospital as a client of CET service. LUT can provide its CET service to the hospital and then later, it can start a taxi service for the patients and their families and friends, for example. This is the core idea of the managers’ “client club” that aims at diversifying service through the value network of CET service. A client club can function like a small panel to develop a new business idea accordingly. The company has not yet decided the form of the club, and the creation of a client club is still at the intention stage. The current state stays a **relationship marketing reference**.

*e) Summary (Realisation of the 3<sup>rd</sup> strategic intention)*

■ *Mobilising existing client network (Successful example of Adobe) and obtention of award*

LUT succeeded in mobilizing its client network to expand its business to another city. In this way, LUT can mobilize its client network to explore new service development. Though LUT has not formulated a client club as such as of December 2019, there is good potential for LUT to formulate one to identify new demands for mobility services.

India Smart Grid Forum Award 2018.

The obtention of such an award improves the brand image of LUT. LUT succeeded in identifying a business opportunity through client network. LUT can develop its capacity to collect further information on market opportunities through the client network.

There are positive elements in branding and the creation of a client club. To what extent is LUT capable of mobilising those elements efficiently? To answer this question, internal organization will be an important focus for LUT and its managers. In particular, from an

organizational perspective, there is no communication plan that handles online communication, customer relationships, services, and the "vision" of the company in an integrated manner, and there is no such department. As an organization, as is pointed out in service diversification, the market focus is so broad that they need to be treated in an integrated manner, which should be organized as an organization or as a solid process.

#### *4) Conclusion (Analysis 1: three strategic intentions and realisation gaps)*

The three strategic intentions of LUT are clear, and the company has executed actions to achieve these intentions: in order to establish FMAs, LUT kept trying to solve cutting-edge constraints of the electric mobility service ecosystem.

Through the development of business so far, though LUT's trials and executions had various results, the company established no FMA that the managers intend to develop.

It is true that the company took advantage of being a first mover<sup>75</sup>. The company developed the business steadily in Bangalore, and it started replicating the CET service to other major Indian cities. This fact helps the company establish credibility in its operation. However, the author assesses that the geographical expansion has not yet reached the point where this asset can be an FMA since the business development in new cities is still under development.

The company exploited the fact that it is a first mover and made efforts to establish FMA through geographical expansion, service diversification or branding, but none of these aspects established a concrete FMA.

At the core of the analysis, it is certain that the company accomplished a lot before other players, and it is certain that the company learned ahead of others. However, no concrete accumulation of knowledge was manifested. Certainly, the driver's incentive scheme, for example, is in place, but it is still too weak to be an FMA. The actions taken as a first mover are not connected to FMA. For example, the improvement of its fleet management system envisaging its future business development and/or the optimisation of the organization of the learning mechanism (organization of internal communication process, for example) on the innovation ecosystem innovation could have been an important asset if it had been properly done. Many actions as a first mover could have become valuable assets if the learnings had been better accumulated.

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<sup>75</sup> Being a first mover is not equal to possessing a FMA. Advantage as a first mover is not FMA since FMA is defined as a sort of competitive advantage.

The list of constraints and mitigation actions formulated by the managers can be considered the result of learning and a concrete asset. In the next analysis, the author analyses the contents of this list, which is the result of three years of business development and opportunity exploration efforts (while looking ahead to future business development).

The focus of analysis is on the establishment of FMA (as well as on the competitive advantage<sup>76</sup>) and on the service diversification: an important step towards a business model innovation.

The analysis of the list is followed by another analysis on the organization that is important for capability development, which is one of the concrete assets that can become a FMA / Competitive Advantage (CA).

## *II) Analysis (2) Planification gap: Gaps in “the list of constraints and mitigation actions”*

The previous analysis revealed that the company eventually did not develop any FMA despite its various and continuous efforts. Still, some components such as a driver incentive mechanism matured with a certain learning curve over time. The highest-level learnings by the managers resulted in the formulation of the list of “Constraints and Mitigation Actions (C&MA)”: it was developed after three years of business activity reflecting the learnings of the managers. This section analyses the list of C&MA so as to understand how the managers plan to deal with the issues regarding its service diversification and accomplishment of BMI.

The list of C&MA is composed by a series of constraints and mitigation actions corresponding to each constraint. The listed constraints by the managers are classified into seven categories (see Table 22). Refer to Appendix 4 for detailed information about the contents of the list.

The words and phrases in double quotation are citations from LUT’s document. The reader must be aware that some “constraints” (= challenges) mentioned by managers are not constraints and should be considered as mere factors or parameters.

Here the author analyses each subject of constraints and assess its impact on FMA and BMI. As concluded in the previous section, the trials and errors of the company aiming at establishing FMA and achieving BMI are the company’s claimed top priority. However, the

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<sup>76</sup> Note that a special case of competitive advantage that depends on time aspect is an FMA. Since the analysis of the next section also deals with organizational aspect of the company, sticking to a narrow concept of competitive advantage does not reflect reality: internal competitive advantage does not necessarily benefit largely from the fact that the company is a first-mover. The author is aware that the managers of the company keep using the word “First-Mover’s Advantage” but the paper expand to the analysis to the competitive advantage from here so as to better adapt to the reality of the business activity.



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market focus for new service development has quite a wide range. Its business development strategy has multiplicity; in fact, its business expansion has two possible dimensions: geographical expansion and service diversification. The service diversification itself has a wide range with multiple target markets (airport taxi, bus, intercity taxi, delivery, charging infrastructure service, for example) and an appropriate identification of business opportunities is critical for the expansion of its business activity. In order to develop such new markets, the company is ready to adapt new vehicles and new technologies. Therefore, business actions that look not only at existing markets or existing customers, but also at the entire innovation ecosystem of EVs and mobility services are required. On top of that, the managers sometimes paraphrase constraints as challenges. The author understood that this implies that there is business opportunity behind the constraints. This suggests that the managers consider those factors as barriers and at the same time as opportunities if the company can circumvent/solve them. With the above-mentioned elements in mind, below is the analysis of the list. Please refer to the appendix for a comprehensive analysis of each of constraint.

In order to achieve the previously mentioned strategic intentions, different constraints—or “challenges”—were listed by the managers. Mitigation actions corresponding to each constraint were also listed (c.f. chapter 5), and are here evaluated. The author identified two types of constraints: **ecosystem constraints** and **business constraints**. Business constraints are constraints specific to the organization, while ecosystem constraints are universal for all other actors. For example, LUT recognizes the availability of vehicles as a key constraint. This is a constraint for all other potential players. To solve it, LUT has worked to push OEMs. Not only did LUT benefit from this effort, but so did every other actor. Another important characteristic of constraints is whether they disappear after the development of innovation ecosystems or remain despite the development of the ecosystem. The author pointed out that the mitigation actions could also be classified into two kinds: **ecosystem-favourable actions** and **business-favourable actions**. If the result of a mitigation action only benefits LUT, this mitigation action can be considered as a business-favourable action. If the result benefits not only LUT but also potential competitors, this mitigation action can be considered as an ecosystem-favourable action. These labels help to better understand the nature of constraints and mitigation actions, as well as to better refine the formulation of mitigation actions.

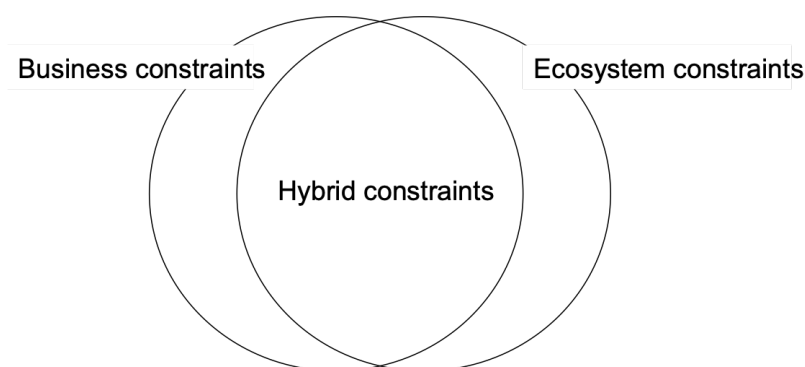
This section analyses the constraints and mitigation actions mentioned by the managers from BMI and FMA/Competitive Advantage (CA) perspectives. From here, the discussion will be

expanded to include competitive advantages as well, which are, in a broad sense, the same as FMAs. Until now, LUT was a First Mover (FM), but the company may lose its position as an FM in the future, and the author judges that "being FM" is not always important in future strategies over the long term. For BMI and the development of FMA/CA, formulation of mitigation actions is essential, more so than the identification of constraints. Therefore, the principal question is how a constraint and its corresponding mitigation actions are well linked and if they contribute to the establishment of FMA/CA. To analyse this, each constraint is analysed with the following perspectives (in Appendix 4)<sup>77</sup>.

### 1. Characteristics of constraints (type, dependencies and persistence)

- What is the **type** of constraint: ecosystem constraint or business constraint\*?
- What parameters influence the status of each constraint?
- Is the constraint **dependent** on other constraints?
- Is the constraint **persistent or transient**?
- **How is the constraint linked to BMI or the development of FMA/CA?**

*\*The constraints can be classified into two different categories: a business constraint is a constraint within the company, and an ecosystem constraint is a constraint within a certain innovation ecosystem. There are also hybrid constraints that are on one hand business constraints and at the same time innovation ecosystem constraints. This will be illustrated in the following section with a concrete example.*



### 2. Mitigation action and its purpose

- What is the mitigation action suggested by the managers?

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<sup>77</sup> The author found that there are two types of "constraints" that LUT lists. The first type is constraints that LUT can solve, mitigate or circumvent by itself. The second type is constraints that LUT CANNOT solve, mitigate or circumvent by itself and that require actions of other actors in the innovation ecosystem. The author labels the first type as business constraints and the second type as ecosystem constraints.

The author also found that there are persistent constraints and transient constraints. This typology is important when discussing the establishment of FMA.

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- What is the purpose behind the mitigation action?
- Does the suggested mitigation action give a new business opportunity?

### 3. Establishment of BMI and FMA/CA

- Does the suggested mitigation action enable the company to achieve BMI?
- Does the suggested mitigation action enable the company to develop FMA/CA?
- What are other possible actions to achieve BMI or to develop FMA/CA?

#### *1) Analysis on the list of constraints*

The author points out that among constraints listed by LUT, there are two types of constraints: business constraints and ecosystem constraints. On top of that, some constraints are directly linked to the establishment of FMA by solving them while others are not. Moreover, there is the time aspect of the constraint: knowing if it is a temporal constraint, whether a persistent constraint or a transient constraint, is important when considering the establishment of FMA.

At the end of this analysis, the author will point out that some constraints are less specific in action due to the wide focus of market development.

Among the constraints listed by LUT, the solutions of “vehicle availability” and “price” constraints are not relevant for FMA establishment, except for “entrepreneurs” and “EV resale value”. By solving constraints in “entrepreneurs”, the company is potentially able to develop FMA since the company can propose to the potential entrepreneurs to work together by offering them existing assets and human networks that can be attractive for them in order to start a new business. The constraints in “EV resale value” are also relevant to the establishment of FMA since the company can spend more time trying different ways to identify the best way to increase the resale value of EVs. The solution of “vehicle availability” and “price” constraints contributes to the diversification of service (and therefore to BMI) since “vehicle availability” determines types of services and “price” determines the fee of the service, for example. Moreover, these constraints impact potential business development of CET service. However, the solution of these constraints depends on the action of OEMs, who are actors in the EV innovation ecosystem. LUT lists a majority of constraints within these two topics since the form and the price of an EV fleet play an important role in its service development. LUT needs to keep addressing these constraints so as to “stay a pioneer”.

Solving some constraints on “power infrastructure” and “service infrastructure” as well can lead LUT to develop FMA and achieve service diversification (therefore attain a BMI).

Expanding the power and service infrastructure can lead the company to start new services, such as providing an EV charging service and an EV maintenance service. If these services are deployed in such a way as to create an FMA, the company can also establish FMAs. Both further business development of CET service and potential development of new services are possible by solving these constraints. LUT lists less constraints on these subjects than “vehicle availability” and “price”. One of the reasons can be because these potential service developments related to power infrastructure and service infrastructure are subsidiary to the mobility service that is the main focus of LUT’s operation. The constraints on “power infrastructure” are transient. It means that LUT needs to make actions prior to other players if the company wishes to establish FMA by solving these constraints. In this sense, LUT can consider the constraints on “service infrastructure” as secondary focuses since they are rather persistent constraints. Therefore, it was a reasonable and rational choice for FMA establishment that LUT started a pilot project on EV charging infrastructure prior to a service infrastructure project.

Constraints on “organization” are business constraints, and these indirectly impact BMI. Solving these constraints can lead LUT to establish FMA in terms of the improvement on internal business process performance. These will influence both CET service development and new service development. A performative internal business process can be a source of CA. The solution of these “organization” constraints can lead the company to establish FMA/CA since the company can create a valuable and inimitable organization with talented human resources as a competitive advantage. This, in turn, can facilitate the company’s ambition to diversify the services. However, LUT lists fewer organizational (= internal) constraints than external factors such as “vehicle availability”, “vehicle price”, “power infrastructure” and “service infrastructure”. In order for LUT to establish a CA and achieve BMI by solving other types of constraints, it would be important for LUT to make an effort to improve its organizational performance.

LUT mentions competition in its list. However, competition is not about solving constraints: competition occurs regardless of constraints<sup>78</sup>. Competition does not concern BMI. Competition is an important managerial issue to consider when establishing an FMA or a CA; FMAs and CAs exist to prepare for potential competition.

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<sup>78</sup> This might be the reason for which managers use the word “challenge” in the place of “constraint”. They use these words interchangeably.

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Table 22 summarizes the characteristics of each constraint. The left column is categorization of constraint labelled by the managers and the second column is the title of each constraint named by the author. (The details of each constraint are described in Chapter 5 – III – B.)

The author analysed these constraints and points out that the constraints can be characterised in four different ways.

Firstly, from an ecosystem perspective, there are internal and external constraints. Among the constraints listed by LUT, there are two types of constraints: business constraints and ecosystem constraints. More precisely, there are, on one hand, the constraints on the value network of the company that the company controls and, on the other hand, the constraints on the innovation ecosystem that the company does not directly control.

There are “constraints” listed by LUT that are not constraints and are rather key factors.

Secondly, there are constraints whose resolution leads to establish an FMA (or CA).

Thirdly, there are constraints that are persistent or transient. Persistent constraints stay constraints or re-emerge repetitively. Transient constraints change over time. Knowing this, temporal factors, whether persistent or transient, are important when considering the establishment of FMA.

Fourthly, there are constraints that hinder the company from developing new services. By solving this type of constraint, the company can develop a new service by exploring new business opportunities, such as service diversification, which could lead to BMI (or not). For potential BMI, considering if solving constraints leads LUT to address new business opportunity is important as well.

Table 22 Characteristics of each constraints

<b>Constraint</b> (Categories in the left column are labelled by the managers; on the right column by the author.)	Is the type of constraint a business constraint or an ecosystem constraint?	Does the solution of the constraint naturally establish FMA/CA?	Does the solution of the constraint open new business opportunity?	Is the constraint persistent or transient?	
<b>A) Availability of vehicle</b>	<b>1. Timing</b>	Ecosystem	No	Yes	Transient
	<b>2. Robustness</b>	Ecosystem	No	Yes	Persistent
	<b>3. Feature</b>	Ecosystem	No	Yes	Persistent
	<b>4. Mode of charging</b>	Ecosystem factor	No	No	Transient
	<b>5. Entrepreneurs</b>	Ecosystem	Yes	Yes	Transient
<b>B) Price of vehicle</b>	<b>1. Price of local EVs</b>	Ecosystem	No	Yes	Persistent
	<b>2. Price of imported EVs</b>	Ecosystem	No	Yes	Persistent
	<b>3. EV resale value</b>	Business/Ecosystem	Yes	Yes	Persistent
<b>C) Power infrastructure</b>	<b>1. Diffusion is limited</b>	Ecosystem	Yes	Yes	Transient
<b>D) Service infrastructure</b>	<b>1. Less geographical coverage</b>	Ecosystem	Yes	Yes	Persistent
	<b>2. Less engineers</b>	Ecosystem	No	No	Persistent
<b>E) Organization</b>	<b>1. Talent supply</b>	Business	Yes	No	Transient
	<b>2. Organizational structure</b>	Business	Yes	No	Transient
	<b>3. Organizational memory</b>	Business	No	No	Persistent
<b>F) Driver engagement</b>	<b>1. Driver recruitment</b>	Business	Yes	No	Persistent
<b>G) Competition</b>	<b>1. Deeper-pocketed competitor</b>	Business	Yes	No	Persistent
	<b>2. OEMs as competitors</b>	Business	Yes	No	Persistent

*a) Is the type of constraint a business constraint or an ecosystem constraint?*

The author identified two types of constraints: **business constraints** and **ecosystem constraints**. Business constraints are organization-specific constraints while ecosystem constraints can be either universal for all other actors or at least concern the competitors of the company. For an example of an ecosystem constraint, LUT recognises the availability of vehicles as a key constraint. This is a constraint for all other actors willing to use EVs as fleet. To solve it, LUT has worked to push OEMs. The results of LUT's efforts will not only benefit LUT but also every other actor, or at least its competitors. Hence, other actors can *free-ride* on LUT's efforts and results. On the other hand, for an example of a business constraint, there is a constraint of "talent supply" listed in the category of "organization" (E-1). This is about securing the supply of talented human resources such as data analysts, ICT engineers and managerial candidates that are important for the business development of the company. This is not necessarily a constraint for other actors. Moreover, LUT's efforts in solving this constraint do not directly benefit other actors. Hence there is no concern for LUT about other actors free-riding the results of LUT's efforts in solving the constraint.

The reader must be aware that there are listed "constraints" that are not constraints and shall rather be considered as key factors. An example is "mode of charging" in "vehicle availability" (A-4). In the list, the managers express that whether battery swapping becomes a major charging mode in the future or not is a mere parameter for the company. Thus, "mode of charging" is not a constraint but a mere factor/parameter. The author deduces that this is because the managers assess that "mode of charging" does not have much impact on the future establishment of CA or on the future service diversification and the potential BMI. Note that this factor can be a constraint for another actor such as a battery manufacturing company. This implies that the consideration of a constraint as an ecosystem constraint or not depends on each company; it should be understood that "ecosystem constraints" analysed in what follows are considered as "ecosystem constraints" from LUT's perspective.

The solution of business constraints has a positive impact on the company, even leading to the improvement of its business performance. On the contrary, for ecosystem constraints, the solution can benefit other actors in the innovation ecosystem including competitors. While the solution of an ecosystem constraint can open new business opportunities to the company, the company needs to pay special attention not to benefit just its competitors that can potentially be dominant in new markets.

The mitigation actions could also be classified into two types: **ecosystem-favourable actions** and **business-favourable actions**. If the result of mitigation action only benefits LUT, this mitigation action can be considered as a business-favourable action. If the result benefits not only LUT but also potential competitors, this mitigation action can be considered an ecosystem-favourable action.

These labels help to better understand the nature of constraints and mitigation actions, as well as to better refine the formulation of mitigation actions.

*b) Does the solution of the constraints naturally establish FMA/CA?*

The previous section points out that there are two types of constraints: business constraints whose solution only benefits the company itself, and ecosystem constraints whose solution benefits other actors as well, including competitors. For the latter type of constraint, competitors can free-ride the efforts of the company in solving the ecosystem constraint.

On top of this, the author points out that the solution of some constraints can lead the company to directly develop an FMA or a CA, while the solution of other constraints does not.

For example, solving constraints in “EV availability” does not lead the company to build any FMA nor CA, but, on the other hand, the company can potentially develop an FMA by solving a constraint of “power infrastructure”. Of course, a solution of the latter type of constraint may not lead the company to develop an FMA or a CA if the corresponding “mitigation action” is not appropriately formulated. While it is important for the managers to identify constraints, the formulation of mitigation action can lead (or not) the company to develop an FMA / CA.

*c) Does the solution of the constraint open new business opportunities?*

The solution of some constraints leads the company to exploit new business opportunities, while others do not contribute to opening new business opportunities. Exploitation of new business opportunities helps the company to diversify its service and accelerates the company’s bid to become an “e-mobility platform”. The solution of some constraints therefore leads the company to innovate its business model.

