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The influence of brands' omni-channel strategy on consumer's behavior

Grégoire Bothorel

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**Université Paris 1 Panthéon Sorbonne
Ecole Doctorale de Management Panthéon Sorbonne
PRISM Sorbonne – Pôle de Recherche Interdisciplinaire en Sciences du
Management**

THÈSE
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Présentée et soutenue publiquement
le 21 septembre 2020 par

Grégoire BOTHEREL

**L'influence de la stratégie omni-canal des marques sur le
comportement du consommateur**

-

**The influence of brands' omni-channel strategy on
consumer's behavior**

Sous la direction de Mme Régine VANHEEMS
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Professeur, Université Paris Dauphine

« L'Université n'entend donner aucune approbation, ni improbation
aux opinions émises dans cette thèse. Ces opinions doivent
être considérées comme propres à leur auteur. »

À mes parents Gabrielle et Philippe

À Justine

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GENERAL INTRODUCTION

CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED
COMMUNICATION CHANNEL: A PEOPLE-BASED AND INCREMENTAL
APPROACH

CHAPTER 2: BRAND CHANNELS' ORCHESTRATION: UNDERSTANDING THE
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GENERAL CONCLUSION AND DISCUSSION

GENERAL INTRODUCTION

Section 1: The research context and positioning

In 1960, Theodore Levitt put forward the concept of “Marketing Myopia” in the *Harvard Business Review*. In his founding work, Levitt already demonstrated why being customer oriented instead of product oriented enables firms to adjust and adapt to rapid changes in their respective markets. In other words, instead of selling products or services firms should focus on customers’ needs and satisfy these needs with a forward-looking approach. Firms should less focus on series of short-term transactions to drive revenue and more on building an offering that responds to customers’ needs and enables to build long-term relationship with customers. Beyond product leadership and operational excellence, customer intimacy has then become a key factor of differentiation to dominate an industry. As a matter of fact, marketing has experienced a paradigm switch from a purely transactional approach to a relational approach that has gained great attention in the literature of service industry from the 1990’s.

1.1 From selling products to building relationships: the paradigm shift of marketing

Relationship marketing may be defined via a marketing strategy continuum. It defines in contrast with transaction marketing. Key features illustrate the switch from transaction marketing to relationship marketing as highlighted in the founding keynote paper of Grönross in 1997.

While transaction marketing focuses on the short term, relationship marketing focuses on the long term. Another key feature of transaction marketing is that marketing mix (the 4Ps) and the technical quality of output are dominating functions within the organization while interactive marketing is a dominating function of relationship marketing. More importantly, Grönroos highlights that transaction marketing has mainly focused on the monitoring of market shares. Instead, the management of customer base and the quality of interactions are key features of relationship marketing. Finally, a last major difference is the idea that transaction marketing relies on ad hoc customer surveys while relationship marketing implies an active listening of customer through real-time feedback collection (Table 1).

Transaction marketing	Relationship marketing
A short-term focus	A long-term focus
Marketing mix (4P) is a dominating function	Interactive marketing is a dominating function
Monitoring market shares	Managing the customer base
Ad hoc customer surveys	Real-time customer feedback
Technical quality of output is dominating	Quality of interactions is dominating

Table 1: The key dimensions of transaction versus relationship marketing

Since 1997, the rise of digital technologies has deeply transformed the adoption of relationship marketing. In other words, digital has been a key enabler of this approach. As a matter of fact, the rise of new technologies of information and communication due to digital and data has empowered consumers. Actually, brands and retailers have to face a complex equation in which historical pillars of consumers' behavior are challenged.

A main concern is certainly the ability to move from product-centric scenario to an interactive approach of relationships between firms and customers. Rust (2017) proposed a broader perspective to translate interactions between firms and customers, from a product to a service scenario. A "product scenario" (Figure 1) translates into a relatively aggregate bi-directional flow, in which firms push rather standardized products to their customer targets and get aggregate information about customers' response (i.e. market share, turnover...). In contrast, a "service scenario" (Figure 2) translates into more interactive flows so that firms constantly adapt their offerings and messages to individual-level inputs to serve customization and personalization.

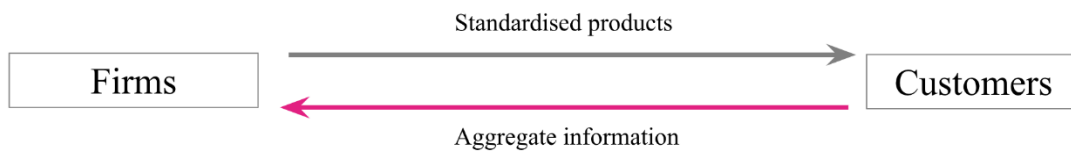


Figure 1: a typical product scenario

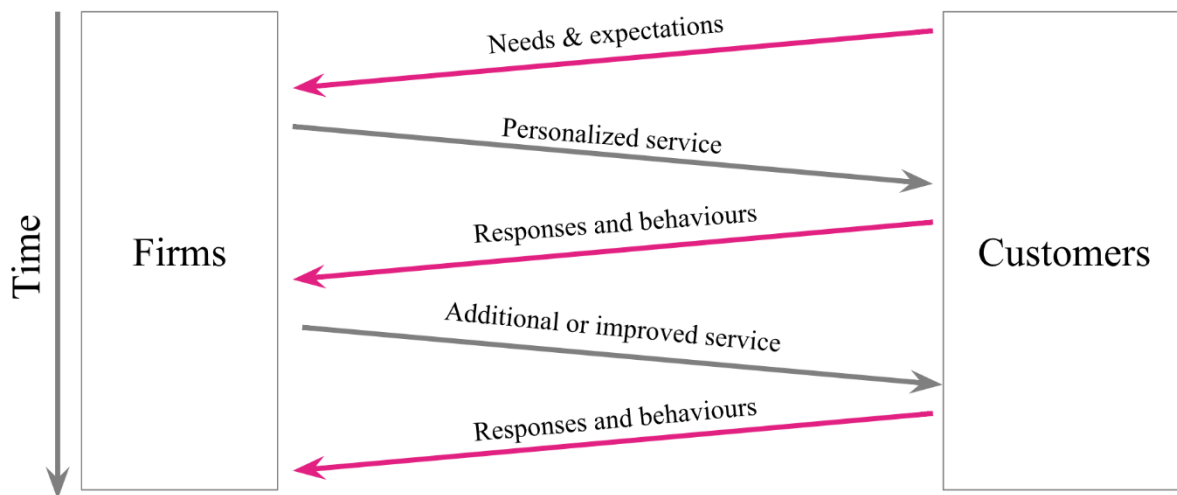


Figure 2: A typical “service scenario” translates into firms’ responses to individual inputs

This paradigm switch raises multiple questions: How can companies implement a relationship marketing strategy when dealing with customers who are more demanding in terms of service, instantaneity and relevance in the relationship they have with brands? How must companies implement a strategy when dealing with the opportunity to contact prospects and customers through numerous channels and across multiple touchpoints?

Furthermore, the advent of digital has brought key elements to relationship marketing. In particular, the ability to collect data at the individual level, to activate such data through mass customization and to drive relevance have made the idea of one to one marketing (Peppers and Rogers, 1993) much more realistic than ever before. In contrast, by drastically decreasing the cost of relationship (such as the cost per contact), digital has also contributed to a growth in the volume of communication brands send to prospects and customers. Therefore, its first use was actually more transaction-oriented than relation-oriented. This observation was counterintuitive in light of the founding works of Grönroos (1997).

Indeed, thanks to the ability of collecting individual-level data, digital opened new ways to measure consumers' behavioral responses across a variety of channels. Focused on the return on marketing investments, brands and retailers embraced digital and lower cost channels and saw improved short-term ROI (Kierzkowski et al. 1996). This has resulted, for some brands and retailers, to a transactional and short-term focus while relationship marketing implied to think and measure on the long term. In particular, the wide adoption of email for customer activation has resulted in a growth of the volume of communication sent by brands to their customers. Even though the switch from traditional to digital channels resulted in an increase of the ROI of communication campaigns –mainly driven by costs reduction–, a higher frequency of contact may lead to decreased value on the long term (Godfrey, Seiders, and Voss, 2011).

1.2 From multi-channel management to omni-channel orchestration

1.2.1 From “multi” to “cross”: when prefixes reveal a significant conceptual evolution

The relatively recent use of the term “omni-channel” by both practitioners and academics justifies an historical conceptual background. Actually, the term “omni-channel” builds on an extension of “multi-channel” and “cross-channel” (Vanheems, 2015) and, as we discuss here, is of paramount importance in the title of this doctoral work.

For long, firms have identified the relevance to offer multiple transactional channels as a way to seek growth and reach new customers' targets (Bates, 1989; Vanheems, 1995). The adoption of multi-channel strategies implies a rather siloed approach to market as every channel addresses a distinct customer segment. Make a firm's offering available on additional channels was a means to better cover the market quantitatively and improve the penetration to grow. In this context, Neslin et al. (2006) defined multi-channel customer management as “*the design, deployment, coordination, and evaluation of channels to enhance customer value through effective customer acquisition, retention, and development.*”

The idea of multiplying channels has gained a great interest over time, to the point that multi-channel retailing has become a norm for many firms (Brynjolfsson, Hu, and Rahman, 2013).

The move from multi-channel to cross-channel translates a significant evolution of customer behavior with the advent of Internet. The concept of channel migration, which translates the

idea that customers may move from one channel to another during the same purchase journey, is at the core of the definition of cross-channel. As a result, most firms then emphasized on the management of interactions between these channels. First, managing channels' interactions reveals to be essential because enabling customers to purchase through multiple channels was not anymore a point of differentiation (Vanheems, 2015). Then, it has been demonstrated that customers used several of the offered channels for a same purchase journey (the ROPO effect for Research Online Purchase Offline and oppositely the showrooming phenomenon) (Verhoef, Neslin, and Vroomen, 2007). Finally, multi-channel customers (customers purchasing from two channels and more) were proved to be more profitable than single-channel customers (Rangaswamy and Van Bruggen, 2005; Vanheems, 2009).

In this context has emerged an important focus on the design of seamless shopping journeys by identifying and avoiding any rupture in the switch from one channel to another. Beyond the notion of channels' coordination, Cao and Li (2015) provided extensive guidelines for channels' integration. Indeed, cross-channel integration was proved to drive sales growth.

1.2.2 The recent advent of omni-channel: towards a hybridization of retailing and communication

To inform the concept of omni-channel, we could focus on the terminology evolution. While "omni" defines as a combining form meaning "all", omni-channel could mean "all channels" or more generally "all touchpoints". More importantly, in the omni-channel world, channels do not only refer to transaction channels (retail stores and ecommerce websites) but include all touchpoints between a firm and its customers. A touchpoint could be transactional as well as non-transactional, meaning that communication touchpoints should be considered in the scope of omni-channel. This conceptual evolution (Figure 3) is key to understand the research field that we contribute to. In 2015, a special issue of the *Journal of Retailing* has investigated for the first time the concept of omni-channel. Interestingly, the terms "multi-channel" and "cross-channel" coexist in several contributions to this special issue, but the introduction article by Verhoef, Kannan and Inman investigates the switch to "omni-channel retailing". The authors define omni-channel management as the "*synergetic management of the numerous available channels and customer touchpoints, in such a way that the customer experience across channels and the performance over channels is optimized. We thereby acknowledge that the different channels interact with each other and are used simultaneously.*" This doctoral work draws on these major conceptual inputs of omni-channel. Several key dimensions emerge from this definition: the notion of synergies between channels, the objective of optimization (both

for customer experience and for performance) and finally, the concept of interaction and simultaneous use of channels.

Also known as the “*ubiquitous paradigm*” which defines as the ability to purchase products and services Any Time, Any Where, through Any Device, omni-channel reveals the tangle of channels and the simultaneous use of touchpoints (Badot and Lemoine, 2013). As omni-channel management defines as the management of all available touchpoints, there is a need to further understanding how synergies can emerge from these touchpoints’ interactions and how an overall performance can be optimized when activating multiple touchpoints simultaneously.