For example, solving the vehicle availability constraint leads the company to develop a new business with newly available EV models. Since the solution of some constraints leads the company to exploit new business opportunities, the author highlights the importance of prioritisation of different constraints based on how much the solutions of the constraints influence the achievement of strategic intentions, especially that of the service diversification.



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There are two types of constraints that lead the company to exploit business opportunities: constraint concerning the current market and constraints concerning new market development. Solving both constraints is important, though they have different characteristics.

Constraints concerning the current market are characterised as challenges mainly concerning the existing business ecosystem. These constraints can hinder LUT's market development, for example, through geographical expansion. On the other hand, constraints concerning new market developments are characterised as challenges concerning relevant innovation ecosystems. These constraints can hinder LUT's market development through service diversification. In both cases, these types of constraints are critical for the company to become an "e-mobility service platform" and therefore influence the process of BMI.

*d) Is the constraint persistent or transient?*

The temporal aspect can be also taken into consideration. The author points out that constraints can change over time. Some constraints are transient, evolving over time. For example, the specification in "EV availability" is a transient constraint. The state of a constraint evolves over time. Among transient constraints, there are temporal constraints that disappear after a certain period of time. For example, the constraint on the deployment of charging infrastructure is a temporal constraint. Once this constraint is solved, it does not re-emerge as a constraint. The other constraints are persistent constraints that always remain constraints.

The constraints and corresponding mitigation action change according to the business development: both the development of the business ecosystem and the development of relevant innovation ecosystems are concerned. Because of the temporal evolution of constraints, the list of C&MA should be updated regularly, and a dedicated organizational process is required to do so.

The above analysis revealed that the constraints can be classified differently by their characteristics, and the formation of corresponding mitigation actions strategically differs depending on their characteristics.

The number of constraints is expected to increase as long as the company tries to enlarge its business through the combination service diversification and geographical expansion. In order for the company to deal with these constraints while aiming at diversifying service to become

an “e-mobility service platform” (and therefore achieving BMI), the author points out some missing managerial focuses in the list of C&MA.

## *2) Missing managerial focuses in the list of Constraint and Mitigation Action*

Based on this analysis of the characteristics, the author points out in this section three missing managerial focuses in the list of Constraints and Mitigation Actions (C&MA).

### *a) Missing managerial focuses*

**The list of C&MA was missing characteristics of constraints and their prioritization.** Prioritizing constraints by their strategic characteristics is important from a managerial perspective. The analysis shows that there are business constraints for which the solution does not depend on other actors and ecosystem constraints for which the solution depends also on the action of other actors in the relevant innovation ecosystems. Other characteristics of constraints concern their direct contribution to the establishment of FMAs when solved, as well as their direct contribution to the accomplishment of service diversification and their temporal aspect (transient or persistent).

**The organizational aspect was missing** at first in the list when the author received the list from a co-founder. The “organization” category in the list and the constraints under this category were added after a discussion between the co-founder and the author in 2018. After several discussions between the co-founder and the author, new constraints were added to the list regarding talent supply, organizational structure and organizational memory.

In addition, **the formation of corporate structure** can be a business constraint in the list. Since the company envisages diversifying its services, different business units will be regrouped in one organization. In order to manage different services with different business logic, an upper-level managing structure will be required so as to keep an organizational coherence in the company.

### *b) Transforming ecosystem constraints into competitiveness*

The constraints recognized by LUT are of two types: innovation ecosystem-oriented (ecosystem constraints) and business-oriented (business constraints).

#### ■ *Transforming ecosystem constraints into business competency*

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Transforming ecosystem constraints into business competitiveness can be a key concern. Eventually, it is about reflecting on Business Model Innovation. The author assesses that this thought framework helps a company to develop the survivability, “replicability” and “diversifiability” of the service. Through solving constraints, the company can identify or obtain:

- New business opportunities,
- Influence on the ecosystem’s evolution (resistance),
- Different kinds of competency, depending on the nature of the constraint solved.

The last component can be a key focus when formulating the list of C&MA: the managers can prioritize the solution of constraints based on whether that solution brings any competitive advantage to the company.

### *3) Conclusion (Analysis 2)*

This section analysed the list of C&MA formulated by the managers of LUT. The author first revealed that the listed constraints can be characterized differently. Some constraints are time dependent, and the solution of some constraints contributes to the establishment of FMA, for example. In particular, the distinction between business constraints and ecosystem constraints is important: this point was evoked during a discussion with the co-founder and validated by him. Ecosystem constraints are constraints in the innovation ecosystem while business constraints are constraints in the internal value network of the company. This enables the managers to discuss different types of constraints separately so as to formulate corresponding mitigation actions according to the specific nature and characteristics of these constraints; it should nevertheless be noted that there are constraints that concern both innovation ecosystems and internal value networks.

On top of that, the ecosystem constraint has an important characteristic: solving an ecosystem constraint generates a common benefit among ecosystem actors, including competitors. Yet, at the same time, solving ecosystem constraints means that the company is the first company to solve the challenge locally. The author concludes that, because of these two decisive properties, it is critical to create a situation that is advantageous to the own company while solving an ecosystem constraint. Other types of characteristics are:

- Pertinent or temporal,
- On current market or on new market development,

- Directly linked to the development of FMA/CA or not.

The author points out that based on these characteristics, the corresponding mitigation actions should be formulated differently. By understanding the characteristics of each constraint, the listed constraints must be prioritized (or evaluated) by their connection to the new business development, to the establishment of FMA and eventually to become an “e-mobility service platform”, thus achieving BMI. This should help the company to optimally attribute its resources to each mitigation action. As well as the prioritization, the managers need to reflect what kind of business resources should be allocated to each mitigation action while the resources are limited.

In the second part of the analysis, the author points out that there are some missing focuses in the list and the transformation of ecosystem constraints into business competitiveness can be a key concern. This shall further be discussed in chapter 7, in the conclusion and discussion. The author guesses that the number of constraints will increase as the company develops its business.

Because of these factors, the list of C&MA must become more precise. Since the company expects to expand its business through geographical expansion and service diversification, the constraints in the list shall continue to increase and/or change. The business environment shall also continue to change according to the development of relevant innovation ecosystems. The list should therefore be constantly updated so as to formulate appropriate mitigation actions.

In order to deal with the future evolution of the list, the author points out that organizing the process of formulation and reformulation of the list will be an important business challenge. This list can reflect the learnings of past business activities and the learnings on the evolution of relevant innovation ecosystems. A dedicated team or an organizational process that collects the information and updates the list with updated C&MA will have a value. The list can be an important managerial tool so as to eventually achieve a BMI by exploring different market opportunities and seeking to establish FMA and/or CA.

The organizational aspect of the company is an important focus in BMI research. The following analysis focuses more on the organization of the company, namely what changes have been observed and how the company organizationally prepares itself to achieve BMI.

This analysis on the list of C&MA pointed out that the organizational aspect was missing the first time the author received the list from the co-founder. It does not mean that the organizational change aspect is not important for the managers or for the company to achieve BMI. The following section analyses what kind of organizational changes were observed, and the author evaluates what kind of capability development will be required so as to achieve BMI based on the previous two analyses.

### *III) Analysis (3) Organizational gap: Gaps in organisational capability to accomplish a business model innovation*

Analysis (1) analysed the gaps between LUT's business achievement and **the establishment of FMA and the achievement of BMI**. Analysis (2) analysed the gaps between **LUT's list of constraints and mitigation actions** and **the establishment of FMA and the achievement of BMI by service diversification**. This section analyses how the organization of the company has been changed over four years of operation.

So far, from an organizational perspective, the following changes have been observed: drivers' management, for example incentive scheme, has matured, the composition of employees has changed since talents required have changed according to the development of the business, the organizational process has stabilised and enabled the replication.

Geographical expansion and service diversification will continue to be important for the company to become an "e-mobility platform" by achieving BMI. Geographical expansion and service diversification requires different logics of organization: stabilisation and addition/modification of capabilities. It signifies that the required talents will keep changing according to further business development.

While the relevant innovation ecosystems keep evolving, the author points out that following three focuses are important.

(i) Stabilizing business processes for geographical replication of the organization. This has already been observed during the research. The author observed that stabilization of organizational processes is an important condition for geographical replication of the organization. For any new service to be replicated to other cities for market development, the same sort of organizational stabilization would be required before the replication. If the organization is not ready for the replication, there shall be an organizational gap to be filled.

(ii) Capabilities required for service diversification and for exploring a new business opportunity. In order to develop new services, new capabilities should be acquired. If any missing capability exists, that organizational gap should be filled.

(iii) Corporate structure and logic: towards business model innovation. In order to achieve a BMI through the combination of geographical expansion and service diversification, an upper-level logic used to manage different business units in one organization will be required. This calls for a corporate structure. Once the company adds new services to its business portfolio, a new corporate-level organizational structure shall be developed.

The following section gives an analysis of BMI and the organizational change of LUT<sup>79</sup>.

■ *Stabilizing business processes for geographical replication of the organization*

The company expands its geographical coverage of the service to other cities as a part of its business development. The research observed that the geographical expansion of the organization requires a stabilization of business processes.

The geographical expansion of CET service can be considered as an ordinary business development of CET service. At the same time, according to the author, it can also be considered as a preparative step for the company to innovate its business model. Based on interviews with the COO and an accountant of the company, the stabilization of business processes was an important prerequisite for this geographical expansion to happen: the company's organizational processes needed to be stabilized for the geographical replication. The organizational processes include driver management, daily fleet management, fleet maintenance and scheduling processes. Since the company was a start-up company, the company developed these processes from scratch and optimized the processes over time. The accountant of the company also emphasized that exceeding the threshold of 10 clients in Bangalore was an important condition for setting up a branch office in Delhi. This is related to the profitability of the business: ten clients in one city is the break-even point for LUT's CET service. The author evaluates that the company managed well in terms of the geographical replication of the organization this time.

■ *Capabilities required for service diversification and for exploring a new business opportunity*

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<sup>79</sup> LUT does not possess any technological advantage against (potential) competitors. EVs are bought from other company as well as ICT system.

## Chapter 6 – Analysis

The company envisages to diversify its service to other types of mobility services and relevant services. The author considers that this is an important step for the company to become an “e-mobility service platform” before a BMI happens. Unlike geographical expansion of the service that replicates the entire organizational process, service diversification requires adding or modifying organizational processes. For example, if the company starts a charging infrastructure service, it will require the development of an optimal process for charging station management. This is a new capability for the company at a business unit level to be developed.

In order to diversify its service, the company needs a capability to search a new combination of different assets. If each asset is valuable and rare among competitors, they can ideally be a competitive advantage. This can be achieved through corporate entrepreneurship, namely the agents that explore and identify a new business opportunity. Such capability shall be developed at an individual level or at an organizational process level so as to organize a dedicated team for it. As of the end of 2019, this was taken care of by the co-founder and the CEO.

### ■ *Stakeholder management*

An important observation comes from the co-founder on stakeholder management. He mentioned that he needs to convince investors that the company seeks to diversify its service since some (at least one) investors invested in the company while expecting the business growth of CET services. In addition to this, the author observed during field surveys that some employees have different ambitions for service diversification. Moreover, during a test pilot project, the author observed that a transport manager of a client company was interested in adapting a new model of EV to LUT’s CET service, but he was not at all interested in LUT’s service diversification. These observations suggest that stakeholder management is an important component for the company to continue its exploration towards service diversification, adding on to the external business environment and the development of relevant innovation ecosystems.

### ■ *Innovation ecosystem intelligence*

Previously, the list of C&MA was analysed. As of the end of 2019, the list was formulated and updated by the managers. However, once the company further expands its geographical coverage of the business activity and diversifies its service, more and more detailed and concrete constraints will be identified: in the future, to transform its business model to be an

“e-mobility service platform”, an exponential increase in the number of constraints (as well as corresponding mitigation action) is expected, constraints that the company needs to deal with. This will complicate the process of identification of constraints, formulation of mitigation actions and execution of mitigation actions. In order to deal with the increase of constraints, it is necessary to develop an appropriate organization, meaning an organization that facilitates the accumulation of learnings on the development of innovation ecosystems from past business activities and current business activities. The author assesses that a dedicated team or a regular meeting will help the managers to better manage the list and update the list of constraints and corresponding mitigation actions. A new organizational process or a new structure is required so as to establish efficient innovation ecosystem intelligence.

#### ■ *Corporate structure and logic: towards business model innovation*

In addition to this, since service diversification naturally expands the business portfolio of the company, the company must develop an organizational structure that integrates different business logics in one organization: the company needs to structure its organization as a corporation with subordinate business sections.

The author points out that this is a new function for the company to be developed so as to manage multiple services in multiple geographic locations. Since the company envisages to start diverse services such as charging infrastructure, airport taxis and buses, the development of this upper-level corporate structure shall be a challenge.

According to the author, it is the responsibility of the CEO and co-founder to deal with these points. Since LUT faces evolving from being a business provider to being a corporate-structured company (as an “e-mobility service platform”) that needs to manage different business activities in different locations as a single organization (business portfolio management), the above-mentioned functions should also be embedded in the organization.

#### ■ *Conclusion (Analysis 3)*

For future business development envisaging to achieve BMI, the following three components can be organizationally important: stabilization of organizational processes for geographical replication of new services, new capabilities for new service developments and upper-level business logic and functions so as to transform the company into a corporate structure with different services in one organization. For these changes to happen, the author points out that following three capabilities can be important.



## Chapter 6 – Analysis

The first one is a corporate structure that embraces diverse business units. As the company develops its business and diversifies its service, both the organization of each business unit and the organization of the totality of the business units as a corporate structure shall function parallelly. The latter organization is the organization that enables the company to provide “an e-mobility platform”. The latter organization is therefore a prerequisite for the accomplishment of its BMI. The second one is a capability to lead the transformation of the organization towards corporate structure. This shall be expressed by the managers in order to achieve the transformation of the organization. The third one is an “ecosystem leadership” that develops a favourable value network within the relevant innovation ecosystems by bringing about changes through solving constraints.

Seen from an organizational perspective, the author assesses that these three capabilities will be required in order to achieve an eventual goal of the company becoming an “e-mobility service platform”, which is the aimed BMI. Greenwood and Miller (2010) point out that:

Others maintain that firms need to cumulatively develop their capabilities in ways that maintain their uniqueness and competitive advantage (Teece, Pisano, & Shuen, 1997). But only appropriate organizational designs can configure resources to achieve these things (Galbraith, 1995, 1999; Miller, 2003; Nadler & Tushman, 2003).

In order to develop the above-mentioned capabilities, the company needs to reconsider its appropriate organizational designs. The appropriate organizational design is a condition to achieve a BMI, while the development of the appropriate organizational design can happen in parallel to the achievement of the BMI. This shall require further research to conclude this point.

### *IV) Conclusion (of chapter 6)*

In this chapter, the author firstly analysed the company’s strategic intentions and their realisation. In terms of FMA, the company did not manage to establish any FMAs. The company steadily expanded the geographical coverage of its CET service. However, the number of clients in each city stays marginal enough that the author assesses that the company has not established any scale economy advantage or surpassed the cost barrier against copycats. In terms of service diversification, the most remarkable business activity was executing multiple test pilot projects using newly available EVs, including e-rickshaws and e-buses. However, none of them, as of the end of 2019, led the company to diversify its

service. As a result of business development and different explorative business activities, the managers of the company arrived to formulate a list of “Constraints and Mitigation Actions (C&MA)”. This was an important outcome for the company as it allows LUT to learn from different experimental activities.

Secondly, the author analysed the list of C&MA. It is a managerial tool that the managers use to deal with the uncertainty of the business environment and of the development of relevant innovation ecosystems. The author points out that product availability and product price issues constitute a major part of the list. This indicates that towards service diversification (BMC according to the author), the company faces the unavailability of products (including the unavailability in the sense of appropriate price) as a major challenge to be solved. However, this is an external constraint (an ecosystem constraint) that the company does not control. This situation is the same as the pre-stage of a BMC as suggested by Cavalcante (2014); while Cavalcante (2014) defines the pre-stage with the unavailability of technology required for a BMC, in this case, it is the unavailability of a product that forms the pre-stage. The company attempted continuous negotiations with potential EV manufacturers and tried to accelerate the development of the innovation ecosystem of EVs. Apart from this, the author claims that the constraints can be classified by different criteria. The categorisation of each constraint allows the managers to better formulate the corresponding mitigation actions. The author also claims that the number of constraints in the list of C&MA can be longer when the company starts developing different services. The establishment of a team dedicated to collecting updated information on the development of different innovation ecosystems shall be required in the future. In addition, the author points out that organizational aspects were less mentioned in the list. The organizational aspect was entirely missing at the beginning when the author first received the list from the co-founder. This corresponds to the suggestion of Rasmussen (2015) that says that “firms emphasize strategic fit in discussions prior to conducting BMI, while neglecting considerations of organizational fit” (p.38).

The author thirdly analysed the organizational change aspect to achieve the vision of the company. As of the end of 2019, no visible preparation was observed in terms of organizational change towards BMI. Over three years, the organization of the company experienced changes: the company hired new employees while some left the organization, driver management was optimized along with the development of an original incentive system, required human talents have changed along with the evolution of a fleet management system, for example. The author suggests that the stabilisation of business processes was a key component for the company to expand (or replicate) the CET business to

## Chapter 6 – Analysis

other cities such as Delhi and Hyderabad. Then, the author points out that different capabilities need to be developed in order to start new services. These organizational capabilities consist in a capability to formulate a corporate structure and logic, a capability to organise the learnings and insights on the innovation ecosystems and the business ecosystem and additional capabilities required for diverse services. Stakeholder management and innovation ecosystem intelligence are also important to ensure the efficient exploration and execution of service diversification. The author observed that the nature of these capabilities are different from Dynamic Capabilities, which were suggested as important for BMI, for example, by Teece (2018). Since the case company is not yet at the stage where the company can test different BMs due to the unavailability of products required for a BMC, the suggested organisational capabilities required during this phase are different from Dynamic Capabilities according to the author. Still, it will be important for the company to efficiently develop the non-dynamic capabilities in order to establish FMAs or other types of competitive advantages in the near future by diversifying the service before its potential competitors.

## Recapitulation – Key takeaways

This chapter analyses the gaps between the vision of the company—strategic intentions and the list of constraints and mitigation actions—and reality. The first section analyses the declared strategic intentions of the company from the perspective of First-Movers' Advantage (FMA) defined as *“a special case of competitive advantage resulting from market entry timing”* (Kerin et al., 1992, p39), and from the perspective of Business Model Innovation defined as *“a modification or an addition of business activities that changes value network so as to improve business performance”* (p.72 in Chapter 2). The first analysis concludes that none of their intentions have been fully achieved. The author then brings the focus on the *“list of constraints and mitigation actions”* formulated by the CEO and the co-founder that is analysed in the second analysis. The second analysis points out that the managers should classify the constraints with various labels so as to better formulate the corresponding mitigation actions. An important classification is to distinguish ecosystem constraints that exist at the level of the *“innovation ecosystem”* - *“the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution* (Adner, 2006, p. 2)” and business constraints that exist at the level of its business ecosystem - *“the value network of a company to provide services/products* (p. 83 in Chapter 2)”. The author claims that it is important to distinguish ecosystem constraints and business constraints since the solution of ecosystem constraints can benefit all actors in the innovation ecosystem, including competitors, while the solution of business constraints in principle only benefits the company. The author also points out that organizational aspect is less mentioned in the *“list of constraints and mitigation actions”* that corresponds to a study led by Rasmussen (2015), that says that *“firms emphasize strategic fit in discussions prior to conducting BMI, while neglecting considerations of organizational fit* (p.38).” The third section then analyses the organizational gaps of the company. The focus on organizational changes during the process of a Business Model Innovation (BMI) is an important focus in recent business model study (Rasmussen, 2015).

At the end of the analysis, the author points out important organizational issues identified throughout the field observations and the analyses through which the author concludes that the company needs to develop some capabilities so as to achieve the declared strategic intentions of the company. The author claims that capability development is an important prerequisite for the company to transform its business model in order to become an *“e-mobility service platform”*.



## *CHAPTER 7 - CONCLUSION*

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*CHAPTER 7 - Conclusion: result, discussion and theoretical contribution*

This section first presents the **results of the research**, followed by key empirical observations, **discussions, theoretical contributions** and **managerial recommendations** based on the research results. This section then explains the limits of the research and future research orientations. Lastly, the **conclusion** of the research will be explained.

■ *Practical importance of the proposed research questions*

The thesis defines the following three questions for its research. Faced with **uncertain development of relevant innovation ecosystems**,

RQ 1. How do top managers **formulate the vision** of a start-up company?

RQ 2. What are the **challenges** in developing competitive advantages while envisaging to attain a Business Model Innovation?

RQ 3. What **organizational capabilities** should be developed to prepare a Business Model change while the product required for Business Model change remains unavailable?

These research questions find their importance in a context in which the **service aspect of business** is becoming more and more critical in a business scene coinciding with the development of the Internet and ICT. Data and information have their own value, and the development of ICT enables companies and individuals to benefit from the use of abundant data and information, in particular through the Internet. Ubiquitous Computing (Weiser, 1991) and the Internet of Things (IoT) (e.g., Atzori, Iera, & Morabito, 2010) are representative concepts that show us that the value of a product can depend on the utilization of relevant data. In addition, the service aspect cannot be negligible for the recent product design strategy (Harrison, 2006; Sundin & Lindahl, 2008). The value of a product can depend on the relevant services and vice-versa. **Products, services**, and the **use of data** are three components that create mutual synergy and become indispensable to maximize their respective values. Mobility as a Service (MaaS) (e.g., Ligen et al., 2018; Polydoropoulou et al., 2020; Utriainen & Pöllänen, 2018), for example, is a representative example of the situation. Polydoropoulou et al. (2020) explain that “MaaS implementation requires the combination of several transport modes and services, including public transport, taxi, car rentals (traditional transport modes) and emerging transport options (e.g. [sit.] autonomous vehicles, bike- and car-sharing, ride hailing, carpooling, etc.) (Transport Systems Catapult, 2016; EC, 2017a), while integrating some key components such as booking, ticketing and multimodal traveller information services” (König et al., 2016). MaaS, for instance, harbours each aspect of

product development, service deployment and data utilization that mutually create synergy and increase each other's value.

In this context, Business Model Innovation (not a mere product innovation, nor service innovation) shall be an important concept to understand and analyse the dynamism of multidimensional development of different innovation ecosystems. The product development needs to consider the relevant service development while the service development needs to take the relevant product development into consideration. How a company can formulate its vision when different ecosystems for products, services and information simultaneously develop by mutually influencing each other (RQ 1) is an increasingly important managerial subject. The question is of extreme importance for the company at the early stages of a corporate venture, since the formulation of the vision can be one of critical determinants of the success of the business (Bocken & Snihur, 2020; Light, 2006).

Business Model Innovation aims at improving business performance and at developing competitive advantages through Business Model Change. In the above-mentioned multidimensional context, the business challenges of product-oriented (or technology-oriented) companies and service-oriented companies can differ. Understanding and analysing its own business challenges is critical for the long-term survival of a business, considering the uncertain development of relevant innovation ecosystems. In particular, seen from the perspective of a service provider, what are the challenges in developing a first-mover's advantage and in attaining a BMI (RQ 2)?

When product and service become interdependent in regard to their value, the quality of one can influence the other. The lack of an appropriate product can be a critical barrier for a Business Model Change of a service provider, and vice-versa. In such a situation, proactive companies shall still continue working to find a breakthrough for the envisaged Business Model Change. Taking the two research questions above into consideration, what **organizational capabilities** should be developed to prepare a Business Model Change while the product required for Business Model Change remains unavailable (RQ 3)? Exploring the answer to this question will help the company that seeks to develop a competitive advantage (or first-mover's advantage) despite the uncertainty concerning relevant product/service developments by other actors.



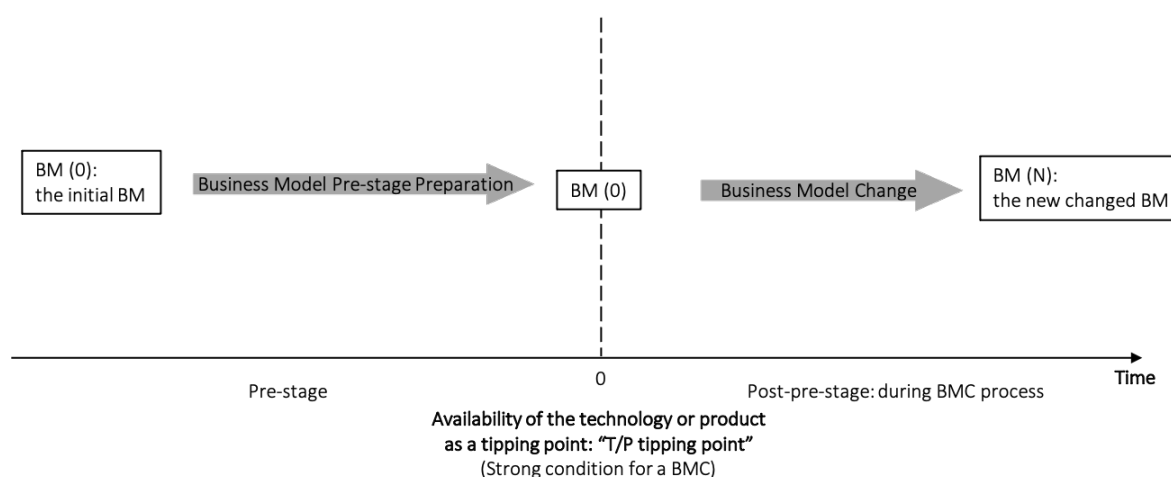
## 1) Result

### ■ Theoretical results

As a result of the thesis, the author **expanded the concept of the pre-stage of BMC** defined by Cavalcante (2014) from simply the unavailability of the technology to the unavailability of the technology and the product. As an elaboration of the definition given by Cavalcante (2014), the author suggests to define the pre-stage of a BMC as a phase in which the technology or the product required for an envisaged BMC is not yet available.

To facilitate the discussion, the author labels the time when the Technology or Product (T/P) become available as the T/P tipping point. Also, the author labels the phase after this tipping point as the *post-pre-stage* or BMC process phase (see Figure 21).

Figure 21 Definition of pre-stage, post-pre-stage and T/P tipping point



Then, the author claims **the unavailability of the technology and the product functions as a strong condition** – an objective and binary condition – for a BMC. Other conditions to attain a BMC, such as the existence of client, the monetization of the business, feasibility and executability - that respectively correspond to BM components suggested in past literature such as value proposition (e.g., Chesbrough, 2007), revenue model (e.g., Lehmann-Ortega & Schoettl, 2005), value network (e.g., Rasmussen, 2015) and leadership (e.g., Voelpel et al., 2004) – can only be verified once this strong condition is met. Therefore, the author claims that the technology and product unavailability is a stronger condition for a BMC in comparison to other weaker conditions (see Table 23).

Table 23 Technology and product availability is a strong condition as compared to other conditions for BMC

	<b>Objective, binary condition?</b>	<b>Condition</b>	<b>Existing literatures on BM</b>	<b>Mode of qualification</b>
Type 1 (Weak condition)	No	Existence of clients	Value proposition(s) (e.g., Chesbrough, 2007)	It has to be identified, developed and/or verified through experimentations during a BMC process.
		Monetization of the business	Revenue model (e.g., Lehmann-Ortega & Schoettl, 2005)	
		Feasibility	Value network (e.g., Rasmussen, 2015)	
		Executability	Leadership (e.g., Voelpel, Leibold & Tekie, 2004)	
Type 2 (Strong condition)	Yes	Tech./product availability	“Pre-stage” (Cavalcante, 2014)	Strong condition to be met before the beginning of a BMC process.

In the dynamics of a BMC, the author claims that the T/P tipping point is an important turning point since the organizational capabilities required before and after this point are different. While existing literature suggests that dynamic capabilities (e.g., Teece, 2018) play an important role for BMC and BMI without clearly distinguishing the pre-stage and the post-pre-stage, the author points out that the two phases before and after the tipping point should be distinguished; as a consequence, the importance of non-dynamic capabilities during the pre-stage should be highlighted. The thesis demonstrated several examples of these non-dynamic capabilities, such as the sensibility to the development of T/P required for an envisaged BMC (or BMI), the capability to take proactive action towards the development of the T/P (see Figure 22) and/or, as claimed by Adner (2006), the capability to assess project risks that arise from the interdependency of multiple innovation ecosystems and the uncertainty of their development.



experimentations also differs. Therefore, the purpose and output of pilot projects during the pre-stage differ from those examined during the post-pre-stage as well.

All of these differences call for the organizational capabilities specific to the pre-stage situation. The critical organizational capabilities required differ between the pre-stage and the post-pre-stage: this indicates that the managers need to consider the organizational change strategy.

## *II) Key empirical observations*

Through a comprehensive qualitative case study, the author explored answers to the following questions.

In a situation of **uncertain development of relevant innovation ecosystems**,

- how do top managers **formulate the vision** of a start-up company?
- what are the **challenges** to developing competitive advantages while envisaging to attain Business Model Innovation?
- what **organizational capabilities** should be developed to prepare for Business Model Change while the product required for Business Model Change remains unavailable?

### *1) First research question: how do top managers formulate the vision of a start-up company?*

The first research question is “in a situation of uncertain development of relevant innovation ecosystems, how do top managers formulate the vision of a start-up company?” The author observed that the managers develop their vision with three different layers of abstraction. On the first layer, at the most abstract level, the managers have a **business model idea** that the company seeks to develop. The idea of the business model stayed abstract (“becoming a platform of e-mobility services”) and the idea did not change significantly during three years of observation. The second layer is less abstract; the managers develop three **strategic intentions** where the development of **competitive advantage** (more specifically, the development of **first-mover advantage**) is central. The third layer is a list of identified constraints to achieving the business model idea and/or the strategic intentions, and “mitigation actions” are formulated to reduce the negative impacts of these constraints on the business development.

*2) Second research question: What are the challenges in developing competitive advantages while envisaging to change the Business Model?*

The second research question is “in a situation of uncertain development of relevant innovation ecosystems, what are the challenges to developing competitive advantage while envisaging to change its Business Model?” The author observed the company while it was envisaging to change its business model by combining service diversification and geographic expansion. According to the author, the company envisages to achieve Business Model Innovation and tries to develop competitive advantage through this Business Model Change (BMC).

The company faces different challenges in developing new services and using new products. First of all, the author points out that the company is in a specific phase of a BMC – the pre-stage – when the technology or the product required for the execution of the envisaged BMC is not yet available. The author points out that during this pre-stage, the organizational capabilities required differ from those of the “post-pre-stage,” when the technology or the product become available. By analysing a list of “constraint and mitigation actions” formulated by the managers, the author points out that the challenges, mostly composed of business ecosystem challenges and innovation ecosystem challenges. By looking more specifically into the details of the list, the author observed that the issue of product availability has more gravity than other issues. This confirms the operational importance as well as theoretical validity of the concept of the pre-stage (Cavalcante, 2014) extended to product (un)availability. Through longitudinal observation, the author claims that the pre-stage of a BMC can last over a long period – more than three years for the case company. During the pre-stage, the learnings and experimentations on BMC are limited when compared to the post-pre-stage situation: since there is no available technology or product required for the envisaged BMC, the company cannot verify the validity of the envisaged BM, and the learnings remain knowledge-based learnings. For example, the possible specification and price of the technology and product could enter this trend. Thus, the company cannot acquire process-based learnings, such as optimal use patterns of the technology and product.

In addition to this, the author observed the ignorance on the organizational aspects of the initial list. This observation empirically confirms the assumption of Rasmussen (2015): “ambiguity remains about the causal link(s) between the organizational context and BMI. One of the problems might be that firms emphasize strategic fit in discussions prior to conducting BMI, while neglecting considerations of organizational fit” (p. 38). This ignorance on the

organizational fit leads to a discussion on the development of ecosystem leadership capability that the author claims, in the following part, to be important throughout the pre-stage and the post-pre-stage.

As well as observing the importance of learnings in the development of an innovation ecosystem through experimentations using similar products (= pilot projects) and negotiation with OEMs, the case demonstrated the importance of convincing stakeholders – such as investors, suppliers (OEMs), clients and employees – to adopt the system in order to start engaging in the exploration of potential BMI. Pilot projects, for example, were a means to communicate with potential suppliers of the product (OEMs) and with potential clients, while the pilot projects during the pre-stage were NOT used for testing the validity of a future BM.

*3) Third research question: What organizational capabilities should be developed to prepare a Business Model Change while the product required for Business Model Change remains unavailable?*

The third research question is “In a situation of uncertain development of relevant innovation ecosystems, what organizational capabilities should be developed to prepare a Business Model change while the product required for Business Model Change remains unavailable?” As a result of the length of the pre-stage, the author insists on the importance of the organizational capabilities required during the pre-stage, that are different from those required in the post-pre-stage, such as dynamic capabilities. In order to start a new service, modifications of operational organizational capabilities, as well as additional resources and capital, are required. However, a company requires another type of capabilities so as to get out of the pre-stage situation and move to the “post-pre-stage” phase. Within the value network (i.e., the business ecosystem), a company requires a capability to convince its stakeholders – such as investors, suppliers (OEMs), clients and employees. Beyond its business ecosystem, the company needs specific capabilities, such as the capability to learn about the development of innovation ecosystems and the capability to promote other actors to invest themselves in the innovation ecosystem developments favourable to the company. The latter capability corresponds to ecosystem leadership, that is the capability to involve/promote different actors in the ecosystem.

The author, as a result of the thesis, claims that the following capabilities play an important role during the pre-stage: 1) **intelligence (learnings) on the relevant innovation ecosystem development** and on the possible performance of nearly available products through pilot

projects (experimentations) using similar (or alternative) product, 2) **stakeholder management** within its value network to obtain their cooperation including continuous financial support and 3) **ecosystem leadership** with negotiation skill to promote manufacturers to start manufacturing the products under favourable conditions.

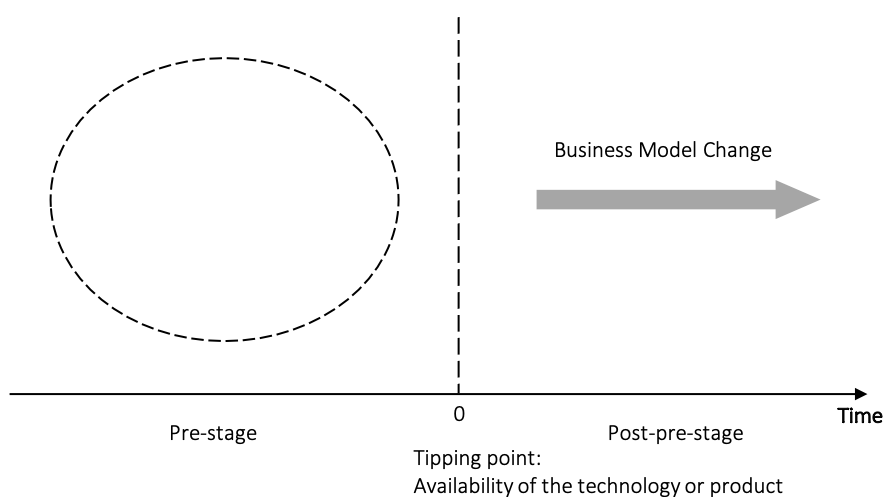
### III) Discussion

This section discusses the research results, taking the analysis in chapter 6 into consideration.

#### ■ *Extending the pre-stage concept to product unavailability*

Cavalcante (2014) distinguishes the phase of a business model change from its pre-stage by the (un)availability of the technology needed to implement the business model change. “A company that can overcome the challenges in the pre-stage will be able to implement business model change by the time the new technology becomes available (or soon after)” (Cavalcante, 2014, p.13). Cavalcante (2014), implicitly, defines the pre-stage as a phase before a business model change when the technology required to implement the business model change is unavailable (refer to the Figure 2 in Cavalcante, 2014). Cavalcante (2014) points out, with empirical evidence, that the company faces different challenges during this phase. He highlights the importance of the experimentation and the learning during this phase.

Figure 23 Defining the pre-stage and post-pre-stage of a Business Model Change distinguished by a tipping point



Source: Cavalcante (2014), modifications by the author

The thesis, with its empirical evidence, affirms the necessity/use/advantage/importance of defining the pre-stage of a business model change. Since a BMI is a type of business model

change qualified as innovative, the author affirms the importance of defining the pre-stage a business model innovation.

The thesis, with its empirical evidence, suggests extending the definition of the pre-stage from the one defined previously to the one defined as the unavailability of the technology and the product. The thesis suggests a definition of the pre-stage as **a phase before the beginning of a business model change, or a business model innovation, when the required technology or the required product is not yet available.**

After “the discovery of a ‘pre-stage’ of potential business model change, characterized by processes of experimenting and learning that can subsequently lead to actual business model change (p. 2)” by Cavalcante (2014), there has not yet been empirical research that supports his “discovery” of “an intermediary step before effective business model change” (Cavalcante, 2014, p. 18). This research is the first of its kind that gives an empirical focus and evidence for the pre-stage. “A larger number of companies could possibly have contributed to describe better the pre-stage phenomenon” (Cavalcante, 2014, p18). The thesis first of all contributes to fill this research gap by giving empirical evidence on the newly identified pre-stage of a business model change.

#### ■ *Capabilities required during the pre-stage: comparison with dynamic capabilities*

The author applies the concept of the pre-stage to the case company and shows that the nature of the **organizational capabilities** required during this phase should be distinguished from the organizational capabilities required **to execute** a BMI in the post pre-stage.

BMs, BMI and dynamic capabilities are three related literature streams, and they have expanded simultaneously since late 1990s (Foss & Saebi, 2017). There is a great number of research focusing on the role of dynamic capabilities during a BMI (Best, Miller, McAdam, & Moffett, 2020; Bocken & Geradts, 2020; Čirjevskis, 2019; De Silva, Al-Tabbaa, & Khan, 2019; Di Toma, 2020; Heider, Gerken, van Dinther, & Hülsbeck, 2020; Inigo, Albareda, & Ritala, 2017; Lin, Zhang, Yan, & Jiang, 2020; Maus & Sammut, 2018; Randhawa, Wilden, & Gudergan, 2020; Schmidt & Scaringella, 2020; Teece, 2018; Vicente, Ferasso, & May, 2018; Weimann, Gerken, & Hülsbeck, 2020). “The crafting, refinement, implementation, and transformation of business models are outputs of high-order (dynamic) capabilities” (Teece, 2018, p. 40).

First defined by Teece, Pisano, & Shuen (1997) as “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” (p. 516), dynamic capabilities are the firm’s ability “by which management, supported by



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organizational processes, senses likely avenues for the future, devises business models to seize new or changed opportunities, and determines the best configuration for the organization based on its existing form and the new plans for the future (Teece, 2018, p. 41).” Dynamic capabilities “aggregate and direct the various ordinary capabilities” such as routine activities, administration, and basic governance, as well as aggregating and directing “the second-order dynamic capabilities” that adjust and recombine a firm's existing ordinary capabilities as well as developing new ones (Teece, 2018).

The dynamic capabilities framework suggests that the following organizational capabilities are important: the capability to sense business opportunities, the capability to device BMs to seize the opportunities and the capability to transform the organization (Teece, 2018). These dynamic capabilities realign the resources and (non-dynamic) ordinary capabilities of a company to modify its BM (Teece, 2018) and therefore the firm’s revenue model and value propositions, for example. “The strength of a firm's dynamic capabilities determines the speed and degree (and associated cost) of aligning the firm's resources - including its business model(s) - with customer needs and aspirations” (Teece, 2018, p. 43).

While “strong dynamic capabilities enable the creation and implementation of effective business models” (Teece, 2018, p. 48), Teece (2018) recognizes that the dynamic capabilities are needed to manage new business structures along with existing operations “provided the **new business model is not an impossible reach** from the existing business (p. 48).” This indicates that the dynamic capabilities are not of use to attain an envisaged business model change if the new business model is impossible to reach due to certain conditions. The result of the thesis affirms as well that the dynamic capabilities are not sufficient for a company to get out of the pre-stage situation. What are the other types of capabilities required?

### *Non-Dynamic Capabilities play an essential role during the pre-stage*

The pre-stage defined in the thesis is the phase before business model change (or BMI) when the technology or the product required to attain the BM change or the BMI are still unavailable. The thesis suggests that the capabilities required to execute a BMI are different from those required to exit from the pre-stage. During the pre-stage, it is not only necessary to have dynamic capabilities to sense and seize business opportunities and to transform the organization, but a company also needs to have capabilities to overcome the challenges so as to **become able to** promote business model change.