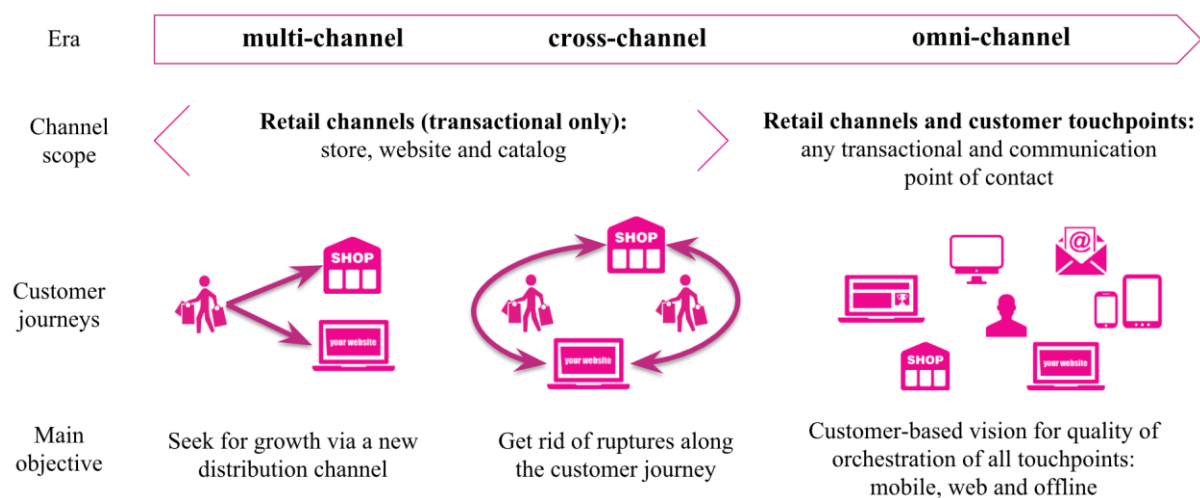


Figure 3: from multi-channel to omni-channel (personal figure)

If past research investigates the potential synergies between retailing channels (Rangaswamy and Van Bruggen, 2005; Vanheems, 2009), very few research has been conducted on the question of interactions between “touchpoints” when these touchpoints are used by the firms as a way to communicate with their customers. Such an issue is all the more important the historical frontier between retailing and communications’ channels is becoming obsolete, as it discussed in the following section. In an omni-channel environment, a retailing touchpoint can become a communication touchpoint and vice-versa.

The aim of the doctoral thesis is to analyze *omni-channel communication* that we defined as “*an integrated approach that enables to track the interactions of each individual through different communication channels in order to identify and exploit synergies that generate value*”

for advertisers and consumers, leading to an efficient allocation of communication investments" (Bothorel, Vanheems and Guérin, 2016). Omni-channel communication, which is the object of this doctoral research, relates to several research streams in the literature because of its holistic nature. We present in the next section (Section 2) the conceptual background that we draw on.

1.2.3 Channels, devices and touchpoints: a terminology clarification

Omni-channel, and its integrative logic centered on the customer, has made emerged a multiplicity of terms such as touchpoints, channels of contact, devices whose meanings could be confused. We aim here at clarifying such terms.

A **channel** is a means, a medium *"through which the firm and the customer can interact"* (Neslin et al., 2006; Venkatesh & al., 2012). A few years later, Kumar and Reinartz (2012) posit that firms can use channel in two different ways:

- A purchase channel (transactional), through which a transaction with services may occur (price and real-time availability)
- A communication channel (relational), through which is displayed information related to a purchase channel, which aim is to build and maintain a long term and profitable relationship with customers.

The interaction between a firm and a customer could be bidirectional or unidirectional. Channels such as most human interactions (call center operator, physical store...) or digital channels (websites, live chat, email, text messaging...) are bidirectional because they support instant two-way interactions. On the other hand, unidirectional channels only support one-way communication either from brands to customers (postal mail, TV ads...) or from customers to brands (Amazon Dash's buttons). This has resulted in a relative fragmentation of the literature on channel management with extensive work on transaction channels and multi-channel retailing and fewer works on communication channels, especially in multiple-channel contexts.

While transactional channels enable firms to showcase and sell products or services, communication channels enable firms to initiate, develop and maintain the relationship with their prospects and customers.

To avoid any misunderstanding, **devices** should be distinguished from interaction channels. We suggest that devices are gateways through which customers can access or be exposed to

the content of a channel. Therefore, each device affords different channels. While some channels are device specific (a mobile application would only be available on smartphones or tablets), some others are accessible through multiple devices (email, website...). In that later case, the channel should adapt the device's specificity and the experience of a given channel differs depending on the device accessing it. An email, for instance, adapts to the type of device used by connected customers (desktop PC, tablet, smartphone, smartwatch...). Therefore, in omni-channel contexts, brands and retailers should distinguish a change in communication channel from a change in device of exposure.

Finally, omni-channel brought the concept of **touchpoint** that defines as “*an episode of direct or indirect contact with a brand or firm*” (Baxendale et al., 2015; Verhoef et al., 2015). In other words, touchpoints represent any interaction that occurs between a firm and a customer along the journey. Touchpoints are therefore, much more precise about the interaction as they are both channel-specific and device-specific and describe a precise task performed by a customer.

1.3 The key drivers of the adoption of omni-channel strategies

More and more companies, both brands and retailers, adopt omni-channel strategies. The need to implement such strategies can be explained by different main drivers which are the following:

First, the multiplication of touchpoints through which firms and customers can interact that leads to the development of innovative contact strategies due to the new nature of some touchpoints. Firms need to leverage these new touchpoints thanks to new usages.

Second, more and more mature and demanding customers want to interact with the firms anywhere, at any time and through any device. As a matter of fact, firms need to be able to adapt to these customers' expectations and then to be available through several touchpoints. As competitors may interact through multiple touchpoints with their customer, there is a need to offer the same level of services to maintain a competitive advantage.

Third, major technological advances have enabled the development of data marketing to collect more and more customers' reactions and behaviors along the relationship and to rebuild an exhaustive customer-centric view. Therefore, such customers' knowledge enables to design informed contact strategies through all available touchpoints.

The fast adoption of omni-channel finds its roots in the simultaneous coexistence of these drivers. An omni-canal communication strategy becomes a way of differentiation as well as a way to gain a competitive advantage.

1.3.1 First drivers: the proliferation of channels and touchpoints and their usages by brands

The first driver relates to the growing number of channels and therefore touchpoints available due to digital and mobile technologies.

At the beginning of the writing of this thesis, at the end of 2014, the smartphone penetration rate -as measured by the Mobile Marketing Association-¹ was 55.6% in France. Three years later, in 2018, this penetration rate was 78 %. In four years, Mobile has experienced a 40% growth in penetration rate in France. This growing penetration directly drives a shift in the way people browse online as the world had really become “mobile first”: more than 52% of all global web pages are served on mobile devices (Chart 1).

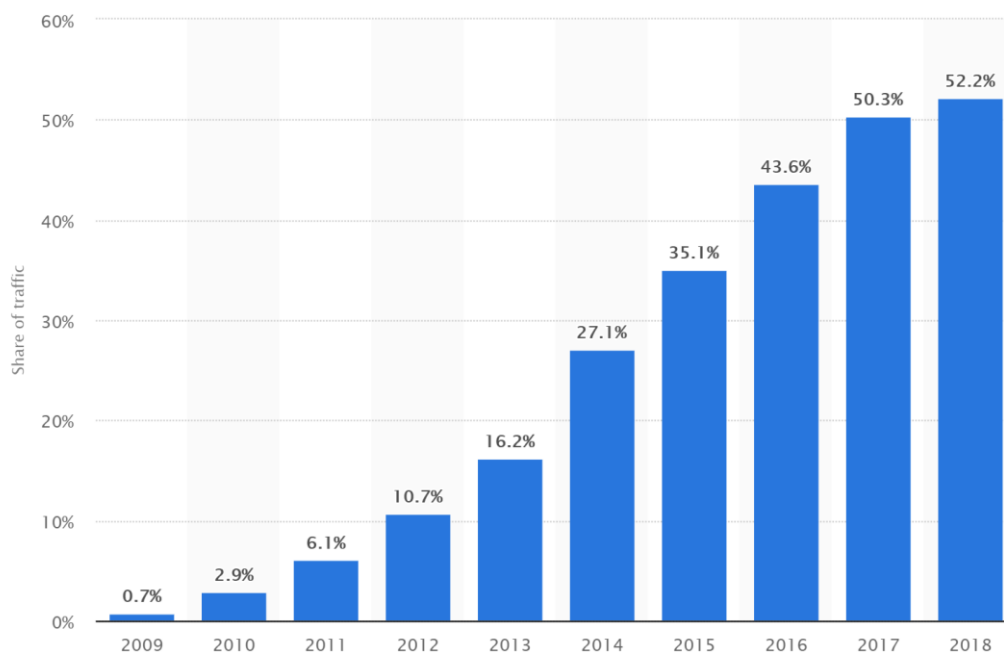


Chart 1: Percentage of all global web pages served to mobile phones from 2009 to 2018 (Statista)

¹ Study Mobile Marketing Association, France, 2017

As a result, the number of connected devices per person in France has raised from 2.3 in 2013 to 3 in 2017² and could reach 4 devices worldwide in 2020.³

Social media, mobile apps, push notifications, online targeted banners are just a few examples of newly appeared channels that brands and retailers use to engage with their customers. Interestingly, the lines between relational and transactional channels are blurred (Verhoef, Kannan & Inman, 2015). Indeed, channels such as mobile applications or social media are used in different ways by brands. While some brands have set up a transactional mobile application (M-commerce), others have launched a pure relational mobile application. While social media are being used as a relational channel by many brands, the emergence of “one-click-buy” posts makes it possible to fill-in a basket on the brands e-commerce website in just one click on the post. Beyond the proliferation of channels, their mixed use for both relational and transactional purposes also contributes to omni-channel logics.

Even if mobile has not been yet massively adopted for purchasing, its role is fundamental in pre-purchase decision-making. An internal use case at Numberly (1000mercis Group) reveals that 69% of advertising exposure through mobile devices result in purchase through desktop. It demonstrates how critical is the adoption of people-based approach rather than channel-centric or device-centric approaches. In other words, we can make a first fundamental observation: there are so many channels and devices with multiple objectives that “siloe reasoning” becomes obsolete to fully capture the omni-channel phenomenon.

In their article, Verhoef et al. (2015) open major research avenue for omni-channel arguing that, “*it implies that in an omni-channel world, researchers are interested in questions regarding how each customer touchpoint can affect brand and retail performance*”. Evaluating the impact of each specific touchpoint on customers’ path to purchase then becomes a critical issue for omni-channel research (Lemon and Verhoef, 2016).

² “Consumer Barometer” study, TNS for Google, 2017

³ Business Insider, 2017

1.3.2 Second driver: more informed, more mature and more demanding customers thanks to access to different channels and touchpoints

The second one is related to the consumer himself who makes use of multiple channels in his path to purchase and interact with brands through a myriad of touchpoints. Beyond the proliferation of channels and touchpoints, the main disruption relates to new consumers' usages in an omni-channel world. We have mentioned that many brands and retailers have launched new distribution channels as a way to reach new customers and seek growth. Nowadays, brands and retailers are less focused on the number of channels they offer but rather on the quality of the orchestration of those channels in a customer-centric perspective.

In their article, Badot and Lemoine (2013), explain how important are the transformations of consumers' behavior in retailing due to digital transformation. Indeed, consumers build their own purchasing journey by switching from one channel to another (Vanheems, 2010), including digital, mobile and physical channels such as retail stores, websites and smartphone applications. These channels and touchpoints can be activated by firms to communicate with their customers but they can also be used by customers willing to get in touch with the firms anywhere, on any device, at any time along their life journey.

Beyond mobile increasing penetration, this highlights the massive adoption of technology by consumers, several studies reveal that this adoption comes with a maturity of mobile phones' usages.

Indeed, the study «*Connected Commerce* » from DigitasLBI⁴ reveals that 33% of smartphones users bought through their mobile on a monthly basis. Moreover, 85% of smartphones owners have used their mobile phone in-store: a key figure that highlights consumers' ubiquity.

One of the outcomes of such maturity in mobile usages is that consumers become more demanding in terms of service, relevancy and instantaneity in their relationship with brands.

This may lead to a misalignment between customers' demands and brands' service offerings. Several figures from the study “*Email Marketing Attitude*⁵” conducted by the French association SNCD (Syndicat National de la Communication Directe) illustrate such a trend:

⁴ Digitas , Connected Commerce Study, 2015

⁵ EMA - Email Marketing Attitude Study, SNCD, 2015

- Consumers perceive a decreasing relevance of brands' commercial offers: 30% of consumers perceived communication as relevant in 2014 versus 51% in 2013.
- Consumers perceive an increased volume of brands' commercial emails: 78% of consumers perceived an increasing volume of marketing solicitations in 2014 versus 68% in 2013.