When focusing on the pre-stage of a BM change / BMI, the research results suggest that developing dynamic capabilities is not enough for a company in the pre-stage to start promoting a BM change / BMI.

The research result suggests, for example, that the managers need to obtain the understanding and accord of stakeholders such as investors and employees so as to start exploring possible service diversification for a BMI. The managers need to convince the investors of the necessity of potential BMC (and BMI) without necessarily having a concrete idea of a new business model nor a concrete plan to attain a business model change / innovation since there is no concrete product for a service diversification. The understanding and the corporation of the investors can be critical.

Hermes, Böhm, & Krcmar (2019) argue that the investors, as part of the stakeholders, support the company engaging in BMI through a financial support mechanism. The thesis, with a specific focus on the pre-stage, shows that some challenges concerning stakeholders exist before the actual BMC. Siebold (2020) argues that different types of stakeholders, including employees, government and customers, for example, contribute to the realization of BMI. The thesis suggests that the nature of the communication with these stakeholders – employees and customers as well as investors and suppliers (OEMs) - during the pre-stage differs from the communication during the “post-pre-stage”. The communication required during the “post-pre-stage” is meant to convince the stakeholders of the business performance of a new concrete BM, whereas the managers must rather convince them of the **potential necessity** of change during the pre-stage. In fact, the necessity for change is not always evident. The managers need to obtain the understanding and cooperation of stakeholders to mobilise the company’s resources without a concrete BM idea, thus without a visible benefit or a return on investment of mobilised capital and efforts.

The required organizational capability here **does not correspond to dynamic capabilities** since:

- this organizational capability is not that of **sensing** business opportunity nor of **seizing** any identified business opportunity, and
- this organizational capability is not that of **transforming** the organization for a concrete BMI.

Therefore, the pre-stage company requires organizational capabilities different from dynamic capabilities. The pre-stage situation requires an organizational capability in order to obtain

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the understanding of the stakeholders, telling them that they are to engage in explorative activities though the managers are not even sure if they can identify any new BM.

The cooperation of stakeholders can be considered as a prerequisite to begin the exploration for a potential BMC. This prerequisite exists within the Business Ecosystem (BE). The prerequisite can form another type of pre-stage situation or determine the BMC readiness of the company, independently from the condition of the availability of T&P. The solution of this prerequisite is another turning point before the beginning of the BMC. (This subject on the prerequisite in the BE will be discussed separately with the BMI's "path dependency" (McGrath, 2010) and "real option" approach (e.g., Ruet, 2006; Van Putten & MacMillan, 2004).) Since important organizational capabilities and parameters to consider are different in these phases, the manner of tackling project management to realise a BMC or BMI shall be different during the pre-stage and after the pre-stage.

### ■ *Capabilities required during the pre-stage: within experimentation and learning*

The nature of experimentation and learning is equally different between the pre-stage and the "post-pre-stage". Cavalcante (2014) points out that the pre-stage is characterized by experimentation and learning. According to Cavalcante (2014), the experimentation is "(1) researching the technical challenges in connection with the emergent technology and giving demonstrations/making prototypes; and (2) performing new practices, e.g., collaborating in the joint project (the researchers' meetings and the managerial meetings at the steering committee represent new practices for the companies involved)" (p. 13). While he compares the empirical findings of the experimentation with past literature, such as McGrath (2010), Sosna et al. (2010), Chesbrough (2010) and MacInnes (2005), it should be pointed out that the nature of experimentation during the pre-stage and during the "post-pre-stage" is different: during the pre-stage it is impossible to execute "business model experimentation" (McGrath, 2010) *stricto sensu* since a technology or a product required to form an experimental business model is missing. For example, "capability of the early detection of erosion of their new business model" (McGrath, 2010) is specific to the "post-pre-stage" situation, and this capacity cannot be of use during the pre-stage situation.

The same idea is relevant for "learning". According to Cavalcante (2014), learning is "(1) acquiring new knowledge in connection with the technical aspects of the emergent technology; (2) discussing new ideas on possible commercial opportunities for the companies; (3) interacting and contacting, i.e. networking with the other partners in the project" (p. 13). Itami & Nishino (2010) argue that "doing" is the source of learning. Itami & Nishino (2010)

argue that “since this learning (or information accumulation) is a byproduct [sit] of tasks that somebody has to do anyway, a properly designed business system should allow for firm learning with little extra cost (p. 367).” As the nature of the experimentation is different between the pre-stage and the post-pre-stage due to technology/product unavailability, the nature of learning by doing also differs during the pre-stage and during the post-pre-stage. If the technology or the product becomes available, the company can establish a prototype BM using the required technology or product; on the contrary, during the pre-stage, this type of learning is impossible. The case observation shows that the types of possible learning during the pre-stage include learnings such as the timing of technology/product availability, the possible specifications and the possible price and running cost. These learnings are knowledge-based learnings that are not accompanied by organizational learnings on the business process, for example. The accumulation of product-use data based on actual use of the product cannot be expected during the pre-stage. McGrath (2010) confirms this, though the pre-stage concept is not mobilised in the article, by stating that “it is difficult to know in advance how best to take advantage of them [the trends and changes of technologies and products] via business model innovation” (p. 253).

Not only the learning on the required technology and product, but also the learning on the stakeholders is obtained through experimentation.

Experimentation serves as a connection with the real world, which - in the case of business model experimentation - means a world of customers and partners: the business environment. Experimentation includes intervening (Hacking, 1983): Managers interact with the business environment [customers and partners] by tweaking business model components and by interacting with stakeholders to gain knowledge about the viability of the business. [...] Through experimentation, business models (i.e., managers' cognitive representations) are made material, and the company shares them with potential clients and partners. [...] Another outcome, associated with the signalling [sit] and the convincing roles of experimentation, is connected to the strategic legitimation process (the validation of the business model not only by the company, but also by its environment). Through experimentation as a set of symbolic actions, companies can demonstrate the business model and legitimate the venture (Bojovic, Genet, & Sabatier, 2018, p. 155).

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Though partial experimentation of a new BM is possible during the pre-stage, the company cannot test the desired BM in a complete form during the pre-stage due to the absence of required technology or products. The validation of the business model by the company, customers and partners is therefore impossible during the pre-stage.

### ■ *Non-Dynamic capabilities to be developed*

As is discussed above, when a company is in the pre-stage situation, the possible experimentation and learnings are different from those led and acquired during the “post-pre-stage”. The organizational capabilities to be developed during the pre-stage, therefore, are different as well. The research results suggest that following capabilities are required: 1) **intelligence (learnings) on the relevant innovation ecosystem development** and on the possible performance of nearly available products through pilot projects (experimentations) using similar (or alternative) products, 2) **stakeholder management** within its value network to obtain their cooperation, including continuous financial support and 3) **ecosystem leadership** with negotiation skills to encourage manufacturers to start manufacturing the products under favourable conditions.

These findings overlap with Cavalcante (2014). Cavalcante (2014) points out that managers need to overcome challenges at both individual and organizational levels such as:

- technological problems and uncertainty (which affect all organizations),
- conflicting views between managers and employees,
- a lack of the requisite skills, and
- a shortage of financial resources (affects all organizations).

### *Intelligence (learnings) on the relevant innovation ecosystem development*

The author suggests that the capability of intelligence (or the learning) on the relevant innovation ecosystem cannot be a competitive advantage during the pre-stage. McGrath (2010) claims that the experimentation capability can be amount to a competitive differentiation (advantage) of the company since it enables the company to learn about new BMs rapidly. Despite the suggestion of McGrath (2010) that focuses on the post-pre-stage situation, the author suggests that the experimentation capability during the pre-stage situation cannot be rare and valuable. In fact, the experimentation only allows for new knowledge of the development of the innovation ecosystem (which is already available within the ecosystem), while the company does not acquire any organizational learnings (which can be a unique learning within the ecosystem) about the new BM.

### *Stakeholder management*

The author suggests that the capability to manage the stakeholders can be a competitive advantage during the pre-stage. The capability to convince the stakeholders of the necessity of a potential BMC during the pre-stage while the required technology or product is not yet available can be a rare and valuable capacity.

### *Ecosystem leadership*

The research observations indicate that the company was trying to develop a competitive advantage by collaboratively working with a few OEMs, in particular product suppliers. McGrath (2010) pointed out that “it is well known in the literature on the management of technology that a major change in an underlying technology tends to spark an ‘era of ferment’ that only ends when key design decisions are made, and a ‘dominant’ design emerges” (p. 253). By collaboratively developing a product in cooperation with the suppliers to identify the dominant design prior to competitors doing so can form a competitive advantage. The author claims that this can be one way of developing a competitive advantage. The capability of effectively collaborating with the supplier(s) can be a competitive advantage that the company can develop in the pre-stage phase.

The research suggests that a certain competitive advantage can be achieved by developing organizational capabilities during the pre-stage of a BMC. This point should be studied further with empirical observations and evidence. For example, some capabilities developed during the pre-stage might be of use during the post-pre-stage – such as stakeholder management – while some other capabilities – such as capabilities to learn about the development of the relevant innovation ecosystem – may not necessarily be of use during the post-pre-stage.

### ■ *A critical capability - ecosystem leadership - and the prerequisites for a BMC*

The previous discussion was about organizational capability required during the pre-stage. Here, the author discusses whether there are any other possible preamble conditions (turning points) to be considered, apart from the availability of T&P.

“Unavailability of the technology and the uncertainty surrounding it” are challenges during the pre-stage (Cavalcante, 2014). These challenges are essential to tackle before moving to the “post-pre-stage” and preparing a potential BMC. The research extends the pre-stage concept to the product unavailability. When considering the unavailability of T&P, there are two possible situations: the company either possesses the capability to develop its own technology or product in-house (first case) or does not possess the capability (second case).

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### *For a company that can develop in-house technology or product (Case where BE equals to IE)*

When the focal company can develop the technology or the product required in-house for the BMC, i.e., if the company envisaging a BMI plays a central role in the relevant innovation ecosystem of the technology or product, the challenges are found within the BE of the company, including its own R&D challenges. In this case, a technological innovation or a product innovation is a prerequisite for a BMC and, therefore, for a BMI. These interplays between technology/product innovation and business model innovation are recognized by scholars and studied (e.g., Baden-Fuller & Haefliger (2013), Visnjic, Wiengarten, & Neely (2016)). Feng et al. (2019) investigate the situation where the BE is equal to IE: the core value proposition of the focal company corresponds to the core innovation of the focal IE. In this case, Feng et al. (2019) point out that the dynamic capabilities of the market dimension, i.e. the market-sensing capability, and of the technology dimension, i.e. the integrating capability, coordinating capability and learning capability, are essential to express ecosystem leadership in the innovation ecosystem.

### *For a company that does not develop in-house technology or product*

When, on the other hand, the focal company does **not** develop technology or products in-house, i.e., if the company envisaging a BMI does not play a central role in the relevant innovation ecosystem, the focal company needs to obtain the new technology or product from outside the company. In this case, there are two possible situations.

If the required technology or product is already available, the pre-stage does not exist. The focal company is not in the pre-stage but is already in the “post-pre-stage”. In this case, a technological innovation stimulates the development of new BMs (Pateli & Giaglis, 2005) and the capabilities necessary for the early stage of a BMC, such as dynamic capabilities, are the key.

If, in the other case, the required technology or product is not yet available, the focal company envisaging a BMI needs to promote technology suppliers or product manufacturers to make a BMC possible for itself. In this case, the BMC calls for technology or products, and convincing the supplier or the manufacturer can be a challenge. The focal company then needs to demonstrate an ecosystem leadership to promote the supplier or manufacturer to start providing the technology or the product.

The thesis suggests that parameters such as the purchasing power, the brand image of the focal company (see Test pilot project 1: Renault’s ZOE in CHAPTER 6 - I)2)a.) and long-term profitability can be critical assets to play the leadership role of an innovation ecosystem. The

author deduces that not all companies are eligible to assume the ecosystem leadership role by developing certain organizational capabilities. The research results suggest that there are some preamble conditions to meet in order to become an ecosystem leader. It should also be considered that the ecosystem leadership can shift from one actor to another, depending on the development of an ecosystem (Dedehayir et al., 2018; Dedehayir & Seppänen, 2015).

The author argues that conditions such as the market position brand image and the formulation of a convincing BM for a supplier can be preamble conditions for a company that uses other company's products, rather than develop its own, for its services. The thesis suggests that these conditions shall be satisfied so that the company becomes eligible to conduct a desired BMC and achieve a desired BMI. If the company does not satisfy some prerequisites, the thesis suggests that the company may not be able to proactively change its BM and needs to wait and see until the required technology or product becomes available: the company is obliged to take a "wait and see" strategy, given that the timing of the desired BMC depends on the business development of supplier(s).

■ *Project management during a pre-stage: organizational change readiness, capability development and entrepreneurship for first-mover's advantage*

As a result of the thesis, the author insists on the importance of distinguishing the pre-stage of a BMC from the post-pre-stage. Distinguishing the pre-stage and the post-pre-stage is equal to recognizing the technology/product availability as an important **tipping point** for a BMC and BMI. It is important to recognize this tipping point for a BMC since the company can only initiate the BMC process after this tipping point. If the company envisages to develop a competitive advantage, including first-mover's advantage, through the BMC, the author claims that the organizational transition around this tipping point shall be critical.

Through the thesis does not address the subject, within the organizational theory, the importance of **organizational change readiness** (*or readiness for organizational change*) has been pointed out and discussed (Amis & Aissaoui, 2013; Armenakis et al., 1993; Banjongprasert, 2017; Cunningham, Woodward, Shannon, & Macintosh, 2002; Holt et al., 2007; Lehman, Greener, & Simpson, 2002; Rafferty et al., 2013; Vaishnavi, Suresh, & Dutta, 2019). For example, Choi & Ruona (2011) highlight that individual readiness is a key for organizational change. The pre-stage concept clarifies, with a clearly-defined objective tipping point, the phase when the development of change readiness is critical – the pre-stage – and the phase when the development of change capabilities, such as dynamic capabilities, are critical – post-pre-stage.



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Also, the author claims that the research results on the pre-stage capability development, the fact that the organizational capabilities required during the pre-stage are different from those required during the post-pre-stage, have an important implication for the study of **corporate entrepreneurs**. The “entrepreneurship is concerned with the discovery and exploitation of profitable opportunities” (Shane & Venkataraman, 2000, p. 217), and the pre-stage concept objectively separates the phase of opportunity discovery and that of opportunity exploitation; business opportunities can be discovered both during the pre-stage and during the post-pre-stage, while opportunity exploitation can only be executed during the post-pre-stage after the technology/product tipping point.

Related to subject of entrepreneurship and opportunity recognition, there is a discussion if an opportunity is something pre-existent to be discovered or something to be created (e.g., Chabaud, 2014). Alvarez and Barney (2007) suggest that different types of actions are required to exploit the opportunity depending on its nature: if it is to be discovered or to be created by the company. From the empirical observation on the pre-stage of a BMC, the author sheds light on the other aspect of an opportunity: *conditional opportunity*. During the pre-stage, the business opportunity identified by the managers is not exploitable. Even the managers are not sure if it is really a business opportunity or not since they are not yet sure if they can identify and construct an appropriate business model. The existence of technology/product and its specifications (such as price, form, design and performance) are major parameters that determine the success of a business model. The author claims that the observed entrepreneurial activities within the company is qualified as a quest of how to take advantage of the emergence of a business opportunity (that the managers think it is an opportunity) and make that opportunity into an advantage for the company.

The author claims that the pre-stage concept shall be important on a practical level, as well as for the **project management** of new corporate ventures. A company willing to initiate a new business operation needs to consider, as an important condition, whether the technology or product required for the BMC is available or not. As is shown in the result and in the discussion, the pre-stage situation requires different types of capability development and organizational management than the post-pre-stage situation; therefore, it requires different project management. The thesis, with its empirical case study, observed that the pre-stage of a BMC can last for several years. The research results indicate that the target outcomes of the capability developments and pilot projects during the pre-stage of a BMC shall be set taking the pre-stage specificities into consideration.

### ■ *Dealing with the transition*

This thesis, with its empirical observation, highlights the struggles of a company in the pre-stage. Though the author does not dig deep into, human resource management must have a significant impact during this transition period. The case company tries to diversify its service while multiplying the number of cities that they offer their service.

The principal argument of the author is that there are capabilities required during the pre-stage that are different from the capabilities required in the post-pre-stage during the BMC process. The company should deal with this transition accompanied with an appropriate human resource strategy as a key success factor of a growing company is to evolve its organization while reinforcing its business model (Chevalier, 2014). The author observed that the talent supply is mentioned by managers as one of the challenges in the list of C&MA. Talent supply is an important element of human resource management. On top of it, as Chevalier (2014) points out, the **managerial leadership** required to grow the operation size of the company shall be crucial. In the case of the observed company, the author observed that the CEO and the co-founder share their roles as a daily operational top manager mainly taken as the CEO and a vision maker mainly taken by the co-founder. Once the product required to diversify the service becomes available, the company needs to reconsider the managerial structure to efficiently operate multiple business units: additional mid-managers or regional managers, for example, shall be required.

While the *dynamic capabilities* (Teece, 2018) serve to reconfigure the organization, more human oriented factors within human resource management such as employees' motivation, salary system and human resource evaluation mechanism (Chevalier, 2014) are not negligible during the transition period from the pre-stage to the post-pre-stage and beyond.

### ■ *Prerequisites for a BMC and real option approach*

As was previously discussed, the cooperation of stakeholders can be considered as a **prerequisite** to begin the exploration of a potential BMC. This prerequisite exists within the Business Ecosystem (BE). The prerequisite can form another type of pre-stage situation or determine the BMC readiness of the company, independently from the availability of T&P. The solution of this prerequisite should be considered as another turning point before the beginning of BMC. McGrath (2010) points out:

if business model innovation demands experimentation, which in turn requires investment, then firms will need to become comfortable with financial tools that

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make sense in an experimental world. This implies that decisions will be based a lot less on such deterministic concepts as projected economic value added and net present value, and a lot more on investment ideas such as real options reasoning. Indeed, business model experimentation can often be designed to honor such real-options concepts as keeping initial investments small until concepts are proven and only investing more substantially when there is greater evidence that an idea will work - but then being prepared to scale up with vigor. (p. 255)

Sosna et al. (2010) also highlight the importance of low-cost experimentation for a BMC. This approach shall also be applied to the pre-stage situation, not only for a BMC of the post-pre-stage situation. The operational importance of bridging the learning-by-project logic and the real-option logic in an innovation-based competitive environment is also pointed out by Maniak, Midler, Lenfle, & Le Pellec-Dairon (2014). The previous discussion suggests the existence of different prerequisites to be satisfied before the company begins a BMC. The satisfaction of each prerequisite is a turning point for the company. The managers can evaluate how many prerequisites exist before moving to the post-pre-stage. By evaluating the satisfied and unsatisfied conditions, the managers can further invest toward a BMC: real-option approach.

### *IV) Theoretical contributions*

**In-depth case studies on business model innovation based on recent cases and primary data** are rare (Bucherer et al., 2012) and “approaching business model innovation under consideration of specific contexts is highly useful to first understand the phenomenon in its particular situation” (Schneider & Spieth, 2013). This research contributes to filling this research gap by taking the case of a mobility service provider in a developing city that began using a new type of product (EV). The research illustrates the formulation of a new vision by the managers, as well as business actions taken by the company to achieve business model innovation in a context where even the innovation ecosystem of EVs and electric mobility services is still under development.

While the research on BMI in relation with the development of dynamic capability and organizational design constitutes an important research focus in recent literatures (Teece, 2018), Cavalcante (2014) was the first to point out the importance of the pre-stage of business model change. “The main result of this study is the discovery of a ‘pre-stage’ of potential business model change, characterized by processes of experimenting and learning

that can subsequently lead to actual business model change (Cavalcante, 2014, p. 2).” Cavalcante (2014) defines the pre-stage as the stage in which the technology required to promote business model change is unavailable.

There are studies that focus **on the early phase** of BMI, based on empirical case studies (Brea-Solís, Casadesus-Masanell, & Grifell-Tatjé, 2015; Chesbrough & Rosenbloom, 2002; Evans & Johnson, 2013; Karlsson, Hoveskog, Halila, & Mattsson, 2017; Snihur & Zott, 2020) but without a specific focus on the pre-stage that is to be distinguished from the early stage by the availability of the required technology. As of December 2020, Cavalcante (2014) is cited by 39 articles. The author verified 27 of these articles<sup>80</sup>, and none of them offer an empirical focus on the pre-stage. The thesis expands the concept of the pre-stage to the unavailability of the **products**. Based on the conceptualization of a pre-stage by Cavalcante (2014), this research defines the pre-stage as the time period when the technology **or the product** to conduct a target BM change is unavailable.

The author claims that the research on the pre-stage of BMI is essential, since the struggles of the managers during this phase deepen the understanding of “the readiness for BMI”. This should attract the attention of researchers and practitioners as much as the process of BMI and the capability required to conduct BMI. However, there are hardly any empirical case studies that focus on the pre-stage after the definition of the pre-stage by Cavalcante (2014). This can be in part explained by the fact that the focus on the pre-stage requires the identification of a case company that aims at achieving a BMI so as to conduct an empirical longitudinal study.

Cavalcante (2014) states that during the pre-stage, “a whole set of activities can take place” (p. 14) without detailing what the whole set of activities can concretely resemble. The thesis contributes to demonstrating some concrete activities and challenges during this phase of business development.

*a) First contribution: expansion of the pre-stage concept to product unavailability*

The first theoretical contribution is the expansion of the concept pre-stage (Cavalcante, 2014) from a technological unavailability to a product unavailability.

Cavalcante (2014) distinguishes the phase of a business model change from its pre-stage by the (un)availability of the technology needed to implement the business model change. “A

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<sup>80</sup> These articles were accessible to the author.

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company that can overcome the challenges in the pre-stage will be able to implement business model change by the time the new technology becomes available (or soon after)” (Cavalcante, 2014, p.13). Cavalcante (2014) implicitly defines the pre-stage as a phase before a business model change when the technology required to implement this business model change has yet to be acquired (refer to the Figure 2 in Cavalcante (2014)). Cavalcante (2014) points out, with an empirical evidence, that the company faces different challenges during this phase. He highlights the importance of experimentation and learning during this phase.

The thesis, with its empirical evidence, affirms the necessity of defining the pre-stage of a business model change. Since a BMI is a type of business model change qualified as innovative, the author affirms the importance of defining the pre-stage a business model innovation.

The thesis, with its empirical evidence, suggests an expansion of the definition of the pre-stage from the one defined as the unavailability of the technology to the one defined as the unavailability of the technology **and the product**. The thesis suggests a definition for the pre-stage as a phase of business model change, or of business model innovation, when the required technology or the required product is not available.

### *b) Second contribution: the pre-stage requires different organizational capabilities*

The author applied the concept to the case company and showed that the nature of the **organizational capabilities** required during this phase shall be distinguished from the organizational capabilities required **to execute** a BMI.

### *c) Third contribution: influence on innovation ecosystems and ecosystem leadership*

As the third contribution, the thesis indicated that there are prerequisites that the company needs to satisfy in order to proactively overcome the challenges of **the innovation ecosystem** during the pre-stage. Market positioning, brand image and formulation of a BM that is mutually beneficial for both the company and the supplier can be potential prerequisites. The company, before engaging into a BMC, needs to assess to what extent the company satisfies these prerequisites during the pre-stage in order to evaluate to what extent the company can aspire to assume the ecosystem leadership and proactively move to the post-pre-stage. More empirical research is to be done in order to better understand the generality of these prerequisites.

*d) Fourth contribution: proposing a research model for future BM /BMI research*

The fourth contribution is the author's proposition for future research of BMs and BMI (refer below p. 382) in order to better understand "what is really the nature of a BM and BMI and how it should be conceptualized" (Foss & Saebi, 2018). The proposition is to answer the call: "BMI literature does not possess **clearly articulated research models** that lay out the basic causal web-connecting antecedent, moderating, and mediating variables with the key construct and consequences" (Foss & Saebi, 2017).

The thesis confirmed that the focus on a critical turning point – the availability of Technology and Product – serves to define the pre-stage of BMC. As is mentioned in the third contribution, future research can identify other important turning points to be considered. Moreover, the author suggests that the research model which takes different turning points into consideration will be of use to better evaluate the importance of different BM components suggested by scholars. The author claims that empirical research on BMs and BMI that takes taking turning points and BM components into consideration helps the construction of a rigid definition of BMs and BMI. The (past and future) BMs and BMI research can be normalised with BM components and corresponding turning points so as to evaluate the validity of each BM component<sup>81</sup>.

The author encourages longitudinal empirical research which takes critical turning points into consideration by analysing the differences before and after the turning points, so as to be able to understand different aspects (components and phases) of BMs and BMI.

*V) Managerial recommendations*

Following are possible managerial recommendations based on observations and analysis supported by literature reviews.

*1) Distinguishing different types of constraints*

First of all, the case company shall distinguish different types of constraints. The list of constraints made by the company does not distinguish business constraints and ecosystem constraints. Business constraints are the constraints that, when solved, facilitate the business development of the company, while solving ecosystem constraints facilitates the business development of other actors, including potential competitors. The distinction between two

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<sup>81</sup> For BM components suggested in the past literature is thoroughly reviewed for example by Massa et al. (2017).

different types of constraints is important since the nature of subsequent mitigation action differs. To address the ecosystem constraints, the company needs to consider in which condition the solution can give more advantages to the company than to its competitors. This was discussed during the field survey in 2018 and confirmed by the co-founder.

At the same time, it is not clear if constraints are linked to the current market or to future business development (service diversification). Specifying these points helps to prioritize the mitigation actions (See p. 327).

Table 24 Classifying different types of constraints by its nature and its market focus

	<b>Market</b>	
<b>Nature of constraint</b>	<i>Current market</i>	<i>Service diversification</i>
<b>Business constraint</b>	Constraints type A	Constraints type C
<b>Ecosystem constraint</b>	Constraints type B	Constraints type D

A classification enables managers to better understand the nature of each constraint and helps them prioritize information by its importance and the availability of data.

## 2) *Transforming innovation ecosystem constraints into business competitiveness*

Ecosystem constraints are barriers for business development that remain unsolved. Solving an ecosystem constraint means that the company is the first actor that overcomes the particular hindrance. It gives the company a chance to offer novelty to its clients. When there are several ecosystem constraints remaining in the innovation ecosystem, the company needs to consider which order those constraints should be solved in.

Business competency is a set of particular abilities and knowledge that sets a company apart from its competitors. Business competency enables a company to achieve competitive advantage.

Transforming ecosystem constraints into business competencies requires (partial or overall) business model innovation. This transformation process ensures the compatibility of both resilience to business environment change and the organization's adaptability to it.

### ■ *Prioritization*

The company's decision about which constraints it shall transform into business competency calls for a strategic coherence between current capability development and future business development.

This thought framework can help a company to develop the survivability, "replicability" and "diversifiability" of the service. With it, the enterprise can identify or obtain:

- New business opportunities (business growth),
- First-mover advantage (business resistance),
- Influence on the evolution of the ecosystem (business resistance),
- Different kinds of competency depending on the nature of the solved constraint.

"How ecosystem constraints can be potentially transformed into business competency" is a critical question that a company can address in line with the development of competitive advantage, especially First-Mover Advantage.

Along with the above question, the following bus-questions shall help the managers clarify their strategic direction.

- What is the current Business Model of the company?
- What are the business competencies of the company?
- What is the position of the company in the focal Innovation ecosystem?
- What kind of "repositioning" within the relevant innovation ecosystem will make it possible to achieve Business Model Innovation?

### ***3) Regional differences***

As suggested by the above-mentioned point, since the company pursues the development of its business in different cities, it should take into account the different regional market conditions that will influence the business's development in each region. The sequential diversification of services is one of the company's strategic intentions. Still, mobility needs and their evolution, like the evolution of the local innovation ecosystem and business ecosystem, differ from region to region. If the company intends to expand its business only in Bangalore, the main innovation ecosystem that it needs to take into consideration should be that of Bangalore. However, if the company aims to expand its business to other regions, it should study the innovation ecosystem of these regions as well. If the company develops a new business model that can also be replicated in other cities, it can promote a global



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development of the businesses in that city and enable the enterprise to build milestones in new cities as well. Naturally, the national-level innovation ecosystem also impacts business development and, for that reason, should also be studied.

The company has already started providing EV charging infrastructure and bus services in Delhi. Nonetheless, the configuration of the company's business ecosystem differs between Delhi and Bangalore. How can the company secure its competitive advantages in each region? How does it identify market opportunities prior to other competitors in each region? The importance of regional perspective increases over time. This regional difference brings us to consider the following point. A question could be to know how a company should deal with regional innovation ecosystems and national innovation ecosystems. In any case, those two are different perspectives whence they should clearly be distinguished.

### *4) Preparing an appropriate organizational structure*

The author points out that it is important to distinguish different types of constraints and to consider regional differences. For the moment, the CEO and the co-founder take initiatives in identifying new market opportunities and constraints, as well as formulating mitigation actions.

Now the company expects to have two different services, which are EV charging and bus services. Also, the company expects to operate in different cities such as Delhi, Bangalore, Mumbai, Chennai and Pune. The diversification of services and geographical expansion multiply the constraints. The company needs to consider regional constraints as well as pan-Indian constraints. The company needs to consider constraints of different service domains. Each ICE vehicle-based mobility service should be analysed and evaluated regularly so as to determine when to enter the market. This activity is currently done principally by the CEO and co-founder. Through they sometimes work together and sometimes independently on this regard, the activity is unorganized, thus not systematic. This evaluation process should be clearly defined within the organization as an important business activity.

The survey in 2018 suggests that several employees in the company have ideas on further business developments. How does the organization benefit from such buried ideas?

The organizational structure needs to adapt to the situation: the process of constraints and market identification can be structured accordingly, as well as the formulation of mitigation actions.

Related to this multiplication of constraints and market identification, it should be mentioned that the vision of the company remains vague in terms of service diversification. For the moment, it continues to have an opportunistic approach. With this knowledge, how to ensure organizational flexibility and agility is another important point. As the number of branch offices and the number of employees increase, special efforts need to be summoned to ensure the flexibility and agility of the company.

#### *5) Involving different actors: taking the future business model into consideration*

For a further business development, the key actors are not only electricity generator companies or distributors. As it is the case in Delhi, EV charging projects, bus projects, and the relationship with local governments appear to be important. For the optimization of traffic, collaborative research with universities or other research institutions can also be of use. The co-founder also claimed that not every investor supported LUT to diversify its service.

In order to involve different actors, ecosystem leadership appears to be important in the discussion. In practice, managers shall not ignore, as is mentioned previously, the importance of automobile parts companies or other companies possessing technology or products that are important in developing new mobility services. The company can strive to collaborate with such companies so as to better negotiate with EV manufacturers. Companies of mobile phone networks, for example, that possess data on human movement and goods transport, can be potential business partners.

***Recent developments in local business environment: evolutions up to 2021***

The results and discussions in the chapter, as well as the managerial presented above are based on the evolution of the case company and its business environment between 2015 and 2019. The author started the preparation of the research in early 2015 and officially started the research activity in late 2015. This time period corresponds to the foundation of the company: October 2015. The author conducted four field surveys since 2015 and the author sets 2019 as the end of the case study.

In the chapter 1, the author described the local context of the research by presenting information dated around 2015 up to 2017. This corresponds to the period when the managers of the company elaborated their initial vision of the company and strategic intentions by trials and errors. The information on the local context at that time helps to better understand the pre-stage situation of Business Model Innovation: the principal focus of the thesis.

Nevertheless, there have been some remarkable evolutions in its business activity after the end of 2019 up to today: May 2021. The author here describes some of these evolutions so as to better depict what the pre-stage of BMI is and to depict what concrete actions the company eventually took based on strong intentions of the managers toward BMI.

The author presents below the recent development of EV market in India, the recent evolution of the electricity supply situation and the recent development of the EV charging infrastructure. The author then presents the fact that the company started a partnership with two local actors so as to deploy EV charging network: the company started participating in the development of the infrastructure required for the diffusion of EVs and electric mobility services. This recent development coincides with a change in management structure.

■ *Recent development of EV market in India*

The EV sales in India in the fiscal year<sup>82</sup> of 2019 is 152,000 units. This number is six times greater than the EV sales in 2015. The growth in 2017 and in 2018 is phenomenal as the number doubles year by year. Since the data excludes 3-wheeler EV sales, more EVs are sold in India last five years.

Table 25 Number of Electric Vehicle Sales in India from 2015 to 2020

<i>Fiscal Year</i>	<i>2015 - 2016</i>	<i>2016 – 2017</i>	<i>2017 – 2018</i>	<i>2018 – 2019</i>	<i>2019 – 2020</i>	<b>Total</b>
2-wheeler	20,000	23,000	54,800	126,000	152,000	<b>375,800</b>
4-wheeler	2,000	2,000	1,200	3,600	3,400	<b>12,200</b>
EV sales total	22,000	25,000	56,000	129,600	155,400	<b>388,000</b>

Source: Society of Manufacturers of Electric Vehicles (2021)

However, the majority of EV sales in India is occupied by 2-wheelers EV: when focusing on 4-wheeler EVs, the sales in 2019 count only 3400 units. It is true that the number is in increasing trend, but considering the automobile market volume of the country, the number stays marginal.

This number tells the importance of the start-up company that this research studied. The company operates 1,111 EVs as in May 2020 and this occupies the 9.1% of 4-wheeler EVs sold in India since 2015: 12,200 units. The author emphasizes that understanding the business activities of the case company is fundamental for the understanding of the EV diffusion in India.

<sup>82</sup> Fiscal year in India starts from April and ends in March.

■ *Recent development of electricity supply situation in India*

Here the author presents the latest evolution of the local electricity supply situation.

India, based on the data of 2019, represents around 17.74% of the world's population (Charles Rajesh Kumar & Majid, 2020). While the country steadily adds the electricity generation capacity, the energy remains scarce since the demand for electricity continues to grow due to the fast economic growth, urbanization and rising income level that changes people's lifestyle (Charles Rajesh Kumar & Majid, 2020). The power supply availability stays in deficit against the requirement by 0.5% and by 0.7% of deficit for the peak demand in the Fiscal Year (FY) of 2019 (Ministry of Power & Government of India, 2021). The provisional data up to February 2021 also stays deficit by 0.4% for energy requirements and by 0.4% for the peak demand (Ministry of Power & Government of India, 2021). Nevertheless, it should be mentioned that there has been an improvement as compared to the past situation. For example, the energy deficit counts 2.1% for the FY 2015 and the peak demand deficit was even 3.2% (Ministry of Power & Government of India, 2021).

At local level, power outages in urban India continues to occur in 2020 and in 2021 not only due to energy deficit but also due to technical reasons as mentioned in the chapter 1 (Hussain & Times News Network, 2020; Lalitha & Express News Service, 2021; Times News Network, 2020). While the stability in electricity supply is essential component for the diffusion of EVs and for the deployment of e-mobility services, it remains as an unpredictable parameter for individual users and for corporate users.

In order to increase the installed electricity generation capacity, the government of India continues to integrate renewable energy sources into its energy mix. The electricity generation capacity from renewable energy sources has doubled by FY 2019 (65.78 billion unit) as compared to that of FY 2015 (138.32 billion unit) (Central Electricity Authority, Government of India, & Ministry of Power, 2020). This is equivalent to the yearly average increase of 20% from 2015 to 2019. The portion of renewable energy sources within the national energy mix has also increase from 5.61% in FY 2015 to 9.96% in FY 2019 (Central Electricity Authority et al., 2020). This indicates that the energy mix transition from non-renewable energy sources to renewable energy sources is under the way in India. As the consequence, the electricity required to charge EVs is becoming more environmentally friendly.

■ *Recent development of EV charging in India*

Historically, it was an EV manufacturer - Mahindra-Reva (currently rebranded as a part of Mahindra-Mahindra) – that has taken the initiative for the deployment of EV charging infrastructure. The number of EV charging infrastructure deployed by the company is detailed in chapter 5. However, since mid-2017, the company retired from the country-wise EV charging infrastructure deployment. The author has an opportunity to have an informal exchange with the head of strategy and business planning of Mahindra-Reva at a conference in 2016, he already mentioned that the EV charging infrastructure should be taken care by third party actor and not by EV manufacturers.

Lately, local actors such as Tata power and Ola Electric have deployed or have plans to deploy EV charging infrastructures (Miguel, 2021; NEWS18.COM, 2021). In Bangalore, the local public electricity distribution company – BESCOM – operates 136 EV charging units at 70 locations as in February 2021 (Christin, 2021). It is the largest network of charging stations among other electricity supply corporations in the country and the company has decided to add other 140 charging stations (Christin, 2021). This number exceeds the number of EV charging points provided by Mahindra-Reva in Bangalore since 2015 up to 2017 (c.f. chapter 5).

***Recent business development of the case company since the beginning of 2020***

In this local context presented in the previous column, two key evolutions are observed within the case company's business activities. (A part of the information below is also presented in page 159.)

■ *Change in management team*

In February 2020, the CEO stepped into a non-executive role and the former co-founder became the new CEO, taking up day-to-day operations (Banerji & Balakrishnan, 2020).

■ *Partnership with Fourth Partner Energy and HIDCO for EV charging network*

In September 2020, LUT got a partnership with West Bengal Housing Infrastructure Development Corporation (HIDCO) and Fourth Energy Partner to develop a network of EV charging station in New Town in Kolkata (Economic Times Energy World, 2020). With HIDCO, the company deployed 25 EV charging stations in Fintech Hub in New Town Kolkata (Bandyopadhyay & Chakraborti, 2020).

■ *Taking actions to move forward*

These second evolution shows that the company eventually started engaging itself into the development of the e-mobility innovation ecosystem beyond its principal business activity. This can be interpreted as a result of learnings during the pre-stage of BMI. While the project is at the initial stage of its evolution, appropriate organizational changes will be required if this business activity grows to a certain size. The change in management team can be considered as a part of it.

The case company did not wait for the EV charging infrastructure to be completely developed by other actors.

## *VI) Research limits and future research orientations*

### *a) Research limits*

This section reviews the characteristics of the case study and of the application of theoretical frameworks so as to clarify the boundary of the research applicability.

The research took a start-up company providing a service to business clients in cities in India as a case study. The research longitudinally analysed the business development of the company from BMI perspective as a theoretical framework for the study.

The case company has three declared strategic intentions: the establishment of FMA, the diversification of services and the formation of the brand and client club. In this research, the author analysed this start-up company and applied BMI as a theoretical framework. While the observed company did not complete a BMI, the author claims that the observation of companies at a stage before BMI is essential to understanding the nature of the phenomenon.

In addition to these characteristics, the author points out that the observed case company also has the following characteristics. First, the company had intentions to change its business model through a combination of service diversification and geographical expansion. The managers of the case company did NOT have clearly recognise that the company seeks to accomplish a BMI (as is defined theoretically in academic domains). However, the managers and the employees at the headquarters do share an aim to identify a new business model in order to develop the company or to change the business model. The managers and the employees are unconscious in regard to BMI, but they are informed about business models, though the term was not necessarily used as it scholars had defined it. Secondly, the observed company identified a market for its service and run the business ahead of the relevant innovation ecosystems. In particular, the author refers to the innovation ecosystems of products and ICT systems required to provide the service(s) and of relevant infrastructure, such as electricity and battery charging. Due to the relative immaturity of relevant innovation ecosystems, the company faces constraints in these innovation ecosystems that hinder it in achieving its strategic intentions. Thirdly, these constraints are managed by a list that links constraints and the corresponding mitigation action by pairs. The managers use this list as a managerial tool to deal with the constraints in the innovation ecosystems.

The author suggests that the research is of use for those wish to understand the nature of business model innovation with above-mentioned parameters.

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Apart from the research limits described above, the research faced some technical difficulties during its execution.

Firstly, the case company had not completed a BMI during the period when the field research was conducted (2016 - 2019). The author evaluates that the research observed the very beginning of a BMI phenomenon when a company has the intention to diversify its business and starts exploring different business opportunities, though the company is not even sure if there are any demands towards the new business that the company is exploring. This research does not deal with a question about “what a successful BMI is” but rather deals with “how does the process of BMI initiate in the first place?” Secondly, dissociating business activities in the organization related to BMI from ordinary business development activities is difficult. Business development and BMI are two continuous interacting. Neither the vision nor the strategic intention of the company could have been clearly distinguished from general business development activities. Thirdly, the research collected data on the development of innovation ecosystems with support from the case company. The author tried his best to cover variant information resources and different actors; however, this method has its own limit of comprehensibility.