However, while the customer perceives an increase in the volume of brands' commercial emails, things are different in reality as the same study reveals that the volume of brands' commercial emails decreased by 3,4% in 2014, from 8,5 in 2013 to 8,2 commercial emails per day and per web user in 2014. Therefore, as customers perceive both a proliferation of communications through different touchpoints and a decreasing relevance of content, such communications could be less efficient. This raises new challenges to address for brands and retailers. They must greatly invest in order to be (1) more reactive to customer-initiated interactions and touchpoints and (2) more efficient by identifying the right triggers to push a message, in a proactive way.

1.3.3 Third driver: the technology advances and the emergence of data marketing

1.3.3.1 Any behaviors generate data: The data marketing ecosystem

The third driver relates to technology. Indeed, some major technological advances have made possible to reconcile more and more interactions across heterogeneous channels at the individual-level, and therefore slightly achieve the ideal of one to one marketing. Companies must define their strategies in an increasingly volatile environment, particularly due to technological changes (Grewal, Roggeveen, and Runyan, 2013) that accelerate the emergence of new channels.

The figure below (Figure 5) highlights how a typical customer journey, which combines digital, mobile and physical interactions, now translates into a data journey. Indeed, 69% of offline buyers have looked for information online before purchasing in store (ROPO for Research Online Purchase Offline)⁶. As a result, before any purchase or store visit, consumers' online browsing generates a great volume of behavioral and non-nominative data. Transaction data (online and offline) are, then, usually collected through relationship and loyalty programs.

⁶ Connected Consumer Observatory Study, Fevad/Médiamétrie, 2016

Ubiquity behaviors such using smartphone in-store also generates browsing data and potential post-visit targeted ads. The post-purchase steps of the customer journey which have historically been data-poor are increasingly data-rich thanks to digital consumption of media (TV, VOD) and channels (post-purchase interactions on social media) and finally thanks to the explosion of IoT that enables a greater access to product-usage data: an unprecedented type of data for brands and retailers.

This data journey also highlights current and future data hubs (in pink) such as a Web Browsing data hub, an in-store data hub, a TV/VOD data hub, a social data hub and finally the most recent one: the in-house data hub with IoT. Voice assistant such Amazon Echo or Google Home are iconic examples of the in-home data battle.

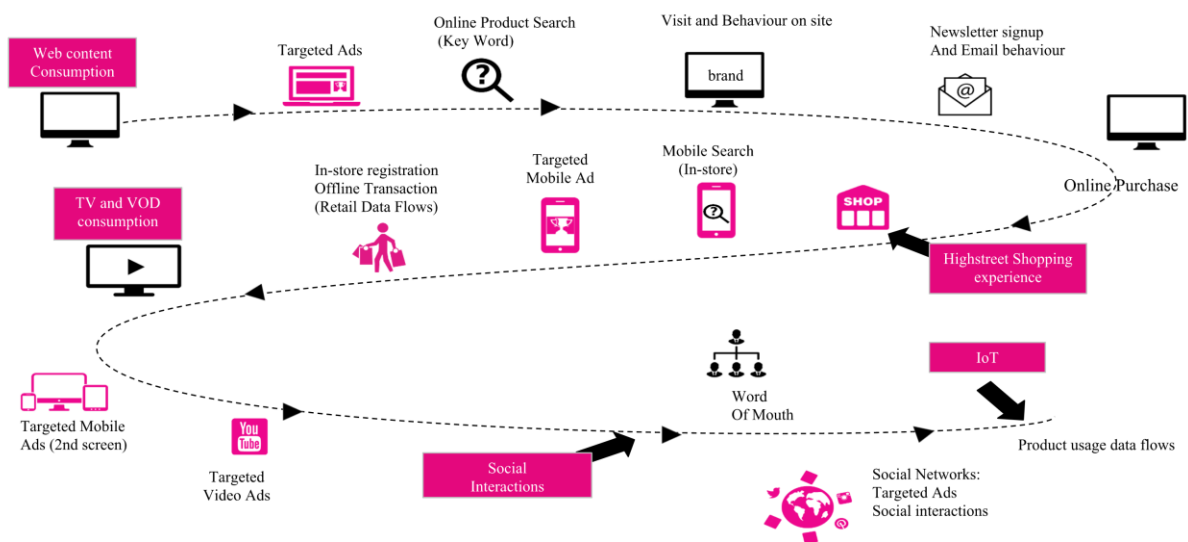


Figure 4: A typical journey from a data collection perspective

1.3.3.2 The revolution brought by programmatic media buying for relationship marketing

Many firms are facing a trend of « media » and « CRM » convergence due to an increasing capability to leverage on each touchpoint individual customer data and targeting. This trend contributes to foster the adoption of omni-channel communication as a means to address customers individually across a broader array of channels. Indeed, the major advances due to a massive switch to programmatic advertising inventory have drastically changed the way brands buy media formats to activate their customers.

The programmatic display market represented more than 1,3 billion euros of investments in 2018, according to the latest figures from the ePub Observatory carried out by the SRI, Udecam and PWC. An increase of 46% compared to the previous year, which allows the market to reach 67% of the online display market (Figure 5). Programmatic represented nearly two thirds of the total display in 2018⁷.

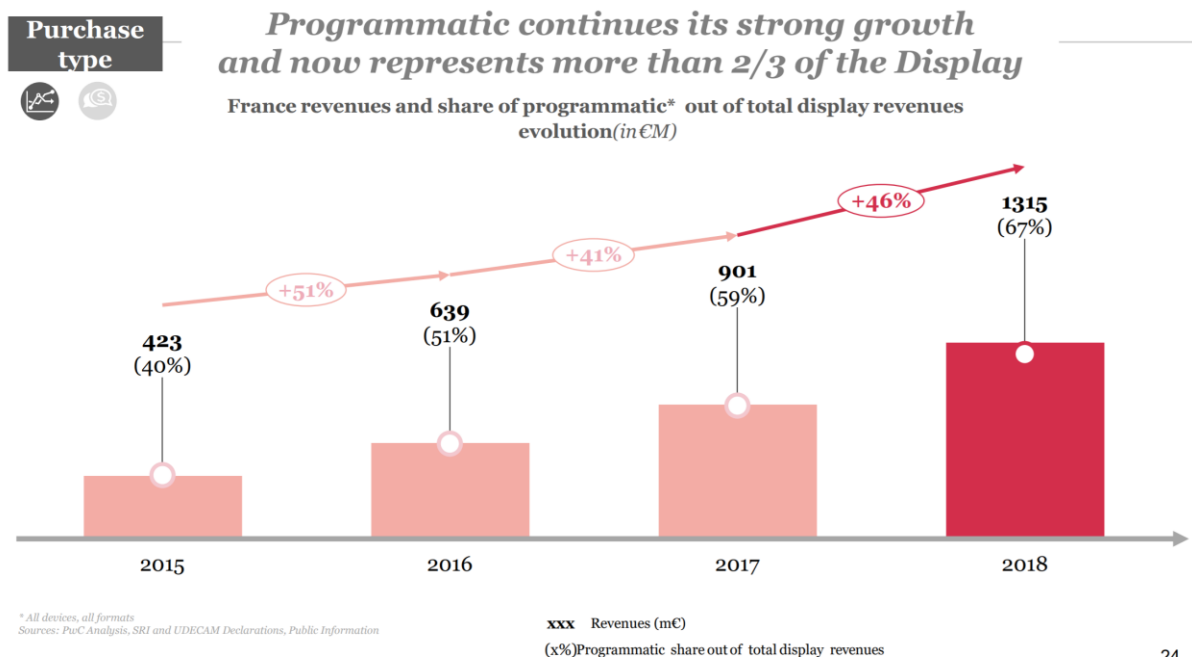


Figure 5: The growth of programmatic media buying by firms

The expansion of programmatic to new channels, which follows the trend of digital media consumption, brings unprecedented capabilities for brands to extend the scope of individual customer knowledge and activation. The historical scope of scholars and practitioners, based on Personally Identifiable Information (PII) channels and prior customer consent, is disrupted. In Europe, 95.3% of marketing professionals use email as their first marketing channel⁸. Its cost, ease of personalization and brands' opt-in collection capability explain the massive use of the channel. PII-based channels define the scope of the Customer Relationship Management (CRM) space. On the other hand, non-PII based channels define the programmatic space. The

⁷ ePub Observatory SRI, Udecam and PWC, 2017

⁸ Cross-channel marketing survey, Experian, 2014

reconciliation of both spaces in the “programmatic CRM” space (Figure 6) enables brands to build a people-based marketing approach across a broader range of channels and touchpoints.

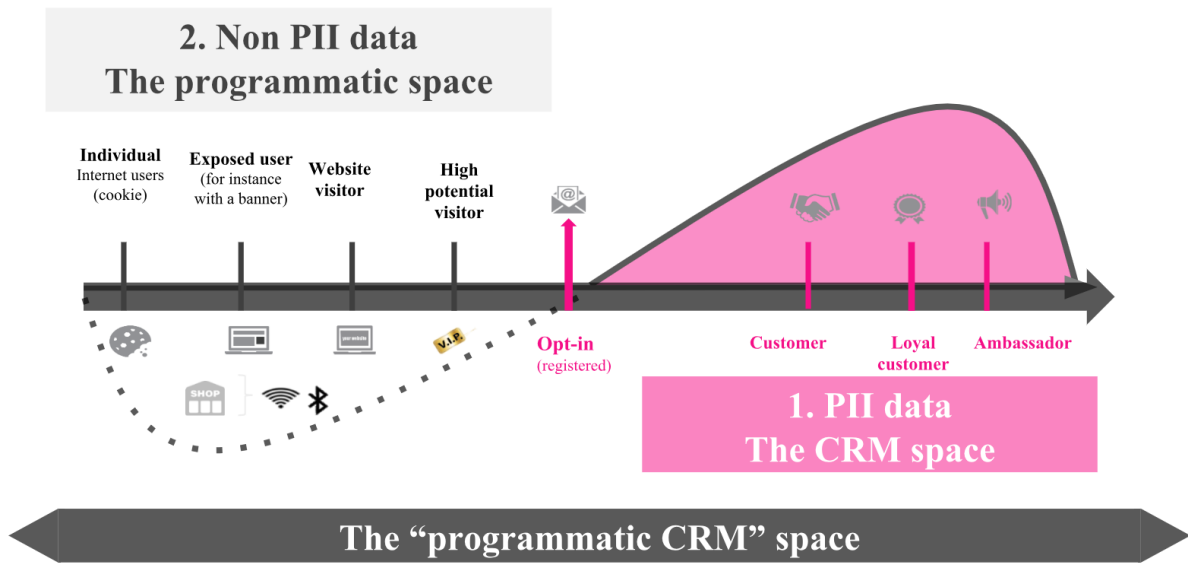


Figure 6: The extended scope of “programmatic CRM” for individual-level relationship marketing

1.4 A core contribution: why incrementality is key to assess causal effects of omni-channel communication on customers’ response?

We have put a lot of emphasis into the methodological approach for omni-channel communication causal impact on customers purchasing behavior. The digital CRM space, now enriched by programmatic channels, enables advertising actions targeted to individual customers. More and more vehicles, platforms and channels in the sphere of programmatic CRM enable firms to collect customer-level exposure data and to know exactly which customers were really exposed at each point of time. Linking such data to customers’ behavioral response, from clicks, to website visits or purchases drastically changes the way marketing and advertising investments are being measured. We can notice that, for long, “*consumer-level advertising response*” has been considered as the most powerful way to assess the efficiency of marketing actions (Little, 1979; Tellis, 2004). Such data became available to researchers in late 1980’s through “*single-source panel data*” that were relatively expensive and that did not cover the full spectrum of firm-initiated channels as most research focused on a single channel: television (Pedrick and Zufryden, 1991) or display (Manchanda et al., 2006). More recently, Danaher and Dagger (2013) applied such methods to multiple channels

communication investments, with a survey approach that generated individual declarative data about communication channels' recall. Li and Kannan (2014) also embraced this approach and analyzed such effects on customers' likelihood to visit a website and to purchase.

More generally, most literature on "*How does advertising work?*" has used aggregate advertising expenditures linked with aggregate sales data (Little, 1979; Dekimpe and Hanssens, 2000). Moreover, such data were mostly analyzed thanks to econometric models to measure advertising and communication effects. In a multiple-channel approach, Marketing Mix Models (MMM) and marketing response modeling (Bowman and Gatignon 2010) emerged as main tools. Studies of synergies and interactions between communication channels (Naik and Raman 2003; Naik and Peters 2009) and long-term effects of a multiple-channel communication (Ataman, Van Heerde, and Mela, 2010) have been conducted. Therefore, the field of measuring and understanding "*multi-channel communication response*" with aggregate data has been prominent.

Our methodological approach aims at providing a core contribution to this research field by responding to key limitations.

Firstly, an important part of the research mentioned above focused on attitudes measurement by assessing advertising effects through survey approaches that only catch customers' attitudinal metrics. The new opportunities of individual data collection from direct database marketing and programmatic media buying make possible a large-scale impact measurement of behavioral responses across multiple steps of the customer decision journey.

Secondly, investigating individual advertising response raises several well-known bias as firms' targeting strategy highlight strong correlations that could lead to possible misunderstanding of channels' effects. The first common bias, often mentioned as "*selection bias*", reveals endogeneity issues induced by firms' intense targeting of higher-value customers or higher-purchase propensity customers (Manchanda, Rossi, and Chintagunta, 2004). Indeed, as such targets are proved the most profitable, most advertising investments are concentrated on customers who have a higher probability of purchase. Analyzing advertising-exposure data often leads to observing the "response effects" on the most profitable customers that do not enable to understand the broader impact of communication channels. The second common bias, often mentioned as "*activity bias*", reveals that most advertising exposures are triggered by customers' interest in a specific brand, product or service. This is even more obvious in data-rich digital environments that provide an unprecedented knowledge of customers' information

browsing and subsequent interests. While already-interested customers react more positively to exposures and significantly boost the Return On Investments (ROI), a critical question arises: what if such customers would purchase even without being exposed?

All in all, we are in a context in which strong correlations could bias the understanding of the phenomenon. That is why it translates into key research priorities highlighted by the Marketing Science Institute that encourages researchers to identify drivers of customer decision making as well as the causality. The term causality, or causation, is critically important here: to what extent does a communication channel causally drive customers' behavioral response?

We came up with the idea that omni-channel orchestration requires a clear understanding of every single channel contribution to customers' behavioral *changes*. As the need to evaluate the contribution of each touchpoint to customers' behavior is becoming essential, we introduce the concept of incrementality. We define incrementality, as the number of conversions, as a whole, that would not have occurred without a marketing treatment being added, i.e. the volume of conversions directly and exclusively caused by a specific treatment. Two conditions are thus advanced to qualify a conversion to be incremental: the ability to (i) assign the conversion to the new treatment exclusively and (ii) the effective customer exposure to that treatment (Figure 7).

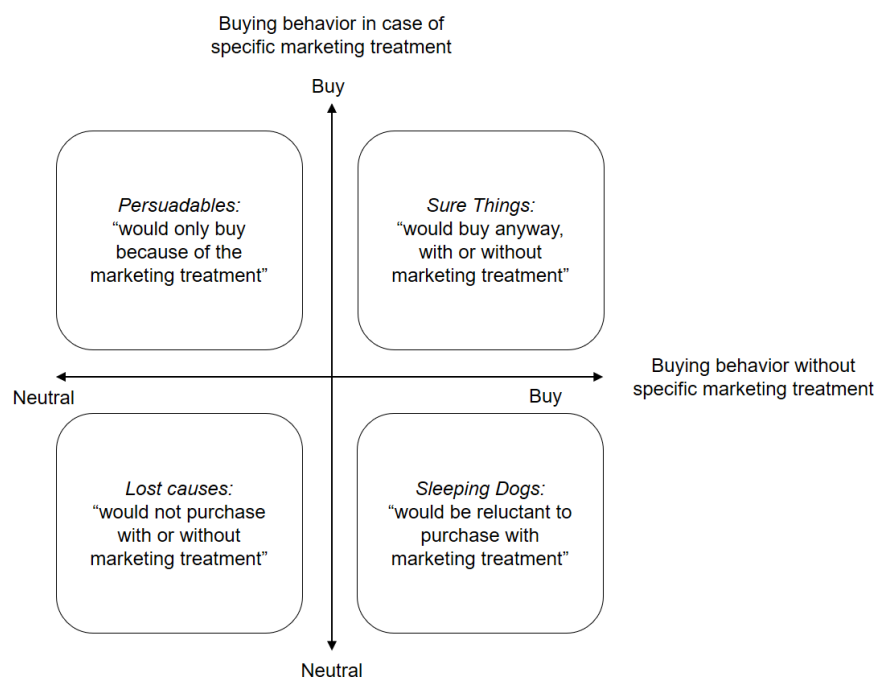


Figure 7: Incrementality-based customers' response to marketing treatment (adapted from Radcliffe, 2007)

Drawing on pioneer works on uplift modeling (Radcliffe, 2007), this variable makes it possible to both isolate and accurately measure the touchpoint's effect on the volume of conversions generated (Chart 2) and, more importantly, to **align channel-specific performance indicators** (that are greatly heterogeneous), thus making it possible to compare the performance of one channel with another. Incrementality also sheds lights on an important topic: the difference between marketing investments efficiency and effectiveness. While effectiveness implies to maximize the output, efficiency implies to optimize the ratio between output's maximization of and the cost to achieve it (Malthouse, Maslowska, and Franks, 2018).

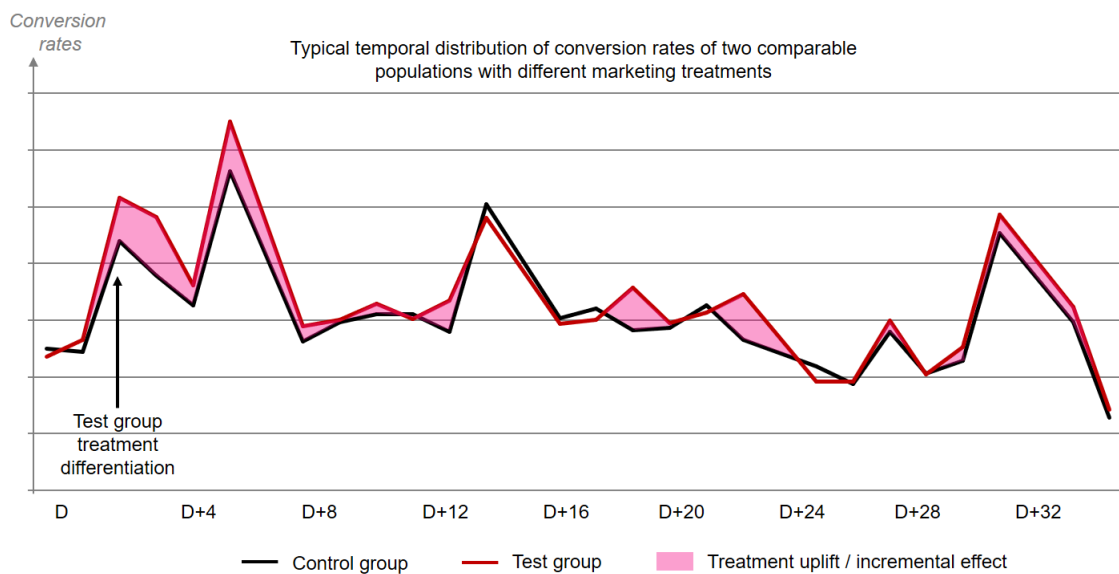


Chart 2: A temporal visualization of marketing treatment incremental impact on conversion

Traditional response models do not predict incremental conversions. Indeed, the approach of such models is to predict the probability of purchase given a marketing treatment. In that sense, response models usually perform well to drive campaigns profitability as they identify individuals with the highest probability of conversion but most of these individuals would have converted anyway, even without any treatment. Incrementality is key because it allows to assess the change in customers' behavior that results from a specific treatment (e.g., such as additional channel). Because our main research question deals with understanding causal impact of omni-channel communication, our focus is not about predicting a customer's response based on observational data but rather to measure the direct causal effect of an additional channel on subsequent behavioral response (Figure 8).

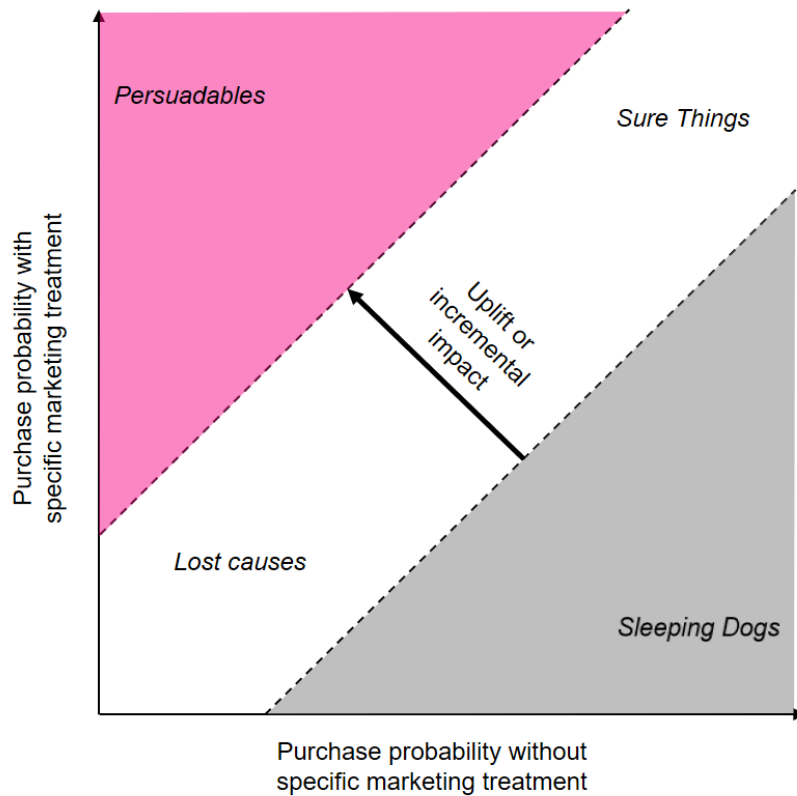


Figure 8: A targeting framework based on incrementality (adapted from Radcliffe, 2007)

The several contributions that we propose were made possible through an experimental methodology to assess for a **causal inference of channel contribution**. A randomized field experiment has been highlighted as a powerful and relevant methodology to compare test groups that can be treated with multiple combinations of channels and control groups that can assess a baseline purchase behavior (Zantedeschi, Feit, and Bradlow, 2016). In the field of communication channels' exposure, randomized field experiments have already been leveraged to assess causal effects on customers' response. Lodish, Abraham, Livelsberger et al. (1995) investigated how television advertising affects purchases with a split-cable system that allowed them to randomize household treatments and collect purchases data using a scanner panel. Randomized exposure to display advertising has also enabled to measure its effect on purchase intent (Goldfarb and Tucker 2011) and on website visits (Hoban and Bucklin 2014). At an aggregate level, geographical experiments have compared treated and control markets (Eastlack and Rao, 1989; Blake, Nosko, and Tadelis, 2015). Otherwise, field experiments with customer-level data could also bring concerns. The main one has been findings of non-significant effect of communication efforts on purchases (Lodish, Abraham, Kalmenson, et al., 1995; Lewis and Rao, 2015). Non-significant effects usually come from the

sample sizes used in reported experiments that are too small and a potentially too small effect on purchases. This brings two motivations:

- i. Considering large sample size for randomized field experiments, both to drive external validity and to be consider a more granular level of analysis with sub-populations
- ii. Quantifying the effect size channel by channel with a key focus on causality.

Section 2: Conceptual background and research opportunity

This doctoral research aims at responding to both a conceptual opportunity opened by the convergence of retail and CRM research and several calls for further research in the field of omni-channel communication.

2.1 Related research: omni-channel research at the junction of several fields of research.

The conceptual positioning of this doctoral work relates to several research streams. Indeed, the integrative nature of omni-channel research leads to some overlap in several research works. The switch from multi to omni-channel, conceptualized by Verhoef, Kannan & Inman (2015), implies to broaden the scope of study to all touchpoints between brands and their customers. Because channels and touchpoints are much diverse in their nature and characteristics, this results in two key implications:

- i. The combination of transaction channels and communication channels. This invites to a merge between retail and relationship management research. This is mainly due to channels' proliferation and the mixed nature of new channels (both transactional and relational).
- ii. The inclusion of both two-way channels and one-way channels (mainly from brands towards their customers) in the research scope. This justifies understanding the effects of channels such as TV advertising, Radio and SMS that are usually one-way channels.