### *b) Future research orientations (theoretical focus on BM / BMI)*

#### ■ *Empirical research models taking turning points into consideration*

The author claims that **empirical research** on BMI that takes different **turning points** into consideration is necessary to advance the understanding of the nature of BMI and BM.

Understanding “what is really the nature of a BM and BMI and how it should be conceptualized” (Foss & Saebi, 2018) is still being discussed. The author’s proposition is to answer the call: “BMI literature does not possess **clearly articulated research models** that lay out the basic causal web-connecting antecedent, moderating, and mediating variables with the key construct and consequences” (Foss & Saebi, 2017).

1. BMI is a phenomenon that can only be qualified after the completion of the process

The research applied the conceptual framework of Cavalcante (2014) on business model **change** to a business model **innovation** envisaged by the managers of the company since the author considers that business model change is a wider concept, and the innovation of a BM is included in the changes of a BM. Foss & Saebi (2017), for example, define BMI as “designed,

novel, and non-trivial changes to the key elements of a firm's business model and/or the architecture linking these elements" (p. 13).

The observation of the research case confirms that it is practically impossible to qualify whether any change observed during the pre-stage shall be considered as a part of the BMI or rather as trivial "minor changes" (Foss & Saebi, 2017, p. 13).

A BM change can be qualified whether it was a BMI or not by evaluating whether the business performance of the company, with its new BM, excels that of its competitors, or whether the business with the new BM is competitive or not, for example.

2. Taking conditions into consideration apart from the condition of availability of technology/product

The author hereby suggests, as a theoretical contribution, a proposition for future research of BMs and BMI so as to better understand "what is really the nature of a BM and BMI and how it should be conceptualized" (Foss & Saebi, 2018). The proposition is to answer the call: "BMI literature does not possess **clearly articulated research models** that lay out the basic causal web-connecting antecedent, moderating, and mediating variables with the key construct and consequences" (Foss & Saebi, 2017).

The author claims that taking different conditions corresponding to each BM component during a BM change process into consideration is an important step to developing a rigorous and robust theorization of BMs and BMI.

Similar to the lack of agreement on the definition and the components of BMs, there is a challenge as Massa et al. (2016) claim that BM and BMI research has been challenged; in fact, to some scholars it is not obvious that it was asking new questions using novel insight to address and solve those questions.

The literature review part of the thesis revealed that there are four essential components of BMs suggested by the scholars: value proposition, revenue model, leadership and value network. The author claims that these components correspond to several **turning points** (Dumez, 2016, p. 124) during BM change.

While the observed case company was struggling to obtain a product to promote a BM change, new client acquisition and monetization with a newly changed BM are expected to



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equally be challenges for the company after the pre-stage. The managers of the case company were trying to develop a competitive business with an envisaged BM.

Each of the four BM components identified through the literature review can be considered as a condition to be met during a BMC process.

The validity of envisaged value propositions of the new BM can be evaluated at the point when the company acquires new clients (or not). The validity of the envisaged revenue model of the new BM can be evaluated at the point when the company successfully monetizes with the new BM. The validity of the envisaged leadership of the new BM can be evaluated at the point when the company successfully completes the BM change. Finally, the validity of the value network of the new BM can be evaluated after the completion of the change by assessing if the new BM is competitive or not. Here, it is important to note that these BM components can be tested only in the post-pre-stage period, not before.

Note that the suggestion here only includes 1) identifying a corresponding turning point to evaluate the validity of a (potential) component of a new BM<sup>83</sup>, and 2) narrowing the unit of observation to different turning points so as to decompose the  $\Delta BM(N-0)$  to facilitate detailed analysis on a change process of BM. This is a sequential analysis (Dumez, 2016, p. 123). By doing this, the author claims that each empirical BM and BMI research can contribute in “lay(ing) out the basic causal web-connecting antecedent, moderating, and mediating variables with the key construct and consequences” (Foss & Saebi, 2017).

Note that the order of turning points can change according to the (potential) components of BMs that each empirical research suggests, or according to the nature of the process of the change: the monetization and the acquisition of the first client can happen simultaneously, for example.

### ■ *When to have a clear and concrete BM idea?*

The research suggests that the process of BMI can advance without the managers having a concrete idea about the business model that the company aims to realise. The observed company's key phrase is "becoming an e-mobility service platform," but it did not have any concrete business model to realise. Still, the company expanded the geographical coverage of a service and was about to diversify its service. The author considers that a process of BMI was about to start, though the managers did not have a concrete description of what “an

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<sup>83</sup> Note that the author does not claim that the four components of BM identified by the literature review are correct.

e-mobility service platform” was. In this situation, it is difficult to clearly distinguish whether any choice that the company takes is based on its intention to achieve BMI or based on other parameters, such as establishing FMA. The author claims that this ambiguity should be elucidated to better understand the nature of the BMI process: a clear conception of future BMs shall not be a prerequisite for the initiation of the BMI process. **Research focusing on the distinction or the interconnection between the formulation of BMs and the realisation of BMI shall be interesting in order to understand the different natures of these phenomena.**

#### ■ *BMI and project and project management*

Another theoretical focus can be about business model innovation and project management. As was observed during the research, the process of BMI requires significant means of project management. This includes identification of business opportunities, assessing available internal and external resources, assessing the feasibility of a new business model and the financial sustainability of the business model etc. Achieving BMI is a time and resource-consuming project for a company. As was mentioned in the discussion, dynamic capability appears to be essential, and, more concretely, the competence of project management is important for the company.

Here **the author suggests addressing how a BMI can be dealt with as a program with different projects in it.** Different types of project management can be applied to different types of projects: identification of business opportunities, identification of innovation ecosystem constraints, managing customer relationships and managing the development of value network within innovation ecosystems.

#### ■ *BMI and corporate entrepreneurship*

**The other theoretical research orientation can focus on business model innovation and corporate entrepreneurship.** In order to achieve BMI, the company needs explore different business opportunities and identify constraints. In this research, the CEO, a co-founder and the COO played an important role to establish the company, and they continued to play an entrepreneurial role to develop new services. However, the limiting factor to their activities was manpower, as it encompassed only them.

The managers were trying to spare time by stabilising the operation of existing services, but it shall not be enough. The corporate entrepreneurship activities will be structured and organised so as to make the activities independent of individual skills. This point is also highlighted in the context of dynamic capability and is relevant to the development of

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ecosystem leadership. It is pointed out both in the discussion and in managerial recommendations. The author deduces that the leadership can be organised and can be developed while dependent on individual skills. This incites research to dig deep into the literature of corporate entrepreneurship and shall be analysed and discussed under the context of business model innovation with perspectives of innovation ecosystem development and organizational change management.

3. There is still a lack of clarity on whether BM and BMI are independent or dependent variables: the issue of the unit of observation

Similar to the lack of agreement on the definition of a BM and of a BMI (Foss & Saebi, 2017, 2018; Massa, Tucci, & Afuah, 2017; Rasmussen, 2015; Wirtz et al., 2015), it is not yet clear if they are dependent variables or not (Foss & Saebi, 2018).

Foss & Saebi (2018) point out the lack of clearly defined units of analysis is a critical reason for which there exist the lack of “construct clarity” in BM and BMI theory. The author claims that it is critical to distinguish **three units of observation** as sub-sets of the unit of analysis: the initial BM, the new changed BM and the differentiation between them.

As is stated by Foss & Saebi (2018):

Ideally, we want such constructs to create cognitive order out of the “booming, buzzing, confusion” of the business world by offering ‘robust categories that distill phenomena into sharp distinctions that are comprehensible to a community of researchers’ (Suddaby, 2010: 346). “Good theorizing is based on the creation of this kind of cognitive order. If our constructs are unclear and possibly overlapping, we will also likely get causality and mechanisms wrong.

Ideally, the following equation should be valid:

$$\mathbf{BM(N) - BM(0) = \Delta BM(N-0)}$$

with,

BM(0): the initial BM at the beginning of BM change,

BM(N): the new changed BM at the completion of BM change, and

$\Delta BM(N-0)$ : the differentiation between BM(N) and BM(0).

The author claims that the distinction among BM(0), BM(N) and  $\Delta BM(N-0)$  helps to clarify what the respective empirical research on BMs and BMI observes at and focuses on.

Generally, empirical BM research observes and analyses either BM(0) or BM(N) when the empirical observation is static, whereas empirical BMI research observes and analyses the totality of the three units of observation or a combination of two of them in order to analyse the change.

The thesis, through empirical research, observed the BM(0) of the case company and the envisaged BM(N) of the case company, though BM(N) was not attained. For the observed company, the BM(0) was a business-unit level business model while BM(N) was a corporate-level business model. Foss & Saebi (2018) point out that “the issue is seldom raised whether a business model is strictly a business unit property or if it can also be a corporate level property proper (and, if so, what is the relation between the business and the corporate model)” (p. 12). **The author claims that a business model shall not necessarily strictly be a business unit property by definition in order to enable the analysis of similar case companies within the conceptual framework of BMs and BMI.**

The author claims that the distinction among BM(0), BM(N) and  $\Delta\text{BM}(N-0)$  also helps to clarify the lack of clarity on whether BMs and BMI are dependent variables or not. While the definition of BMs and BMI has not yet reached an agreement, if a part of  $\Delta\text{BM}(N-0)$  originated from a component of BM(0) OR if a part of  $\Delta\text{BM}(N-0)$  serves as a component of BM(N), it appears that there is at least one dependent variant between the BM and BMI.

It must be noted that if a definition is one day agreed upon and if the agreed definition of BMI does not embrace any part of  $\Delta\text{BM}(N-0)$ , then the above paragraph will not be valid. However, it does not mean that the proposed units of observation will be useless for the advancement of BM and BMI research. The distinction between these units of observation stays helpful because of the following reason.

#### *c) Future research orientations (operation-oriented research)*

Apart from theoretical orientations of research, the author suggests three orientations of practice-oriented research that in turn contribute to deepen the understanding of BMI, innovation ecosystems and organizational change management theories.

##### ■ *The relationship between automation technology and human role*

The research observed that the company introduced automation technology for routing and scheduling. This automation, however, was not complete and employees always needed to verify and modify the schedule manually. Knowing that the complete automation of routing

and scheduling will be possible one day, the author deduces that certain operations of a business will always remain manually operated. If the automation is complete, why will certain human roles (or functions) stay? What are the reasons behind this? Is it due to technological reasons, economic reasons, ethical reasons, emotional reasons, political reasons or regulations? This research focus will help companies that (try to) apply automation technologies to its value creation process think about the diffusion of advanced technologies and possible ways of BMI. The way automation technologies replace or modify human roles (or functions) influences the efficiency of value creation process. If any human role (or function) remains unchanged, that unchanged role can be a key source of value creation depending on the reason for which it remains unchanged.

Understanding potential changes in human roles by the introduction of automation technologies leads to understand an essential question of a business model: value propositions and value creation. New value propositions can be offered by a value creation process with a new combination of human roles and automation technologies. If these human roles are required due to the demand from clients, these human roles shall be sources of competitive advantage. If these human roles are required due to lack of corresponding technologies, these human roles may be replaced by automation technologies once further advanced technologies are invented. If these human roles are required due to regulation, these human roles do not become a key process since all other competitors also need to keep these roles due to the same regulation.

Related to the previous focus, the second possible orientation of the research is about the importance of peripheral data and pre-routing. The research observed that the company makes good use of roster data from client companies. CET service was a best fit for EVs since the route is pre-fixed, while updated data such as employee “emergence meeting” also helps. The company tried to initiate a pilot project in collaboration with a delivery service company, but this did not take place because the delivery company could not provide daily expected routes. For future mobility services, data obtained from different devices, such as smart home appliances and mobile phones, would become important.

■ *Demand for service-oriented products (design and payment option)*

The managers of the observed company emphasize the importance of the availability and the price of products (EVs in the case). Different mobility services require different robustness, features and design, and this includes questions on the payment mode of products: one shot payment, pay-as-you-go system or flat-rate subscription system, for example.

The service company was envisaging to design products together with manufactures. In that case, the business strategy of parts companies that supply parts to manufacturers may change as well. (In the observed case, important parts can be GPS tracking device, for example.) Such parts companies potentially need to promote the usage of their parts directly to service providers rather than to manufacturers. For that, it is important for parts companies to understand the value of their technology from the perspective of service providers. This potentially changes the structure of the innovation ecosystem of products (manufacturing).

Upon this foundation, how must the company distribute the captured value among these actors? This question is not only about the ratio of distribution but also considers the time aspect.

■ *To what extent has the convergence of different innovation ecosystems advanced in the mobility sector?*

The case company identified diverse constraints within the relevant innovation ecosystems. The company envisages to mobilize the advantage of different advanced technologies for service diversification, such as different types of electric vehicles and solar photovoltaic energy. The company was trying to integrate new technology-based products into its services. This induces the development of a value network that traverses different innovation ecosystems that, up until then, had not had direct connections with each other. This leads us to raise following questions:

To what extent does the development of the business model of a service provider impact the development of an innovation ecosystem?

## *VII) Conclusion*

The issue of the availability of the product required for a BMC is a critical stake for companies envisaging to develop CA through BMC or to achieve a BMI. The thesis applied the pre-stage of a BMC as defined by Cavalcante (2014), originally limited to technology availability, to product unavailability. Unavailability of the required technology or product can be a strong prerequisite to be solved before the beginning of a BMC process. The company proactively envisaging a BMC needs to solve this issue with the supplier; this is one of the five forces of the positioning view (Porter) while the development of the relevant innovation ecosystem remains uncertain.

## CHAPTER 7 - Conclusion: result, discussion and theoretical contribution

The thesis suggests that the nature of the organizational capabilities required during the pre-stage to proactively overcome the pre-stage is different from that of the organizational capabilities required during the post-pre-stage. The author took the dynamic capabilities, learning capabilities and experiment capabilities and discussed the specificity of the capabilities required during the pre-stage, along with the formation of a competitive advantage. For the company that does not develop its own product, it is critical to ensure ecosystem leadership in order to promote other actors to make favourable changes, thus encouraging the suppliers to start producing the required product.

Overcoming innovation ecosystem challenges as well as business ecosystem challenges connected to the prerequisites of a BMC before its competitors is critical for a company to develop FMAs. The capabilities required during the pre-stage are not necessarily the dynamic capabilities which are suggested as critical for a BMC. A company envisaging a BMC must develop a capability to 1) identify the challenges, to 2) prioritise the challenges and to 3) solve the challenges so as to satisfy the prerequisite. A real-option approach may be mobilised during the pre-stage by taking different turning points into consideration as evaluation points. This revolves around the capability to learn.

The thesis, based on empirical observation, suggests that the capability to manage its stakeholders and ecosystem leadership are required as well during the pre-stage. In particular, ecosystem leadership that offers a solution for product unavailability is critical if the company wishes to proactively change its BM and not to take a wait-and-see strategy.

The author suggests a research framework taking different turning points into consideration for further BM and BMI empirical research so as to deepen the understanding of the components of BM and different phases of BMI. This type of empirical research will help clarify the definition of BMs and BMI by decomposing the phenomena of BMC into pieces. In order to do so, further empirical research and discussions are expected. First, they will help identify critical/valuable turning points for BM/BMI study. Secondly, they will help evaluate important components of BMs in each phase of the BM creation, modification and innovation.

*THIS IS THE END OF THE MAIN CONTENTS.*



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## Abbreviation and definition

### List of abbreviations and definitions

Bangalore	A city located in south India  The capital city of Karnataka state. Since November 2014, Bengaluru becomes the official name of the city. Bangalore is used as the name of the city in the thesis as it is still commonly used in and out India.
BE	Business Ecosystem  Business Ecosystem is a company centric concept. It signifies the totality of a value network required for a company to provide a product or a service to the clients.
BM	Business Model
BMC	Business Model Change
BMI	Business Model Innovation  Business Model Innovation is defined as “a new integrated logic of value creation and value capture, which can comprise a new combination of new and old products or services, market position, processes and other types of changes in order to advance, compete and differentiate themselves successfully in their marketplace (Björkdahl & Holmén, 2013)”.
BPO	Business Process Outsourcing
CA	Competitive Advantage
CEO	Chief Executive Officer
CET	Corporate Employee Transport
C&MA	Constraints and Mitigation Actions
COO	Chief Operating Officer
DCs	Dynamic Capabilities
EM	Electric Mobility
EV	Electric Vehicle
FMA	First-Mover Advantage
GoI	Government of India
GPS	Global Positioning System
ICT	Information and Communication Technology
IE	Innovation Ecosystem  Innovation Ecosystem is an innovation centric concept.
LR	Literature Review
LUT	Lithium Urban Technologies
NDA	No Data Available

OEM	Original Equipment Manufacture
PV	Photovoltaics
RBV	Resource-Based View
R&D	Research and Development
T&P	Technology and Product

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## Appendices

### 1) Appendix 1: Market expansion of ICT-based service provider

The following companies are, as in 2016, operating ICT-based logistics service in representative cities in India. These companies are some representative examples of Lithium Urban Technologies' potential competitors.

A: MoveInSync 

B: CUBiTO 

C: Routematic 

D: Agiledge 

E: SAGE GO 

Table 26 City coverage of ICE based route optimization service providers (as in 2016)

		A	B	LUT	C	D	E
	Number of cities	14	6	2	NA	NA	NA
	Number of clients						
1 <sup>st</sup> tier city	Delhi	✓	✓	✓			★
	Bangalore	✓	★	★	★	★	
	Pune	✓	✓				
	Mumbai	✓	✓				
	Hyderabad	★					
	Chennai	✓					
2 <sup>nd</sup> tier city	Vadodara	✓					
	Bhuvaneshwar						
	Vishakhapatnam	✓					
	Mysore						
	Gurgaon		✓				
	Jamshedpur		✓				

Table 27 City coverage of ICE based route optimization service providers (as in the end of 2018)

		A	B	C	LUT	D	E
	Number of cities	22	NA	6	3	NA	NA
	Number of client	94		30+	~15		
1 <sup>st</sup> tier city	Delhi NCR	✓		✓	✓		
	Bangalore	★		✓	★	★	
	Pune	✓		✓	(✓)		
	Mumbai	✓		✓	(✓)		
	Hyd.	✓		✓	✓		
	Chennai	✓		✓	(✓)		
	Kolkata	✓					
2 <sup>nd</sup> tier city	Chandigarh	✓					
	Barmer	✓					
	Vadodara	✓					
	Duliajan	✓					
	Bhuvaneshwar	✓					
	Vishakhapatnam	✓					
	Mysore	✓					
	Mangalore	✓					
	Kochi	✓					
	Coimbatore	✓					
Trivandrum	✓						
Outs ide Indi a	Colombo (Srilanka)	✓					

*II) Appendix 2: Cost comparison between EV fleet and ICE fleet*

Detailed analysis on running cost comparison between e2o and Indica is following.

■ *Comparison between Indica and e2o's running cost with own battery and with battery lease*

Figure 24 shows the estimated running cost of e2o and Indica. In this graph, the running costs of e2o with own battery option and with battery lease option as well as the running cost of Indica are given. It implies that if LUT adapts battery own model, the running cost is as equal as Indica. If LUT adapts battery lease mode, the running cost can be less than that of Indica.

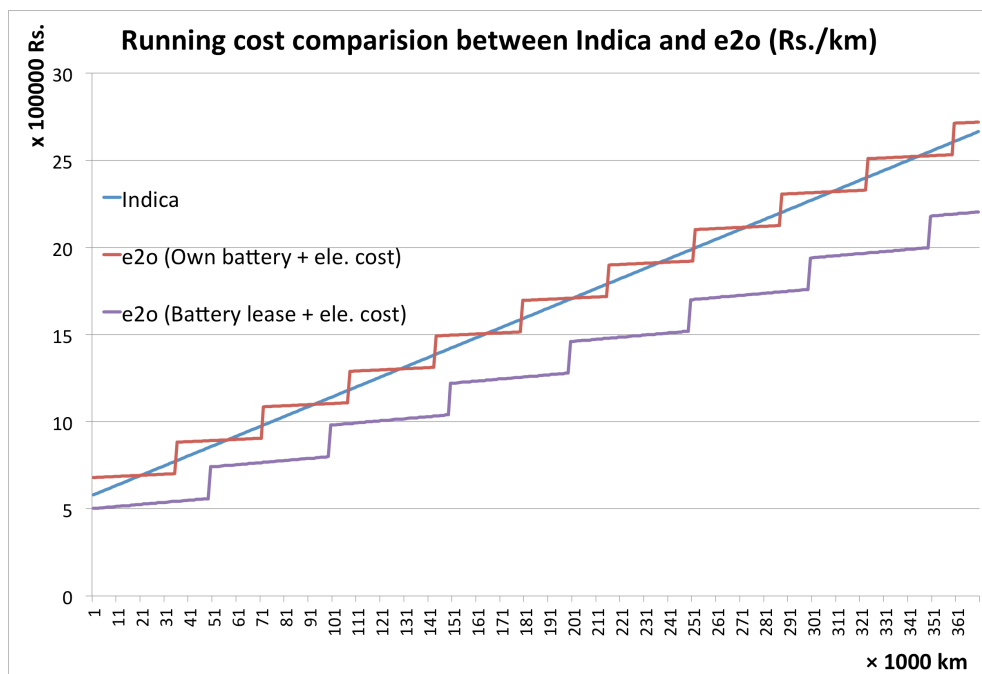


Figure 24 Running cost comparison between Indica and e2o

■ *Comparison with electricity cost and without electricity cost*

Figure 25 shows the estimated running cost of e2o and Indica. In this graph, the running costs of e2o without electricity cost are shown since LUT benefit from free electricity from client companies. It implies that even if LUT adapt battery own model, the total running cost can be less than that of Indica in long run.