Therefore our research relates to multiple research streams that include Relationship Marketing (Grönroos, 1997; Meyer-Waarden, 2007; Aurier and N'Goala, 2010), Integrated Marketing

Communication (Edell and Keller, 1989; Belch and Belch, 1998; Keller 2001; Batra and Keller, 2016)) and finally multi-channel and omni-channel retailing (Verhoef, Neslin, and Vroomen 2007; Vanheems 2009; Konus 2010; Verhoef 2012; Verhoef, Kannan, and Inman 2015)

- i. Concerning Relationship Marketing, this doctoral research extends work that has been conducted in Direct Marketing and advertising (Zantedeschi, Feit, and Bradlow 2016; Stone and Jacobs 2008; Roberts and Berger 1999; C.-W. Chang and Zhang 2016) ; Stone and Jacobs, 2008) and in the field of digital and omni-channel customer management (Peelen et al. 2006; Fader 2012; Volle 2012).
- ii. Concerning Integrated Marketing Communication, it extends research conducted in communication about synergy from touchpoints activated both in an online and offline environment (Naik and Raman 2003; Naik and Peters 2009; Kumar, Choi, and Greene 2017; Havlena, Cardarelli, and Montigny 2007; Danaher and Dagger 2013).
- iii. Concerning multi-channel and omni-channel retailing, this research aims at providing significant extension to research on customers' journey (Dinner, Van Heerde, and Neslin 2014; Srinivasan, Rutz, and Pauwels 2015; Lemon and Verhoef 2016), and brand promotion across the heterogeneity in customers' behavioral response to marketing solicitations (Belch and Belch 1998; Volle 2001; Andrews et al. 2016).

By responding to several calls for further research within the research streams mentioned above, our contribution to omni-channel understanding overlaps with several fields of research. By nature, we can expect that future contributions in the field of omni-channel increasingly adopt a similar cross-field approach.

2.2 The current research limitations and the conceptual opportunity

2.2.1 From “reactive” to “proactive” brands’ contact strategy along the customers’ path to purchase

In digital contexts, most research on the effects of channels on customers' response has focused on customers already engaged in a path to purchase. That is to say, customers who have interacted with the brand through digital touchpoints such as search, social media or websites (Srinivasan et al. 2016). Such customer-initiated interactions reveal that a decision process has already started. Therefore, a gap remains regarding the understanding of such response for customers who are not engaged in the decision process as suggest by the recent work of Court

et al. (2009) and Edelman & Singer (2015). These authors argue for the benefits of designing streamlined customer journeys that compress the consideration and evaluation steps to engage and lock-in customers in a “loyalty loop” (Figure 9). In a context of increasing complexity implied by the management of traditional, digital and mobile channels and the combination of subsequent touchpoints, there is limited knowledge related to how a better orchestration of channels and touchpoints can contribute to engage customers in such a loyalty loop.

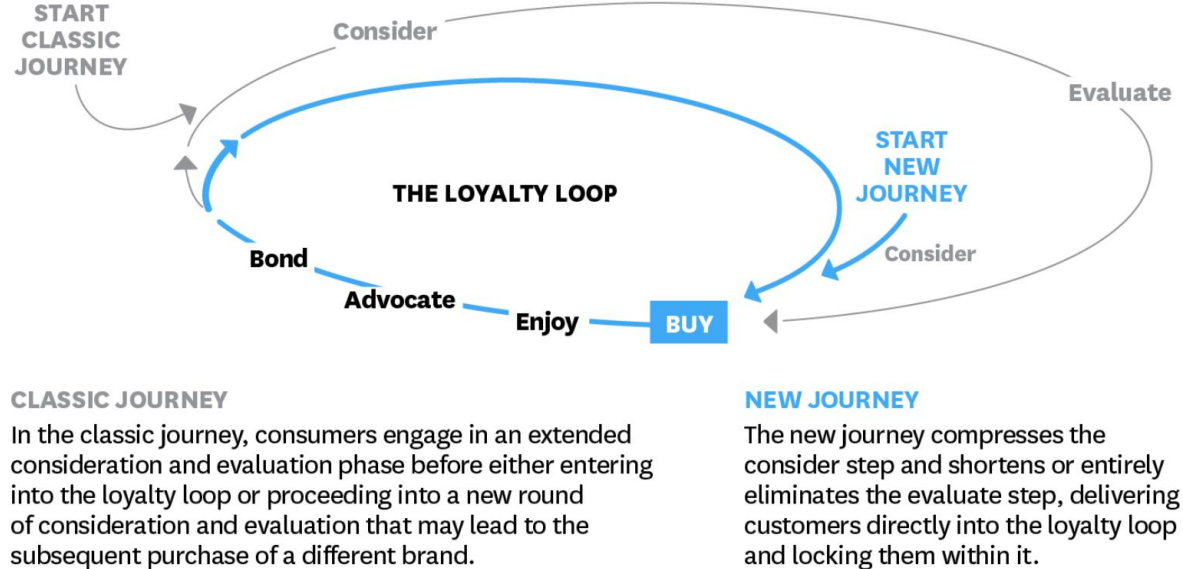


Figure 9: How does the loyalty loop streamline the decision journey? (from Edelman and Singer, 2015)

The “classic journey” as mentioned by Edelman and Singer (2015), translates clearly into brand contact strategy. Indeed, the frontiers between above-the-line and below-the-line marketing still drive a management in silos at the different steps of the purchase funnel. Indeed, the correlation between the objective of communication and the choice of channels is still strong. At the upper and mid funnel steps in which brands and retailers aim at building consideration and positive purchase intention, most channels used are mass media such as TV, Radio or Display. The efficiency of such channels is usually measured thanks to attitude metrics collected through survey and aggregate data like the GRP - Gross Rating Point – which is calculated by multiplying the reach (in volume) and the exposure repetition (number of exposure occurrences). At the lower-funnel step, brands and retailers aim at boosting

transactions by activating performance-oriented channels such as email to opt-in customers. The efficiency of such channel is usually measured thanks to individual-level behavioral data like the conversion rate which is calculated as the volume of customers who purchase for every hundred messages sent (Figure 9).

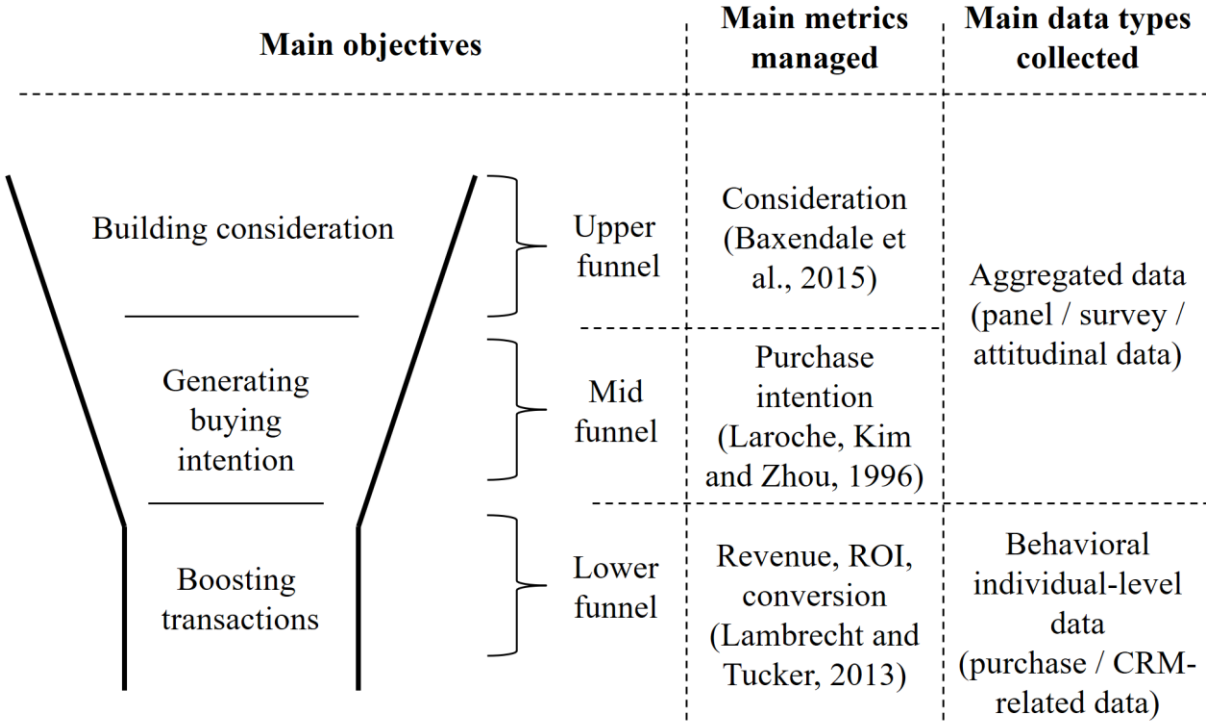


Figure 10: The funnel steps from a brand perspective (personal figure)

A loyalty loop is made possible when brands proactively activate their customer base, most of the time through multiple channels, as customers may be opt-in to several channels such as print, email and SMS. More importantly, the increasing use of programmatic media buying enables brands to individually target known customers through former mass-media, that is to say to activate customers with **higher granularity in targeting at upper funnel steps** of the decision-making process and collect individual behavioral response data. Understanding how the activation of media channels towards already-known customers may interact with lower-funnel channels to engage customers in a loyalty loop is an under-investigated area.

One contribution of this work is the understanding of several brand channels' contribution to engage customers in a loyalty loop in the context of programmatic and opt-in channels combination.

2.2.2 An exploration of the “Direct Marketing” dimension of Integrated Marketing Communication (IMC)

As mentioned earlier, such omni-channel strategies require, then, both orchestration and integration as evidenced by Batra and Keller (2016) who propose a model that assesses the degree of integration of IMC (Integrated Marketing Communication). Based on seven criteria (7C’s), the model proposes to evaluate: coverage, cost, contribution, commonality, complementarity, cross-effects and conformability of marketing communication.

1. **Coverage** refers to “*the proportion of the target audience reached by each communication option employed, as well as the amount of overlap among those options*”. The concept of target is indeed quite mature in the field of Direct Marketing. Interestingly, little research has examined to what extent newer channels (digital and mobile ones in particular) can cover a given target and how their respective reach may overlap.
2. **Cost** implies to “*evaluate marketing communications to arrive at the most effective and the most efficient communication program*”. Cost efficiency of IMC programs opens a main research avenue advanced by Batra and Keller (2016): conducting multivariate field experiments using tracking metrics that feed Return On Investments calculation.

Both coverage and cost dimensions reflect the efficiency of an omni-channel approach to effectively reach the right customers while lowering the cost of activation. This key concern has been studied by Lin, Venkataraman, and Jap (2013) under the concept of “*media multiplexing*” and Taneja et al. (2012) under the concept of “*media repertoires*”. Both concepts translate the growing trend among customers to consume smaller and incomplete “chunks” of multiple media types within a short time period. Media consumptions habits and preferences determine the design of effective integrated omni-channel communications.

3. **Contribution** reflects “*direct ‘main effects’ and the inherent ability of a marketing communication to create the desired response and communication effects from consumers in the absence of exposure to any other communication option*”. Contribution could reflect many outputs, from attitudes driving, to behaviors including purchases. As every channel serve complementary objectives along the customer journey, it could be complex to compare several channels’ effectiveness with a single variable. In this context, the customer’s incremental behavioral response provides an alignment that is fundamental for the orchestration of omni-channel communication.

4. **Commonality** is “*the extent to which common associations are reinforced across communication options; the extent to which different communication options share the same meaning*”. This is linked to information processing research showing that a repeated message is more effective when it is presented in two different modes rather than in one.
5. **Complementarity** defines “*the extent to which different associations and linkages are emphasized across communication options*”.
6. **Cross-effects** reflects that, “*used in tandem, communications are more powerful when they interact and create synergistic cross-effects with other communications*”.
7. **Conformability** is about communication orders or sequences. “*Any particular message may be new to some consumers, but not to others. It refers to communication versatility and the extent to which a particular marketing communication “works” for many target consumers in many times and places*”. This dimension relates to customers heterogeneity and translates the idea that not all customers would respond in the same way to a given treatment. Understanding this heterogeneity is an important research avenue for omni-channel orchestration.