It is also important to consider the cost of charging station that increase initial investment required to run e2o. LUT installs a charging station for each five e2o. (The number varies

depending on the client too.) When battery lease option is adopted, the total running cost of five e2o is less than that of five Indica.

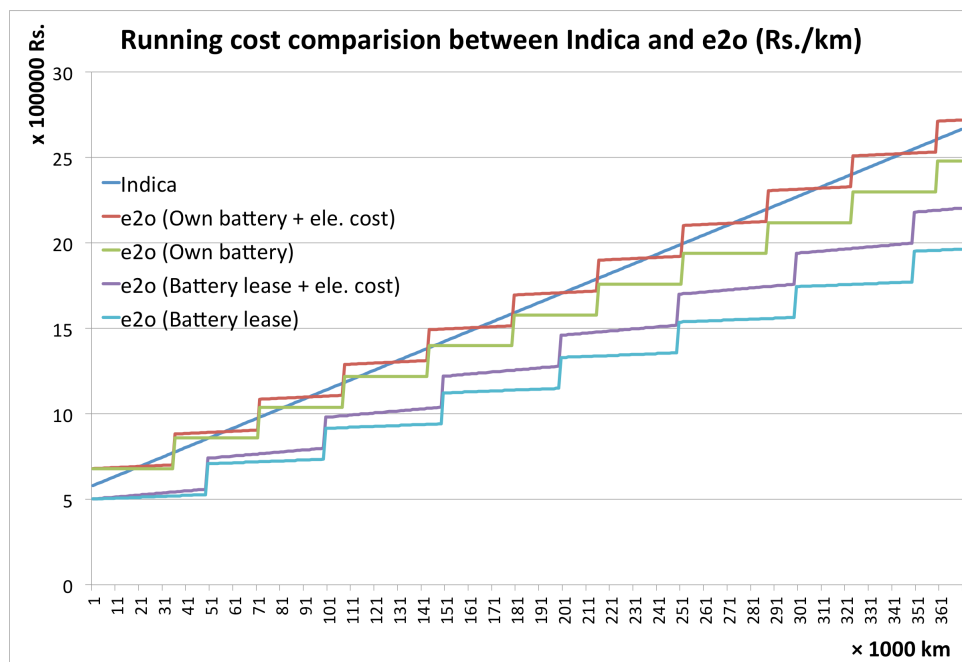


Figure 25 Running cost comparison between Indica and e2o (with and without electricity cost)

■ *Comparison with 5 units, with battery lease option with electricity cost*

Figure 26 shows the estimated running cost of 5 units of e2o and Indica. Price of a fast charger is added as the initial cost and it applies battery lease option. The electricity cost is included. This indicates that the greater number of fleets LUT operates, the gap between the running cost of ICE fleet and EV fleet can become large quickly. If ignoring other cost factors, the more EV fleet it operates, the faster it benefits from low running cost of EV fleets, once it is achieved.



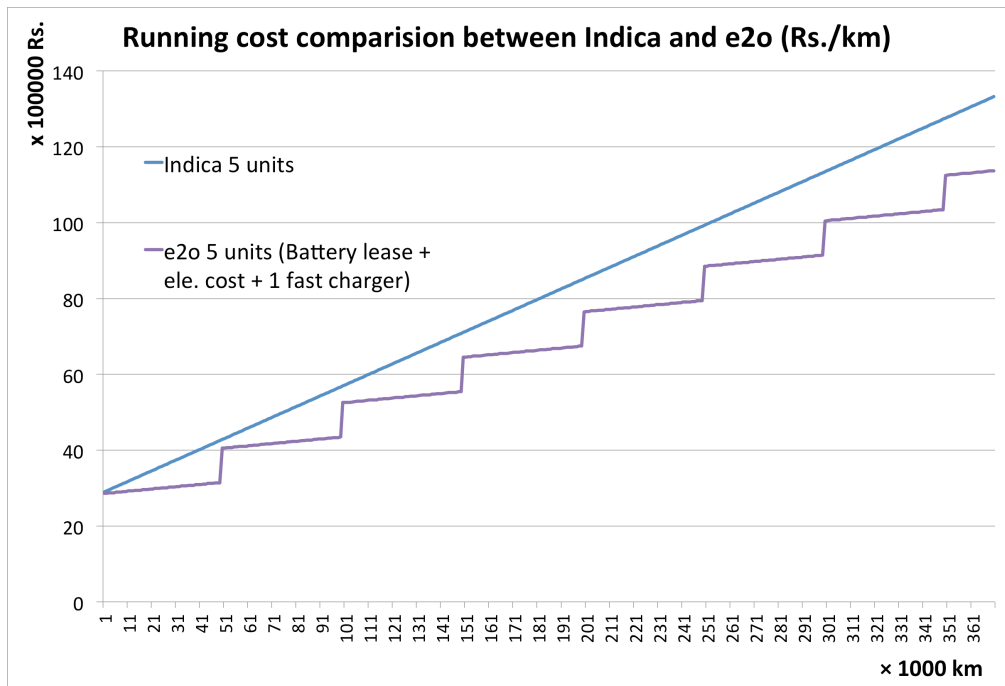


Figure 26 Running cost comparison between Indica and e2o

### *III) Appendix 3: Constraint and mitigation action*

Below is the list of “Constraints and Mitigation Actions (C&MA)” provided by the managers of the case company.

#### *1) Availability of vehicles*

LUT listed five constraints related to the availability of vehicles (c.f. chapter 6):

1. “Timing”: OEMs plan to introduce EVs only after 2019,
2. “Robustness”: early prototypes are built for retail and not fleet suitable,
3. “Feature”: vehicle designs are retail-led when it comes to cars,
4. “Mode of charging”: approaches vary between battery swapping and charging,
5. “Entrepreneurs”: entrepreneurs ready to produce EVs lack speed and reliability.

##### *a) “Timing”: OEMs plan to introduce EVs only after 2019*

For the development of FMA, LUT intends to develop new mobility services using EVs while it’s still part of the few limited companies possessing the know-hows on commercial EV operation. However, lack in variety of EV models in India stays as a constraint that hinders further market exploration of LUT.

##### ■ *Characteristics of constraint (type, dependencies and persistence)*

This “Timing” constraint is an ecosystem constraint since its resolution depends on the development of the innovation ecosystem of EVs. It is principally dependent on OEMs’ EV manufacturing plan. Further, the timing of OEMs’ market entry into EV market depends on the demand towards EVs: what kind of EVs can be sold at what price and how many EVs can be sold. Other parameters such as the diffusion of EV charging infrastructure and the implication of governmental policies and regulation also influence the market entry timing.

This constraint is transient. Once EVs become widely available on the market, this issue will permanently disappear. Therefore, if LUT intends to develop any competitive advantage by overcoming the constraint, it should be done before the permanent settlement of the constraint.

##### ■ *Mitigation action and its purpose*

In order to circumvent this constraint, a mitigation action mentioned by LUT is to “offer to work with OEMs to test their vehicles with the promise of potential procurement, and draw their plans forward”. The purpose is to make OEM aware of the demand for commercial use of EV and push the manufacturing plan forward so as to make OEM put their EVs on the market as early as possible. Pilot projects with three OEMs (including one e-rickshaw company) are a part of this action.

■ *Establishment of first mover advantage or sustainable competitive advantage*

This mitigation action mentioned by the managers is an ecosystem favourable action: it can profit all other potential competitors and it does not give FMA to LUT. One way for LUT to take advantage of this constraint is to consider this as a fact: since no EVs will be available for a certain time period, the company does not need to consider the possibility of potential mobility service provider starting a new service using newly released EV before this time period. This enables LUT to focus on the development of current service or the service development with currently available EVs.

The other way for LUT to take advantage of this constraint is to formulate a new business model while collaborating with OEMs. For example, LUT had a pilot project using eVerito. It resulted that LUT adapted eVerito as a part of its fleets. Since eVerito was already available on Indian EV market, it did not give any advantage to LUT. However, a similar situation with a new model EV is considerable: LUT can collaborate with an OEM, as is mentioned by the managers, so as to have a new model EV with favourable condition to LUT. In this way, the result of the mitigation action enforces the business competitiveness of the company and the result does not immediately be beneficial for all potential mobility service players.

b) *“Robustness”: early prototypes are built for retail and not fleet suitable*

The lack of robustness is considered as a constraint by the managers. Most OEMs’ priority lies on individual use of EVs and not on commercial use of EVs (c.f. chapter 6 section CHAPTER 5 - IV)2). The resolution of the constraint potentially leads LUT to achieve a BMI or to explore new business opportunity.

■ *Characteristics of constraint (type, dependencies and persistence)*

This “Robustness” constraint is as essential as the “Timing” constraint. The EV models that LUT requires for its operation are the ones that can resist to intense commercial usage. The Robustness constraint is dependent to OEMs manufacturing plan (= ecosystem constraint).

The constraint constitutes a critical component along with the previous “Timing” constraint and the following “Features” constraint, the resolution of the “Robustness” constraint is critical for the availability of EVs for commercial use.

Despite the “Timing” constraint, “Robustness” constraint is not completely transient. LUT needs to persistently verify the level of robustness of the available EVs so as to ensure a reliable business operation. It is nevertheless true that once OEMs become aware of commercial needs towards EVs, OEMs will manufacture EVs robust enough for commercial use.

■ *Mitigation action and its purpose*

In order to circumvent this constraint, a mitigation action mentioned by LUT is to “educate OEMs about the wear and tear in fleet operations, and also about battery life-cycles”. The purpose is to make OEM aware of the demand for commercial use of EV and encourage them to manufacture EVs that are durable for intense commercial use. Pilot projects with three OEMs (including one e-rickshaw company) are a part of this action.

■ *Establishment of first mover advantage or sustainable competitive advantage*

If commercial EVs become available, LUT can either improve the quality of its service or develop new services depending on the type of EVs. New service developments lead a new development of business ecosystem and innovation ecosystems. Solving this constraint does not directly enforce LUT’s FMA. However, new service development with a unique business model has potential to give FMA or sustainable competitive advantage to LUT.

c) *“Feature”*: vehicle designs are retail-led when it comes to cars

The “Feature” here includes, for example, the size of trunk room, the existence of passenger seat, cargo allowable weight and passenger/cargo space. Those features suitable for specific commercial use are critical for new business development.

■ *Characteristics of constraint (type, dependencies and persistence)*

This “Feature” constraint is as essential as the “Timing” and “Robustness” constraint. The EV models required for LUT’s operation are those that can be used for a commercial purpose. The “Feature” constraint depends on OEMs’ manufacturing plan (= ecosystem constraint). The constraint constitutes a critical component along with the previous “Timing” constraint and “Robustness” constraint, the resolution of the “Feature” constraint is critical for the

availability of EVs for commercial use. Like the “Robustness” constraint, “Feature” constraint is not completely transient. LUT needs to persistently keep verifying the features of available EVs so as to ensure its appropriate business operation. It is nevertheless true that once OEMs become aware of commercial needs towards EVs, OEMs would manufacture EVs with feature required for various commercial use.

■ *Mitigation action and its purpose*

Like Timing constraint, a mitigation action mentioned by LUT to circumvent its challenges is to collaborate with OEM. It envisages to “provide OEMs with specific design asks for fleet operations”. The purpose is to make OEM aware of the demand for commercial use of EV and push the manufacturing plan of EV for commercial use. Pilot projects with three OEMs (including one e-rickshaw company) are a part of this action. Same as “Timing” challenge, the mitigation action mentioned by the managers is an ecosystem favourable action; it can result favourable for LUT’s business development and at the same time all the other potential competitors.

■ *Establishment of first mover advantage or sustainable competitive advantage*

One way for LUT to benefit from this constraint is to formulate a mitigation action that can result in a favourable situation for the company. LUT can collaborate with an OEM, as mentioned by the managers, so as to have a new EV model with favourable conditions to LUT. In this way, the result of the mitigation action can enforce the business competitiveness of the company and won’t immediately profit all potential mobility service players.

d) *“Mode of charging”*: approaches vary between battery swapping and charging

This is indeed not a constraint that hinders the business development of LUT. Rather, it’s a factor that influences business strategy (or possible business model configuration) of the company.

■ *Characteristics of constraint (type, dependencies and persistence)*

This “Mode of charging” factor is, as says the co-founder, less important than constraints of “Timing”, “Robustness” and “Feature”. This factor is in fact a key parameter and not a constraint that hinders business development of LUT. It’s also principally ecosystem dependent since out of LUT’s direct control.

The deployment of EV charging infrastructure can be a business opportunity for LUT. This will be explained later in this section (c.f., section C, “Power infrastructure”).

This factor shall not be considered as a persistent factor since either mode of charging would prevail the market once it becomes the dominant design or several modes of charging can co-exist depending on the advantage and disadvantages of each charging method.

■ *Mitigation action and its purpose*

The managers take—as they call it—an agnostic posture to this: they do not pay attention to this factor as far as the robustness and feature are ensured for commercial use. This is neither a favourable business action nor a favourable ecosystem action. Isn't there a possible action that would be favourable business? For example, battery swapping option may cost more since LUT needs to purchase extra back-up batteries while it diminishes the charging time. In terms of operation facilitation of the current business, which option (either battery swapping or charging with a cable) is preferable?

■ *Establishment of first mover advantage or sustainable competitive advantage*

Given that LUT envisages exploiting decentralised energy sources like solar PV facilities to charge the battery and enforce its value proposition of CO2 reduction, it seems wiser to apply a battery swapping technology rather than charging with a cable. This point is related to the future business model of the company. The agnostic attitude of the managers can be rooted in the lack of reflection on its future business model. But at the same time, the lack of a thorough consideration of LUT's future business model caused the managers to take an agnostic posture.

The company has not explored entirely the possibility of its business development, probably because it's taken care only by two managers although the business development's focus is wide. To tackle this, regular internal discussions about the future business development or creating a permanent team in charge of it could help integrate and centralize the knowledge.

e) *“Entrepreneurs”*: entrepreneurs ready to produce EVs lack speed and reliability

The availability of EVs depends on OEMs' manufacturing plan as is mentioned previously. In addition to it, it is possible to have a new entrant in manufacturing EVs. Indeed, Reva-Electric, the predecessor organization of Mahindra-Electric, was a start-up company.

■ *Characteristics of constraint (type, dependencies and persistence)*

This “Entrepreneurs” factor is not a constraint for LUT. This factor is independent from the previous constraints. The activities of potential entrepreneurs for EV manufacturing companies are dependent to local business environment and start-up communities such as demands towards EVs and existence of investors.

This factor is dependent to the innovation ecosystem of EVs. This factor is principally transient: once enough offers of EV models are available, LUT does not necessarily expect entrepreneurs to develop new EVs since LUT can expect existing EV manufacturers to develop new EV models.

■ *Mitigation action and its purpose*

The mitigation action indicated by managers is to “collaborate or invest to accelerate the development of products” and to “build favourable arrangements into such deal”. With the mitigation action, LUT intends to seek business opportunities with those entrepreneurs.

■ *Establishment of first mover advantage or sustainable competitive advantage*

The mitigation action can lead the company to develop FMA that could be a long-term SCA. Nevertheless, the relationship between other EV OEMs should be well thought to have a special deal with a specific EV manufacturer.

The managers are considering collaboration with potential entrepreneurs so as to accelerate the development of EVs, and reflect on investing on EV development projects. This would be a business favourable action as LUT could profit from it if it goes successfully. It would also be an ecosystem favourable action as new EV models will be available on the market. The managers mentioned that for either case, LUT should “build favourable arrangement into such deals”.

*f) Summary of availability of vehicles*

All actions directed towards the vehicles’ availability increase impact the supply of vehicles in this innovation ecosystem. Once more vehicles are produced and put on the market, LUT intends to diversify its service, adding for example middle size taxis or large size taxis. Yet, at the same time, the EVs sold by OEMs will also be available for every other player than LUT. At the end, actions influencing the products’ availability are profitable for LUT and benefit the development of the innovation ecosystem.

The challenge is that vehicles' availability is tied to the development of innovation ecosystem. If LUT tries to solve it, it is preferable to prefigure the future development of its business model so as to adjust the design, technical specifications of new EV models. Furthermore, LUT can give more advanced advices on specifications such as data collection methods, types of data collected, price setting, maintenance methods so as to facilitate the business development of the company. For example, GPS tracking function, ease of maintenance, sensors that tell the timing of maintenance can be those advanced specifications. These functions are critical for fleet management. And it is important to reflect on those matters through the perspective of optimizing them so as to optimize the value creation and value capture of LUT's business.

## *2) Price of vehicle*

**LUT listed three constraints related to the price of vehicle (c.f. chapter 6):**

1. "Price of local EVs": Initial price are high for locally manufactured vehicles in the absence of volume.
2. "Price of imported EVs": Import tariffs are high
3. "EVs resale value": Banks are uncertain about the resale value of vehicle

These three constraints are closely linked to the revenue model of possible business models. The price constraint can be considered as a part of availability issues like "Robustness" and "Feature" constraint since LUT cannot start a commercial EV operation if the price condition does not match to required condition. However, LUT distinguish the price constraint from availability constraints. One reason can be because there are some perspectives such as payment method and resale value that include mid-long term solution in price constraints.

*a) "Price of local EVs": Initial price are high for locally manufactured vehicles in the absence of volume.*

The managers claim that the price of EVs is too expensive due to the lack of its manufacturing volume.

### ■ *Characteristics of constraint (type, dependencies and persistence)*

This Price constraint is subsidiary to EV availability: there is no point of thinking about price issue when there is no concrete idea about an EV model. The price of EV is dependent to different parameters such as price expectation from demand side as well as manufacturing



cost of supply side. The price issue only emerges when EVs are available on the market. So this constraint is subsidiary to the vehicle availability mentioned above.

The price factor seems to be transient since the price of an EV model tends to decrease over time. However, since it impacts the revenue model in a business model, the purchase cost of EV potentially influences the feasibility of the business operation depending on other cost factors and expected revenue of the company from the service. In this sense, the price issue is a persistence in contrast to availability issue.

The price of EV impacts the revenue model of mobility services while it is not directly linked to the formulation of business model itself. The price factor determines the threshold of business feasibility in terms of profitability. In this sense, this factor is as critical as the availability constraint.

Not only the price of EV but the payment method potentially impacts the revenue model of a service as is indicated in the mitigation action.

The constraint is persistent since the balance between the price of EV and the service fee determines the profitability of a business. If the service fee decreases over time, the appropriate EV price for a mobility service changes as well over time.

#### ■ *Mitigation action and its purpose*

The mitigation action mentioned is to “negotiate ‘total area under the curve’ deals that include OEM finance”.

LUT intends to modify the revenue model of OEMs regarding EV manufacturing from sales model to lease model since the revenue of mobility service is long-term.

#### ■ *Establishment of first mover advantage or sustainable competitive advantage*

Principally, the resolution of price constraint does not lead LUT to establish FMA nor SCA. However, if the company can have a special deal with OEMs, it can be a competitive advantage.

#### *b) “Price of imported EVs”: Import tariffs are high*

This has practically as same impact as the previous constraint (“price of local EVs”).