These seven criteria reflect the full spectrum of IMC. Our research scope builds upon the Direct Marketing dimension of IMC and does not properly embrace every criteria. Some criteria impact more directly the orchestration of omni-channel communication. In particular, the “contribution” criterion reflects the main expected effects of a channel on customers’ attitudinal and behavioral responses (e.g., build awareness, enhance image, induce sales...). The authors call for further research to enrich the scope of the seven criteria and to better reflect on the full range of outcomes that arises from customer exposure. Indeed, understanding the channel in which the transaction may occur enables a deeper reflection of possible communication outcomes. Drawing on Edelman & Singer (2015), we propose to enrich the understanding of each channel’s contribution. Indeed, as the concept of “*loyalty loop*” invites brands to activate channels that trigger conversion, it seems relevant to evaluate which is the transaction channel (ecommerce website versus retail stores) that most benefits from the communication channel exposure.

Therefore, more channels join the scope of “*one to one*” targeting but with an increasing heterogeneity. We present in the following table (Table 2), an overview of the most activated channels as a facilitator to better catch such heterogeneity on key channels’ dimensions.

Main direct channels	Device	Cost per contact (100 index)	Personalization	Coverage	Time-related effect
Print	NA	+++ 100	+	Quite high, but at a massive cost. No data related to effective exposure.	Lasting effect, due to possible multiple exposure to the medium.
email	50% Desktop / 50% Mobile	+ 0,2	+++	Moderated, but generating lower cost. Highly granular data for coverage analysis.	Short-term: most of the effect observed in the next few days after activation.
SMS	100% Mobile	++ 11	++	Very high, but poor in exposure data (when not clickable).	Short-term: most of the effect observed in the next few days after activation.
Programmatic Display	50% Desktop / 50% Mobile	++ 0,5	+++	Moderated, but increased with a multi-platform activation (Appnexus, Facebook etc...). Coverage is cumulative over time.	Medium-term: most of the effect observed in the next few days after activation.

Table 2: Key features of the main brand-initiated communication channels

Additionally, understanding short-term behavioral consequences generated by firm-activated channels need an integration of the ‘*purchase funnel*’ and the ‘*loyalty funnel*’ as suggested by research agenda advanced by Lemon and Verhoef (2016) on customer journey analysis. Different questions must be raised: What if the type of channel that is activated (print, digital

or mobile) has a possible influence on customers' response? Do some specific channels over-perform to help customers continue their journey? Do they have an impact on customer channel choice for transaction? Does channels' incremental impact differ depending on customers' profiles? Our research aims at addressing these questions that seem justified both conceptually and managerially.

The way a channel may drive a customer to another channel can be highlighted by the literature on own and cross-channel effects. This literature helps to understand whether online and offline marketing efforts drive online and offline sales.

Working on attribution modeling with individual-level data, Li and Kannan (2014) find spill-over effects from Display and email touchpoints to search, referrals and website visits touchpoints. They focused on online touchpoints (including for the purchase step) and call for future research to control for customers selectivity bias (such as selective targeting of customers across channels).

Dinner et al. (2014) pointed out that offline communication drives offline sales, which have been called "own-channel effects". They also highlighted "cross-channel effects" as digital communication drives offline sales and reciprocally. They argued that measuring the impact of a channel on a single channel does not fully reflect its total impact (Figure 11).

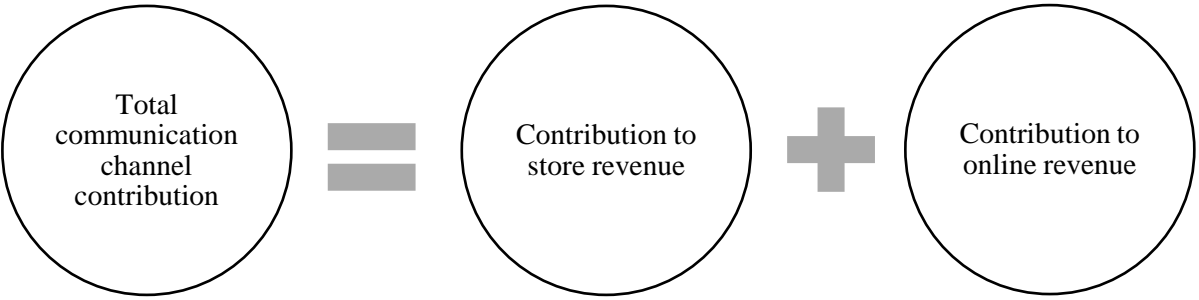


Figure 11: Measuring communication channel contribution across the transaction channels

To do so, they demonstrated that cross effects are particularly important for online communication, namely Search and Display on the offline channel. The comparable magnitude between cross and own effects suggest the importance of such measurements in evaluating communication investments ROI (Figure 12).

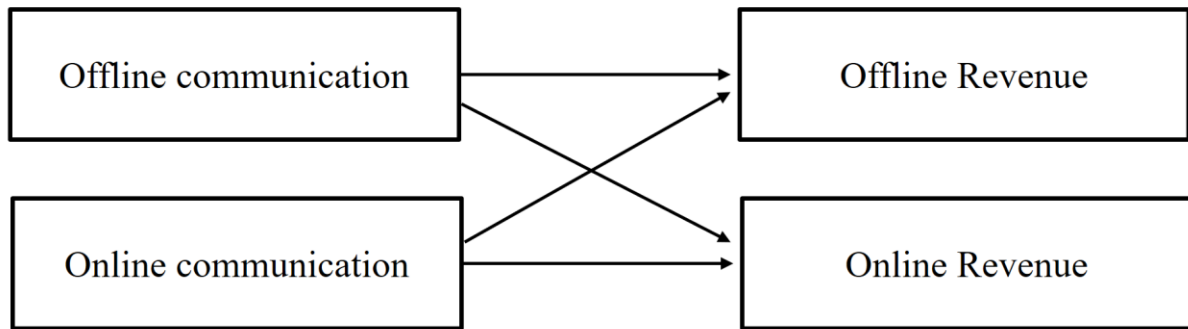


Figure 12: A comprehensive framework of own-channel and cross-channel effects (adapted from Dinner et al., 2014)

Despite the interest of this research stream, so far, it has never integrated mobile as a device and as a way to drive cross-channel behavior and to generate purchase on alternative channels. Furthermore, this research on cross-channel effects was based on descriptive data highlighting correlation rather than strict causality. We draw on their multiple calls for further field research, in particular related to advertising expenditure optimization in light of cross-channel effects.

We respond to these calls with a field research that controls for selectivity bias, includes a mobile touchpoint in addition to digital and traditional touchpoints and finally provides a causal purchase measurement across channels. All in all, we aim at providing a touchpoints' profitability analysis.

2.2.3 Considering customers' heterogeneity in behavioral response to omni-channel communication

"Not all customers are created equal" is probably one of the most cited sentence from Fader's book "*Customer Centricity: Focus on the Right Customers for Strategic Advantage*" (2012). In an interview⁹ on centric centricity for the online series "Knowledge @ Wharton", Fader advances:

⁹ "Peter Fader on Customer Centricity and Why It Matters", online interview : <http://knowledge.wharton.upenn.edu/article/peter-fader-on-customer-centricity-and-why-it-matters/>

“By talking about “the customer” or by talking about “the average customer,” that doesn’t do justice to the vast heterogeneity and the incredible differences across our customers in terms of their propensity to buy, to talk to each other and to respond to different kinds of offers.

Again, step one of being customer centric is not only acknowledging the heterogeneity, but celebrating it; saying, ‘Wow, all this heterogeneity is a great thing because it lets us pick and choose different kinds of customers!’ When we say “the customer,” we are selling ourselves short. I think it’s important to not use those words and to always have a plural there.”

Indeed, a major question arises with omni-channel: are customers profitable thanks to greater marketing investments or do brands and retailers greatly invest on such customers because they are heavy? In a context where brands need to build contact strategies through an increasing number of channels and touchpoints, this question, that has been under investigated by researchers, calls for new models to efficiently allocate marketing resources across these channels. Moreover, most firms cannot afford a massive investment on every possible channel and tend to switch to lower costs channels to boost return on investments (ROI). Often, this is made without considering customers’ response to more expensive channels in their ROI calculations: this is mainly due to a lack of shared and accurate metric to assess the real efficiency and contribution of channels and touchpoints.

After an invitation to focus on customers with the most value (Chart 3) (Roberts and Berger 1999; Thomas and Sullivan 2005; Haenlein, Kaplan, and Schoder 2006), and then on customers who react best to a growth in the volume of communication (Kumar, 2010), the era of the omni-channel may call for new forms of action. The multiplication of channels suggest that customers may actually be unresponsive to communication actions because the channels used for these actions do not align with their preferred channels (Godfrey, Seiders and Voss, 2011).

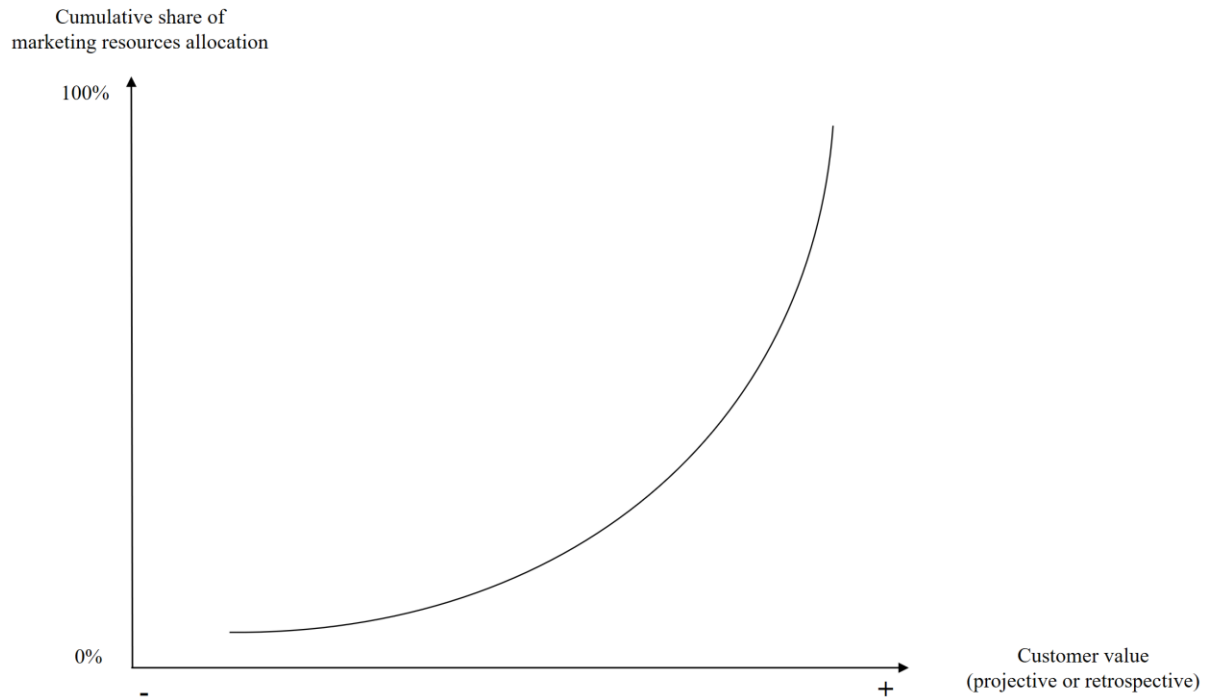


Chart 3: Typical outcome of a customer-value based contact strategy: a concentration of investments on heavy customers.

This observation, as recently mentioned by Verhoef, Kannan and Inman (2015), calls for an assessment of the consumer's responsiveness, no longer to a communication campaign, but to each channel to which he or she has been exposed during the campaign.

2.3 Research questions and methodology: Essays' justification and complementarities

GENERAL QUESTION:

What is the impact of omni-channel communication strategies on customers' purchasing behavior?

The implementation of omni-channel communication strategies raises several issues for firms, specifically for retailers. Several issues emerge and draw complementarity in the contribution to the general research question. Understanding the impact or influence of omni-channel communication strategies on customers' behavioral response opens several avenues of research that we address.

The first research avenue that we address is to understand the different impacts on customers' response generated by additional channels. Studying customers' behavioral response to communication campaigns opens two major research opportunities. First, it implies to focus not only on transaction (i.e. the purchase) but also to focus on earlier behavioral stages in the journey such as visits to website or adding-to-cart any item. Such tracking is made possible by online data collection from online customer interactions. Second, it enables to understand whether the marginal cost of activation induced by an additional channel translates into incremental revenue. Therefore, we explore the "*cost*", "*coverage*" and "*contribution*" dimensions of IMC of additional channels.

A first research question emerges towards a deeper understanding of omni-channel communication impact:

RQ1: To what extent is the marginal cost of additional channels covered by the incremental revenue driven by customers' response (e.g., purchase frequency, average order basket and buyers rate)?

Then, effective omni-channel strategies deserve a better understanding of increasingly complex customer journeys. One major issue raised is the understanding of how several communication

channels may guide customers in their paths to purchase throughout the multiple transaction channels available (e.g. an ecommerce website versus retail stores). One specific communication channel could affect customers' channel choice to purchase but few researches assess causality between multiple communication channels and subsequent customers' transaction, it is therefore a contribution to the understand to full "*contribution*" criteria of IMC.

A second research question emerges to understand and quantify the influence of omni-channel communication on customers' journey:

RQ2: How do alternative brand-initiated channels impact customers' path to purchase through multiple transaction channels?

Finally, the adoption of omni-channel communication strategies implies to investigate the multiple customers' reactions (i.e. often mentioned as heterogeneity) driven by an additional channel in itself or by the interaction between the multiple channels activated. This relates to the need for channels' orchestration. The "*conformability*" criteria of IMC advances the idea of multiple targets' responses to every treatment.

A third research question emerges to understand customers' response heterogeneity and how customers' characteristics explain the overall effects:

RQ3: Who are the most responsive customers' profiles to the simultaneous activation of digital and mobile channels?

2.4 The integrative perspective of doctoral research

Study	1	2	3
Methodology	Randomized field experiments		
Measurement	<p>Incrementality performance measures to assess causation. A homogeneity test is performed for each comparative performance analysis between control and experimental groups. The test is based on the Chi-2 law for independent samples and dummy dependent variable. The significance thresholds (p-values) for each test are indicated.</p> <p>A modeling approach at the individual level, through a logistic regression to predict the purchase probability during the experimental period (Purchase / No purchase)</p>		
Independent variables	<p>1/ Upper and mid funnel behavioral antecedents:</p> <ul style="list-style-type: none"> - Volume of unique visitors - Volume of unique add-to-cart visitors - Volumes of unique buyers <p>2/ Drivers of incremental revenue:</p> <ul style="list-style-type: none"> - Average order basket - Frequency - Transaction rate 	<p>1/ Own-channel and cross-channel effects:</p> <ul style="list-style-type: none"> - Share of uplift to online conversion - Share of uplift to instore conversion <p>2/ Channel profitability:</p> <ul style="list-style-type: none"> - Return on channel investment 	<p>1/ Response heterogeneity across customers' base:</p> <ul style="list-style-type: none"> - By customer value segments - By channel responsiveness - By customers' location <p>2/ Channels' interactions:</p> <ul style="list-style-type: none"> - Extensive dimension: Channel incremental reach / coverage - Intensive dimension: Channel repeated exposure
Research question	To what extent is the marginal cost of additional channels covered by incremental revenue driven by customers' response (e.g., purchase frequency, average order basket and buyers rate)?	How do alternative brand-initiated channels impact customers' path to purchase through multiple transaction channels?	How to relevantly orchestrate digital and mobile channels considering customers' response heterogeneity?
Objective	Antecedents and channel influence drivers	Channel effect on path to purchase	Channel effect across customers' profiles
Communication channels	email, SMS and programmatic display	email, SMS and print	email, SMS and programmatic display
Transaction channels	Online sales	Online versus offline sales	Online + Offline sales

Table 3: overview of the research design

2.5 Essays' abstracts and scientific status

2.5.1 Essay n°1 abstract

This essay aims at investigating the underexplored topic of omni-channel communication. Particularly, we explore the scope of omni-channel communication along different steps of the purchase funnel: from consideration, to purchase intention and purchase. Major technology advances brought by real-time programmatic media buying enables brands to **switch from a channel-centric contact strategy to a people-based strategy** across media and opt-in channels and improve customers' addressability at upper funnel steps. This engages customers in a loyalty loop by boosting the volume of website visitors, of visitor's adding to cart an item and buyers. Three large-scale field experiments carried out on a two-month period for an online CPG retailer respectively on 329,151 opt-out individuals, on 1,125,087 email-opt-in individuals and on 426,451 email-and-mobile-opt-in individuals enable to measure an additional channel's incremental impact. A new channel mainly drives unique buyers' rate and has no significant impact on purchase frequency and average order basket. Such results enable to **link the marginal cost of activation of an additional channel with its incremental impact** on revenue. We discuss these results to understand how brands could improve the orchestration of multiple channels that formerly served different objectives along the customer decision process.

2.5.2 Essay n°2 abstract

Brands interact with their customers through multiple channels and a myriad of channels and touchpoints. For many brands, the selection and orchestration of these channels is critical in order to engage their customers in profitable paths to purchase. This study reports two field experiments whose aim was to evaluate the impact of communicating through different kinds of channels rather than using the same channel. More precisely the aim is to evaluate whether it is more efficient to communicate **several times by using the same channel or by using different kinds of channels in the customer journey**. An experiment has been conducted with a French click-and-mortar retailer's in which email-only communication strategy was substituted by i) a print-and-email strategy and ii) an SMS-and-email strategy, all the treatments controlling for frequency of contact to isolate channel's effect.

On sample sizes of 128,000 and 37,000 individuals, both experiments increased conversion and revenue but **impacted channel-specific distribution of customers**. Compared to email, print communication mainly drove offline incremental sales, while SMS equally drove offline and online incremental sales. The type of firm-initiated channels (email, SMS and print) had a significant influence on customers' purchase channel. Finally, beyond the incremental revenue generated by those additional channels, an ROI analysis was conducted to assess channels' contribution to design profitable paths to purchase.

2.5.3 Essay n°3 abstract

This essay investigates omni-channel communication by understanding the impact of activating a new communication channel **across multiple customers' profiles (i.e. customer heterogeneity)**. The results from two field experiments combining email, SMS and RTB banners, carried out on more than 300,000 and 700,000 individuals, confirm both online and offline conversions uplifts. The study enables to **identify over-responsive and under-responsive customers' segments** built on several criteria such a customer value, customer responsiveness to a channel and location. It contributes to the understanding of sources of heterogeneity in customers' response to omni-channel communication (e.g. customer value, customer habits regarding devices, customer responsiveness to previous channels and location). It also identifies synergy sources among channels and demonstrates that omni-channel is critical to develop the value potential of some customers' segments.

2.5.4 Essays' scientific status

Essay n°1 was presented at the 2019 Interactive Marketing Research Conference (EDGE IMRC) in Houston (USA) and at the 2019 AFM Congress (Association Française du Marketing) in Le Havre (France).

Essay n°2 was presented at the 2017 AFM Congress (Association Française du Marketing) in Tours (France), at the 2017 EMAC Conference (European Marketing Academy) in Groningen (The Netherlands) and at the 2017 Marketing EDGE Research Summit in New Orleans (USA).

Chapter 4 (study n°3) was presented at the 2015 Marketing EDGE Research Summit in Boston (USA) and was published in December 2016 in a special issue of the French journal *Décisions Marketing*, n° 84 dedicated to "Marketing in a connected world".

GENERAL INTRODUCTION

CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED COMMUNICATION CHANNEL: A PEOPLE-BASED AND INCREMENTAL APPROACH

CHAPTER 2: BRAND CHANNELS' ORCHESTRATION: UNDERSTANDING THE IMPACT OF DIGITAL, TRADITIONAL AND MOBILE CHANNELS ON CUSTOMER JOURNEY

CHAPTER 3: HOW TO COORDINATE DIGITAL AND MOBILE CHANNELS TO GENERATE INCREMENTAL VALUE ACROSS CUSTOMERS HETEROGENEITY?

GENERAL CONCLUSION AND DISCUSSION

CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED COMMUNICATION CHANNEL: A PEOPLE- BASED AND INCREMENTAL APPROACH

Introduction

The general introduction of this thesis puts forwards the idea that, to activate their customers, brands and retailers use multiple communication channels that serve several objectives such as building consideration, generating purchase intention and boosting conversions. The broader perspective of the “purchase funnel” concept integrates these objectives that should reflect the different stages of the consumer decision process: from need recognition to purchase and even post-purchase. The analysis of customer journeys emphasizes on customers’ attitude and behavior at the different stages of their decision making process. Therefore, most research has focused on how brands should **adapt** their customer contact strategies to maximize the chances that they finally get the conversion. Doing so implies for brands to build awareness, foster positive purchase intention and identify trigger points that are decisive for transactions.

To address the earlier stages of the customer decision process, also known as the upper funnel steps, brands have historically used mass media (Batra and Keller, 2016) (e.g., television, radio, online and offline display...) and have targeted a large audience to build awareness and consideration (Macdonald and Sharp, 2000). On the other hand, brands take advantage of more performance-oriented channels and touchpoints (e.g., email retargeting campaigns, recommender systems, trigger marketing techniques...) to address the lower funnel steps and to positively impact ROI, revenue and conversion (Lambrecht and Tucker, 2013).

Identifying and recognizing the different audiences and targets across these channels is complex. Indeed, at lower funnel steps, brands usually target well-known individuals, often already-customers, who have already interacted with them. In contrast, the channels used at upper funnel steps are usually activated towards an aggregate audience that is not as qualified

as those at lower funnel steps are. In other words, brands usually do not know how individuals who are already customers may react:

- i. to investments made on additional communication channels,
- ii. at the different steps on their digital decision-making process.

Interestingly, digital communication has brought brands to use multiple types of channels and to think in a channel-centric logic instead of a people-based approach that is at the heart of customer contact strategy. Precisely, little research has studied how individuals who are already-customers of a brand may react along their path to purchase to an omni-channel activation. More importantly, because every channel comes with a different cost of activation, the question of channel's marginal cost versus marginal contribution to performance has been underexplored.

As a result, brands measure the efficiency of their contact strategies from the upper funnel actions to the lower funnel actions via heterogeneous metrics. This heterogeneity comes from the variety of channels that brands activate to serve those several objectives. Indeed, because of their intrinsic characteristics, every channel generates different types of data (e.g., aggregate versus individual response, attitudinal versus behavioral response). Therefore, **the efficiency analysis of such communication actions is more channel-based than people-based**. Brands usually manage upper funnel metrics with aggregate-data (or mass-media-related data) and usually manage lower funnel metrics with individual-level data (or CRM-related data).

Three fundamental trends may explain the need to reshape the way brands interact with their customers and the way they measure the efficiency of their customers' activation strategies:

- (i) the increasing time spent by consumer on digital and mobile media,
- (ii) the increasing switch to digital in terms of communication investments by firms,
- (iii) the digitization of most traditional channels (e.g., online display, radio, TV) thanks to programmatic media buying that enables individual targeting based on behavioral tracking data.

Indeed, these three trends enable a growing access to individual-level data at every step of the purchase funnel. Access to individual and behavioral response data at every step of the contact strategy may radically change the measurement, the understanding and then the orchestration of an omni-channel communication by a brand.

In this essay, our contribution is twofold. Omni-channel communication implies to activate additional channels along the path to purchase but little research has investigated the effect of an additional channel exposure on customers' response to marketing solicitations. We aim at investigating the impact of the rise in contact frequency due to additional channels at multiple steps of customers' path to purchase. Then, activating an additional channel induces a marginal cost, but both scholars and practitioners face a critical issue: isolating the incremental impact of channel on the revenue generated by the contact strategy. This essay could contribute to the understanding of channels' marginal cost versus incremental impact to better orchestrate omni-channel strategies.

This essay aims at addressing these key issues that seem relevant both conceptually and managerially. It starts by presenting the related conceptual background before introducing the research methodology and the results of three large-scale field experiments. It ends with the results' discussion and presents the conceptual and managerial contributions.

Section 1: Conceptual background and hypotheses

1.1. Brand proactive contact strategies across multiple communication medium

1.1.1 How brands evaluate and select media options

As media and channel options expand while marketing-related data continue to proliferate, communication research has focused on the development of tools and models for firms to make recommendations and to conduct cost–benefit analyses that justify these choices. Such research stream often refers as media planning.