#### ■ *Characteristics of constraint (type, dependencies and persistence)*

The price of imported EVs depends on the import tariff as well as parameters mentioned for “Price of local EVs” such as demand side price expectation and manufacturing cost. This factor is ecosystem dependent.

Like as “Price of local EVs”, it is a persistence issue that impact the business model of a service and therefore the profitability of a service along with other cost/revenue factors. The specificities of the Price of imported EVs is that it also depends on the changes in import tariff and foreign exchange rate. There are additional parameters to the price of local EVs that influence this factor.

The price is a constraint that determines the feasibility of a business model since it impacts the revenue model and its profitability. This is as important as the first three constraints in the availability of vehicles.

The payment method of EV price can modify the business model of LUT.

■ *Mitigation action and its purpose*

The mitigation action suggested by the company is to “negotiate ‘total area under the curve’ deals that include OEM finance” and to “push along with foreign OEMs to lower import duties”.

Here “total areas under the curve” signifies the instalment payment. Since mobility service is profitable for years while EV payment is currently a lump-sum payment, the initial investment becomes very high to start a mobility service. LUT want to have a long-term payment deal with OEMs so as to pay back the cost of EV from the monthly profit of the service.

■ *Establishment of first mover advantage or sustainable competitive advantage*

Principally, the resolution of price constraint does not lead LUT to establish FMA nor SCA. However, if the company can have a special deal with OEMs, it can be a competitive advantage.

c) *“EVs resale value”: Banks are uncertain about the resale value of vehicle*

This constraint is related to the revenue model as well.

■ *Characteristics of constraint (type, dependencies and persistence)*

This is an ecosystem constraint since the resale value is determined by the structure of innovation ecosystem of EV. This is at the same time a business constraint since it is possible

for to find a way to increase the resale value by its own. This constraint mainly depends on the price of second hand EVs and the resale value of used batteries.

The resale value is as important as the initial price of EVs for the development of business models since it lower the threshold of business profitability. The resale value of EVs is critical for the revenue of a business model although since it influences the later stage of business development such as one or two years later from the beginning of the service, this issue is not as critical as the availability issue.

This constraint is persistent like the price constraint since it is the balance between resale value and the service fee of a mobility service that determines the profitability of a business.

■ *Mitigation action and its purpose*

The mitigation action suggested is to “look for second life application that defer the risk”.

LUT intends to identify a way to increase the resale value by itself.

■ *Establishment of first mover advantage or sustainable competitive advantage*

Yes, if LUT identifies any second life application.

*d) Summary of price of vehicle*

■ *Two important constraints on EVs*

One important constraint on EV manufacturing is its design (robustness and features). And the other important constraint is the price and the timing. The price and the timing are essentially an identical constraint since the most important issue here is when EVs will be available with the price that LUT can operate a business with profitable revenue model.

Or the other way to understand the situation is to consider the EV availability as a prerequisite and consider the design and the price as subsidiary parameters to build a profitable business model. These depend on the evolution of the innovation ecosystem of EV.

Not only the price itself but also the important tariff, payment method and duration, and resale value influences the revenue model of possible business models.

The managers of LUT have an idea of having a deal with OEMs that include the revenue model of OEMs. It plans to offer a deal that OEMs can continuously earn profit through the mobility service business of LUT. The objective is to reduce the initial price of EV but to make

the profitable period longer for OEMs so that OEMs can finally earn the same amount of money as it sells the EV. (Shift from selling model to rental model.) LUT tries to make a change to the revenue model of OEMs.

■ *Price constraints are not directly linked to BMI or FMA/SCA*

About the price, the mitigation actions of LUT intend to interfere the development of innovation ecosystem. These include phenomena out of the organization such as the revenue model of OEMs and resale value of EVs.

None of mitigation action is concretized as an action. Formulating concrete action plan requires maturation of its future business model idea. Price factor is on one hand highly critical as it determines the feasibility of different business. On the other hand, the price factor does not impact much the competitive advantage of the company. It is considerably important what kind of relation the company builds with OEMs and what kind of business deal it develops so as to leverage other competitive advantages.

3) *Power infrastructure*

LUT listed one constraint related to the power infrastructure (c.f. chapter 6):

4. "Diffusion is limited": Reliable supply remains limited to certain environment.

a) *"Diffusion is limited": Reliable supply remains limited to certain environment.*

Here "limited" has two meanings: region and location.

■ *Characteristics of constraint (type, dependencies and persistence)*

The constraint is an ecosystem constraint since it depends on the innovation ecosystem of EVs or that of EV charging infrastructure. Variant actors such as (central, state or local) governmental institutions, local electricity distribution company, EV OEM, other energy related company and/or other third party company can contribute to diffuse the EV charging infrastructure.

Since LUT can be one of those that diffuse EV charging infrastructure, this constraint can also be considered as a business constraint. For example, for the current operation, LUT prepare EV charging infrastructure by its own. However, once the geographical coverage expand to a certain level such as city-wise or state-wise, it is rather an ecosystem constraint since it is

beyond LUT's control. In this sense, this constraint is a hybrid constraint depending on the size.

The constraint is a transient and it will disappear once significant locations and regions are covered.

#### ■ *Mitigation action and its purpose*

The mitigation action suggested is to “select applications with manageable infrastructure requirements”.

The constraint is like “Mode of charging” for LUT's managers: they focus on what they can do with the provided condition. (It should be mentioned that LUT showed its interest in engaging itself into EV charging infrastructure service in collaboration with Delhi local government.)

The resolution of the constraint leads LUT to explore a new business opportunity. However, a mere EV charging service is a little far from LUT's current operation. There can be a potential synergy if LUT develops a service that mixes ICT and EV infrastructure, for example.

#### ■ *Establishment of first mover advantage or sustainable competitive advantage*

EV charging infrastructure service can be a SCA once LUT finds a profitable way of providing the service and diffuse the infrastructure. However, it is possible to have a competition among EV charging service providers. The profitability of the service depends on the diffusion of EVs both for individual use and commercial use. Though LUT can develop FMA with the diffusion of EV charging infrastructure, potential competition should be separately discussed.

For its current service, LUT does not need any third-party power infrastructure. The company invests on its own charging infrastructure and install EV chargers by itself. This power infrastructure coverage factor rather impacts future service development of LUT. On the other hand, LUT started providing infrastructure services in Delhi. Indeed, the absence of third-party power infrastructure supplier enabled LUT to get into this service domain. This—solving the problem—illustrates how LUT tries to convert ecosystem constraints into business competitiveness. Nonetheless, for the moment it is not too clear whether this adds competitiveness or not: it is not clearly mentioned if there is a logic that connects CET service and this charging infrastructure project.

#### 4) Service infrastructure

LUT listed three constraints related to the service infrastructure (c.f. chapter 6).

1. “Less geographic coverage”: Only a few geographies are supported by OEMs.
2. “Less engineers (maintenance)”: Trained engineering manpower is in short supply

a) *“Less geographic coverage”: Only a few geographies are supported by OEMs.*

Regular maintenance and repair of vehicles in case of breakdown or accident are taken care by the service centres of OEMs. The geographical coverage of these service centres is limited to certain cities and the limited coverage has been hindering the business development of LUT.

The constraint can be both about the currently available vehicle or about new vehicles that will be available in the future.

##### ■ *Characteristics of constraint (type, dependencies and persistence)*

For currently available vehicles, the geographical coverage depends on the sales strategy of EV OEMs.

For future new vehicles, the availability of EV (including design and price) is a prerequisite and the geographical coverage of service centre is subsidiary while it is as essential for business development.

Not only OEMs but also other third-party companies can contribute to the diffusion of service centres. The constraint is an ecosystem constraint.

For the given moment, since the supply of repair parts is extremely limited, it cannot be a business constraint. EV parts have not yet become commodity.

For currently available vehicles, the constraint is transient and once it is solved, it does not repeat.

For future new vehicles, it can appear again as a constraint. And it will disappear once it is solved.

##### ■ *Mitigation action and its purpose*

The mitigation action suggested by the company is to “push OEMs to collaborate with LUT in setting up service infrastructure as well as training modules”.

LUT intends to guarantee service by becoming a major client of service centres customer at market development destination cities. It seems that there is room for negotiation on the payment method (contents of the collaboration) along with the price.

Basically, it will not give a chance to LUT for new business opportunity nor BMI. It influences the value network within a business model.

There is an option to do it on your own, and in that case LUT will open a new business opportunity but it will not be easy at present considering the situation of supply of EV parts.

It may be possible to have third-party companies entering into the EV repair market if significant number of EVs is on the road. In that situation, this constraint becomes more like a business constraint on “how to ensure the reliable repair of EV fleet”.

■ *Establishment of first mover advantage or sustainable competitive advantage*

In any case, there are only two options: either LUT takes care of repair by itself or let others repair the fleet.

If LUT decides to do a repair by itself, it can evoke BMI or a creation of a new business model.

The constraint disappears once the innovation ecosystem of EV develops significantly. If LUT aims at exploiting this constraint to build FMA/SCA, the time period is limited.

*b) “Less engineers (maintenance)”: Trained engineering manpower is in short supply everywhere*

This constraint as well has the availability of vehicle as a prerequisite.

■ *Characteristics of constraint (type, dependencies and persistence)*

This constraint is closely linked to the previous one. This constraint can be considered as a prerequisite of the previous constraint: if there is not enough maintenance engineers, no service centre can be built and operated.

The constraint is principally an ecosystem constraint. However, the mitigation action suggested by the managers considers establishing its own service network: LUT treats it as a business constraint.

This constraint remains for mid-term. Once EVs is diffused widely in the society and third-party service companies emerge, this constraint will disappear: the constraint will be solved along with the development of the innovation ecosystem of EVs.

■ *Mitigation action and its purpose*

As a mitigation action, LUT considers “establish own service network” as a possible option since it “could lower costs as well”.

LUT considers that it is a potential business opportunity. However, it will take time to train EV engineers.

■ *Establishment of first mover advantage or sustainable competitive advantage*

LUT can accumulate know-hows on vehicle breakdown data such as the reasons of breakdown and the timing of breakdown. If LUT succeeds to establish its own service network, it will be a FMA/SCA. The pool of own engineers will benefit LUT when it starts new mobility services with new EVs. This can lead LUT to have a BMI as well.

Here LUT envisages a collaboration with OEMs to enrich the service infrastructure of EVs. This includes service centres developed by LUT itself. For LUT to engages into this deployment of EV service infrastructure, sufficient vehicle number is required so as to make sense for LUT in terms of financial investment. As LUT increases the number of its vehicles, it is possible in the near future to start an internal vehicle maintenance in certain cities. For that, talent and part supplies are essential: more trained engineering manpower is required as well as quality EV parts.

■ *Securing talented human resources*

Securing talented human resources is not an issue for LUT at the moment thanks to its reputation. Still, in order to keep access to those talents for future business development, staying in touch with communities of talents such as EV engineers, ICT engineers, entrepreneurs and managerial candidates is important. Along with that, as LUT currently does not develop new business and only seeks to increase its clients and its geographical coverage, setting a new business objective may attract talented human resources and be fruitful for the business’ development.



## 5) Organization

LUT listed one constraint related to the organization design (c.f. chapter 6):

1. "Talent supply": Bandwidths are considerably constrained.
2. "Organizational structure"
3. "Organizational memory": Organizational memory from work done may be different from the skills needed for the future.

a) *"Talent supply": Bandwidths are considerably constrained*

### ■ *Characteristics of constraint (type, dependencies and persistence)*

This is a business constraint. This constraint is persistent even the company further develops.

### ■ *Mitigation action and its purpose*

LUT envisages that "new funding should allow greater distribution of focused roles" and hiring plan for leaders in sales, technologies, HR, IT, and finance" is considered as a priority.

The resolution of the constraint is not related to new business opportunity. But it is related to BMI in terms of organizational change (= change in internal value network).

### ■ *Establishment of first mover advantage or sustainable competitive advantage*

BMI in terms of organizational change can contribute to establish SCA.

Organization design is related to both current business development and future service development. This factor is not mentioned frequently by managers. Once the company opens new branches and starts new services such as EV bus and EV charging infrastructure service, the organization will become bigger and complicated.

Variation issues such as ensuring organizational flexibility for future business development while ensuring its organizational performance as well as governance issues across different services and different regions will be challenges.

b) *"Organizational structure"*

### ■ *Characteristics of constraint (type, dependencies and persistence)*

This is a business constraint. This constraint is persistent even the company further develops.

■ *Establishment of first mover advantage or sustainable competitive advantage*

Constraint: "we have managed with a top-light org so. Bandwidths are considerably constrained as a result." Mitigation action: "new funding should allow greater distribution of focused roles. Hiring plan for leaders in sales, tech, HR, IT, Finance."

*c) "Organizational memory": Organizational memory from work done may be different from the skills needed for the future*

Constraint: "Organisational memory from the work done so far may be different from the skills needed for the future."

Mitigation action: "Key differences between market segments and their needs must be understood, and training targeted to each distinctively."

**6) Driver engagement**

LUT listed one constraint related to the driver engagement (c.f. chapter 6):

1. "Driver recruitment": Number of finance-able individuals is peaking. Competition for the services of the best will be high.

*a) "Driver recruitment": Number of finance-able individuals is peaking. Competition for the services of the best will be high*

Certain ecosystem constraints are closely linked to the organizational capability development. For example, as commercial EV drivers do not exist in India out of LUT, LUT needs to train its drivers by itself. This situation will change once there are more commercial EV users in the ecosystem. This evokes a question of externalisation and internalisation of business process. This is a critical question on value creation and value capture of its business model.

■ *Characteristics of constraint (type, dependencies and persistence)*

This is a business constraint since there are numbers of recruit-able drivers in Indian cities and skills required to drive EVs are not that different from the skills required to drive ICE vehicles.

However, since there are growing demands for professional drivers, it appears to be a constraint for LUT to identify reliable drivers and to have them work with the company. (Be aware that most drivers work as self-employees for LUT.) The constraint depends on other parameters such as salary, working environment and alternative job opportunities for drivers.

The working environment includes hours on duty per a day/week, codes of conduct and uniform policy.

This is a persistent constraint as far as the demands for professional drivers grow.

Drivers recruitment (and drivers engagement) is a question of leadership and governance in BM.

#### ■ *Mitigation action and its purpose*

The suggested mitigation action is to “explore incentives that allow drivers to shift to a more entrepreneurial stance within the Lithium ecosystem.”

The mitigation action rather concentrates on after-recruitment process. It indicates that managers consider that the success of recruitment depends on the job attractiveness itself. LUT principally does not employ drivers expect for some drivers who work with LUT since its foundation. Hiring drivers as employees increases the human resource cost though it increases the attractiveness of the job.

The other mitigation action suggested is to “increase research to understand the underlying factors behind desired profiles.” Since LUT wants to hire drivers who the company can educate to train them as highly professional drivers with a good code of conduct,

#### ■ *Establishment of first mover advantage or sustainable competitive advantage*

Establishment of performative incentive system can be a FMA/SCA. If the company can have

### **7) Competition**

LUT listed two constraints related to the competition (c.f. chapter 6):

2. “Deeper-pocketed competitor”: There is a risk of deeper-pocketed investors trying to acquire market share by dropping prices.
3. “OEMs as competitor”: Mahindra-Electric itself considers fleet operation.
4. “Followers”: Everything that we ‘prove’ could become something that others repeat

In order to prepare the competition, the development of SCA is critical. Here the development of FMA/SCA or the achievement of BMI is not a purpose but a mean to prepare the constraints. Therefore, this section does not analyse the establishment of first mover advantage or sustainable competitive advantage.

a) *“Deeper-pocketed competitor”*: There is a risk of deeper-pocketed investors trying to acquire market share by dropping prices.

■ *Characteristics of constraint (type, dependencies and persistence)*

The competition principally depends on the business environment: how does the market potentially develop and how potential new entrants assess the demands growth and market opportunity. This is not a constraint but it is a possible business environment change.

It is a persistent factor as far as LUT continues its business activity.

■ *Mitigation action and its purpose*

The mitigation suggested by managers is to “secure access to large capital, ideally as debt, to be able to take the competition deeper”. LUT considers that the way to prepare the “Deeper-pocket competitor” constraint is to have an access to the capital so as to be able to compete the potential competition.

Here, reducing the imitability of the business process is important so as potential competitors cannot imitate the operation even they obtain a large capital.

b) *“OEMs as competitor”*: Mahindra-Electric itself considers fleet operation.

■ *Mitigation action and its purpose*

LUT suggest to “trade the risk of dependence against other risks with more OEMs, and work on form factors where Mahindra-Electric is not a player” as a mitigation action.

It is important to build a SCA that OEMs does not get interested in developing due to the constraint of their business model.

c) *“Followers”*: Everything that we ‘prove’ could become something that others repeat

■ *Mitigation action and its purpose*

The managers of LUT suggests to “build competitive advantages in ‘more than EV’”. LUT considers “there could be in operations (e.g., optimization) or in technologies (e.g., refrigeration)”. The company can build a SCA that is also dependent to partner companies so that followers cannot easily imitate the capability by its own.

THIS IS THE END OF APPENDIX.

FIN

**Titre :** Comment les start-ups gèrent-elles les incertitudes du développement de l'écosystème d'innovation ?  
Le cas d'une start-up proposant un service de transport à destination des employés d'entreprises, utilisant des véhicules électriques, à Bangalore, en Inde

**Mots clés :** Business model innovation, Écosystème de l'innovation, Service de la mobilité, Start-up, Véhicule électrique, Inde

**Résumé :** L'Innovation des Modèles Économiques (IME) (Business Model Innovation en anglais) est un levier indispensable à disposition des entreprises pour développer leur avantage concurrentiel. L'approvisionnement en amont des technologies et des produits, et le développement des infrastructures clés sont les éléments indispensables du réseau nécessaire à une entreprise pour développer un nouveau modèle économique. Cependant, le développement de l'écosystème d'innovation de l'approvisionnement et des infrastructures est rarement entre les mains de cette dernière. Elle fait face à différentes contraintes pour développer l'IME, d'autant plus quand le développement d'un écosystème innovant est incertain. La thèse se concentre sur la phase « pre-stage » d'une IME : quand la technologie et le produit nécessaire pour développer une IME ne sont pas encore disponibles. Comment les directions gèrent cette phase « pre-stage » ?

Ce travail de recherche se base sur l'étude de cas d'une start-up de Bangalore, en Inde. Elle est la première entreprise d'Inde à utiliser des véhicules électriques (VE) pour proposer un service de transports à des salariés d'entreprises. Dès la phase « pre-stage », l'entreprise envisage d'élargir son offre commerciale, au-delà de celle de transports de salariés, afin d'anticiper l'arrivée de concurrent et de se créer un avantage compétitif de premier entrant. Cependant, le modèle de VE nécessaire à ce développement n'existe pas encore, étant donné que l'écosystème d'innovation de ce produit est en construction. La thèse défend l'idée qu'il est indispensable de s'appuyer sur cette phase « pre-stage » afin de mieux comprendre le processus nécessaire à une bonne IME. En effet, les capacités organisationnelles requises durant cette phase « pre-stage » diffèrent grandement de la phase « post-pre-stage », impactant le développement d'une IME.

**Title :** How do start-ups manage uncertainties of innovation ecosystem development?  
The case of a start-up using Electric Vehicles for Corporate Employee Transport Service in Bangalore, India

**Keywords :** Business model innovation, Innovation ecosystem, mobility service, Start-up, Electric vehicles, India

**Abstract :** Business Model Innovation (BMI) is a way for companies to develop its competitive advantage. The upstream-supply of technologies and products, in parallel to the development of key infrastructures are indispensable for a company to build the value network of a new business model. However, the development of innovation ecosystems is dependent to the factors external to the company and to the managers. Companies face varying constraints to achieve BMI when the development of relevant innovation ecosystem remains uncertain. The thesis focuses on the pre-stage of a BMI: the phase when the technology or the product required to achieve a BMI is not yet available. How do managers deal with this pre-stage situation?

The research uses a case-study analysis of a start-up based in Bangalore that was the first company in India to use Electric Vehicles (EVs) to provide Corporate Employee Transport (CET) services. The company aims to scale-up its service line-up beyond CET service before other potential market players in order to build a first-mover's advantage. However, appropriate EV models required for service diversification are not yet available since the innovation ecosystem of EV remains under development. The thesis suggests that a clear recognition of the pre-stage of BMI is critical to better understand the BMI process, especially because the organizational capabilities required during the pre-stage differ from those of post-pre-stage such as Dynamic Capabilities: capabilities to execute a BMI.