The dominant theoretical foundation is the model of reach and frequency (Leckenby and Hong, 1998; Leckenby and Kim, 1994). Indeed, surveys of ad practitioners in the 1980s and 1990s showed that reach and frequency were two of the most significant factors considered when selecting media and channel options (King and Reid 1997; Leckenby and Kim 1994; Nowak, Cameron, and Krugman 1993). The importance of reach-and-frequency distribution estimates is heightened by increased usage of the concept of “*effective reach and frequency*” among both practitioners and academics (Kreshel, Lancaster, and Toomey, 1985; Turk and Katz, 1992). Effective reach and effective frequency analyses represent two perspectives on the same issue. Effective frequency reflects how many exposures are needed for an ad to become “effective”

while effective reach addresses the number of people who are exposed at that level (Cannon, 2001). Over time, effective frequency planning (EFP) has represented the process through which communication specialists put effective reach and frequency into practice. It has become an integral part of the media-planning culture and procedures and, in fact, is the dominant media planning paradigm (Kreshel, Lancaster, and Toomey 1985; Leckenby and Hong 1998; Leckenby and Kim 1994).

Even if, the reach and frequency framework has been influential since the 1980s, it has been challenged with the growing access to marketing-communication data. First, because of its arbitrary standards: main research considering three or more exposures as effective. Second, because of its foundation regarding advertising effectiveness which should be subject to a threshold effect, reflected in an S-shaped advertising response curve, when in practice, response curves tend to be concave, characterized by continually diminishing returns (Vakratsas et al. 2004). Limitations of effective frequency planning (EFP) have been addressed in alternative media planning frameworks, such as Cannon and Riordan's 1994 "Optimal Frequency Planning" (OFP) and the concept of "Frequency Value Planning" (FVP) (Cannon 2001; Cannon, Leckenby, and Abernethy 2002). The central idea of OFP and FVP is to weight every level of exposure in the frequency distribution with the probability that each level of advertising exposure will have an impact on consumers, as demonstrated by the advertising response curve. There are currently numerous models and patents by which planners may estimate reach and frequency distributions for different media. Among academics, considerable work has been conducted on the development of reach-and-frequency estimation models for different media (Leckenby and Hong 1998; Leckenby and Kim 1994b; Rust and Leone 1984; Danaher 1991), with past studies revealing that the majority of advertising agencies in the USA were using at least one computerized model to estimate reach-and-frequency distributions. These studies also showed that most media experts believed that at least some improvements in reach-and-frequency estimation models were required.

The use and perceptions of reach-and-frequency distribution have been challenged with the advent of the Internet as a significant advertising medium. While digital marketing had not gained sufficient momentum or attention to be included in the published research from the 1980s and 1990s, more recent work has focused on the effectiveness of the online reach-and-frequency data itself and not industry practices. With such changes in the media environment and data availability, the application and perceptions of models for reach-and-frequency have changed. Years later, Cheong, Gregorio, and Kim (2010) intended to assess media directors'

perception of models for estimating reach and-frequency distributions for both offline media and online media. Their research has been useful to determine whether there have been changes in the factors used to evaluate alternative media and channels options. In particular, research has focused on the main factors used over time to evaluate offline communication channels but also digital channels: this has resulted in the finding of significant shifts in the way practitioners have leveraged main efficiency-related theories (Table 4).

Despite some consistencies between offline and online communication evaluations, however, the proportion of some of the most popular online-media factors were not as popular for online media:

- The “Reach” criterion decreased by 50 percent ($z = 6.66, p < 0.01$)
- The “Frequency distribution” criterion decreased by 31.9 percent ($z = 3.98, p < 0.01$)
- The “GRP” metric decreased by 58.9 percent ($z = 7.24, p < 0.01$)
- The “Average frequency” criterion decreased by 41.7 percent ($z = 5.43, p < 0.01$)
- The “Effective reach” criterion decreased by 37.5 percent ($z = 4.92, p < 0.01$).

For the factors specifically listed with regards to online media, “click-through rate” (97.3%), “unique visitors” (94.6%), “page views” (92.0%), and “ad impressions” (96%) were mentioned most often.

Factors	Offline			Online	
	'08 (percent)	'94 (percent) ^a	Z ^b	'08 (percent)	Z ^c
Reach	74 (92.5)	51 (81.0)	2.07*	31 (42.5)	6.66**
CPM to target market	74 (92.5)	49 (77.8)	2.52*	67 (90.5)	0.44
Qualitative factors	73 (94.8)	49 (77.8)	2.99**	67 (91.8)	0.74
Total schedule cost	74 (93.7)	49 (77.8)	2.76**	66 (89.2)	0.99
Frequency distribution	58 (74.4)	47 (74.6)	0.03	31 (42.5)	3.98**
GRPs	63 (80.8)	46 (73.0)	1.09	16 (21.9)	7.24**
Average frequency	65 (85.5)	46 (73.0)	1.83	32 (43.8)	5.43**
Effective reach	67 (84.8)	43 (68.3)	2.35*	35 (47.3)	4.92**
Continuity	54 (70.1)	41 (65.1)	2.02	48 (65.8)	0.57
Quintile analysis	32 (41.6)	37 (58.7)	2.02	20 (27.4)	1.82
Media type budget allocation	51 (64.6)	32 (50.8)	1.65	49 (66.2)	0.22
Online purchase rate	—	—	—	47 (63.5)	—
Click-through rate	—	—	—	73 (97.3)	—
Unique visitors	—	—	—	70 (94.6)	—
Visitor duration	—	—	—	59 (80.0)	—
Hits	—	—	—	46 (62.2)	—
Page-views	—	—	—	69 (92.0)	—
Ad impressions	—	—	—	72 (96.0)	—
Cost per action/outcome	—	—	—	63 (87.5)	—

Note: ^aFindings from Leckenby and Kim (1994), * $p < 0.05$; ** $p < 0.01$.

^bComparison with Leckenby and Kim (1994) of proportions of factors used for offline media evaluation.

^cComparison with proportions of factors used for online media evaluation.

Table 4: factors used in evaluation of online and offline media options

The same research also highlights the degree of importance attributed to each factor (Table 5). A five-point scale from “very important (5)” and “not at all important (1),” reveals that “CPM (Cost Per Mile) to target market”, “qualitative factors” and “average frequency” received significantly higher mean importance scores of 4.48, 4.67, and 4.45, respectively - increased from the 1994 study of 4.20 ($t = 2.05$, $p < 0.05$), 4.10 ($t = 3.99$, $p < 0.01$), and 4.00 ($t = 3.48$, $p < 0.01$). The perceived importance rating of “total schedule cost” rose to 4.55, from 4.30 in 1994: most evolutions confirm cost-effectiveness is a main objective for channels’ activation. For online media, “cost per action/outcome” (4.77), “qualitative factors” (4.76), “ad

impressions” (4.71), “click-through rate” (4.67), and “unique visitors” (4.67) were the five most important factors. As a matter of fact, most factors tend to be cost oriented, and behavioral.

	Yr.	Offline Media					M	Online Media					M
		Very Important		Not Important				Very Important		Not Important			
		(5)	(4)	(3)	(2)	(1)		(5)	(4)	(3)	(2)	(1)	
Reach	'08	53.3	36.6	6.6	3.3	0.0	4.40	30.0	23.3	26.7	20.0	0.0	3.63
	'94 ^a	47.6	28.6	4.8	0.0	0.0	4.50	—	—	—	—	—	—
t(128) = -1.07							t(156) = 4.95**						
CPM to target market	'08	50.0	43.6	1.3	0.0	1.3	4.48	54.2	34.7	1.4	2.8	0.0	4.51
	'94 ^a	31.8	38.1	9.5	1.6	0.0	4.20	—	—	—	—	—	—
t(124) = 2.05*							t(140) = -0.26						
Qualitative factors	'08	64.5	31.6	0.0	0.0	0.0	4.67	75.0	16.7	2.8	0.0	0.0	4.76
	'94 ^a	30.2	33.3	14.3	0.0	1.6	4.10	—	—	—	—	—	—
t(121) = 3.99**							t(139) = -1.15						
Total schedule cost	'08	61.5	28.2	3.8	2.6	0.0	4.55	58.9	26.0	6.8	0.0	1.4	4.51
	'94 ^a	46.0	12.7	17.5	1.6	0.0	4.30	—	—	—	—	—	—
t(122) = 1.53							t(141) = 0.26						
Frequency distribution	'08	23.4	45.5	3.9	5.2	2.6	4.02	13.0	35.2	5.8	1.4	2.9	3.92
	'94 ^a	34.9	25.4	14.3	3.2	0.0	4.20	—	—	—	—	—	—
t(108) = -0.95							t(101) = 0.47						
GRPs	'08	46.8	31.2	5.2	5.2	0.0	4.35	7.2	15.9	10.1	5.8	2.9	3.45
	'94 ^a	38.1	19.1	12.7	4.8	3.2	4.10	—	—	—	—	—	—
t(115) = 1.49							t(95) = 3.82**						
Average frequency	'08	38.2	42.1	3.9	2.6	2.6	4.45	17.4	31.9	7.2	2.9	1.4	4.00
	'94 ^a	28.6	19.1	22.1	4.8	0.0	4.00	—	—	—	—	—	—
t(109) = 3.48**							t(108) = 1.33						
Effective reach	'08	60.3	23.1	2.9	2.6	2.6	4.50	27.5	23.2	5.8	1.4	1.4	4.24
	'94 ^a	41.3	19.1	6.4	1.6	0.0	4.50	—	—	—	—	—	—
t(112) = 0.17							t(110) = 1.40						
Continuity	'08	24.0	40.0	9.3	4.0	1.3	4.03	18.6	41.4	14.3	0.0	0.0	4.06
	'94 ^a	19.1	25.3	22.2	1.6	1.6	3.80	—	—	—	—	—	—
t(101) = 1.06							t(109) = -0.16						
Quintile analysis	'08	6.9	34.7	6.9	1.4	4.2	3.72	8.7	21.7	7.2	1.4	2.9	3.76
	'94 ^a	11.1	23.8	12.7	12.7	6.4	3.31	—	—	—	—	—	—
t(79) = 1.63							t(66) = -0.16						
Media type budget allocation	'08	20.0	34.7	10.7	8.0	2.7	3.81	19.7	36.6	12.7	7.0	1.4	3.85
	'94 ^a	17.5	7.9	9.5	14.3	3.2	3.40	—	—	—	—	—	—
t(88) = 1.48							t(110) = -0.25						

(continued)

	Yr.	Offline Media					M	Online Media					M
		Very Important			Not Important			Very Important			Not Important		
		(5)	(4)	(3)	(2)	(1)		(5)	(4)	(3)	(2)	(1)	
Online purchase rate	'08	—	—	—	—	—	—	40.8	22.5	5.6	2.5	1.4	4.35
Click-throughs	'08	—	—	—	—	—	—	71.2	24.7	4.1	0.0	0.0	4.67
Unique visitors	'08	—	—	—	—	—	—	65.3	29.2	1.4	0.0	0.0	4.67
Visitor duration	'08	—	—	—	—	—	—	31.0	47.9	5.6	1.4	1.4	4.20
Hit	'08	—	—	—	—	—	—	21.4	42.9	8.6	0.0	1.4	4.12
Page-views	'08	—	—	—	—	—	—	36.6	50.7	4.2	5.6	0.0	4.21
Ad impressions	'08	—	—	—	—	—	—	71.8	25.4	1.4	0.0	0.0	4.71
Cost per action	'08	—	—	—	—	—	—	73.2	18.3	1.4	0.0	0.0	4.77

Note: *Findings from Leckenby and Kim (1994), * $p < 0.05$; ** $p < 0.01$

Table 5: the importance of factors used in media evaluation

Interestingly, beyond the appearance of new factors brought by the advent of online media, Cheong et al. (2010) research demonstrated a significant switch in the main criteria of decisions to evaluate channel options. While reach and effectiveness factors remain important year after year for offline media, online media important factors focus around cost of channel activation. While digital media implied a radical decrease in the cost of consumer interactions, factors such as “cost per action”, “CPM” or “total scheduled cost” remain important. In particular, the most used factors to evaluate online media options, namely click-throughs and ad impressions, do not any take reach and frequency elements into account.

In fifteen years, it seems that low progress has been made regarding reach and frequency as most practitioners still claim that improvements are needed in the field, especially regarding the criteria of effective reach of channel options.

This indicates that planners are relying to a greater extent on qualitative considerations when they weigh their media choices. This revelation comes despite the fact that the media profession is increasingly complex, with more media and channels options and concomitant expansion in

data (Turk and Katz, 1992; Taneja et al. 2012). Thus, in a more diverse media world, media directors seem to be avoiding sophisticated empirical criteria and, instead, relying on non-quantifiable factors such as experience, or the “feel” for a medium. Some of the most popular criteria used for offline media (i.e., reach, frequency distribution, gross rating points (GRPs), average frequency, and effective reach) were mentioned by less than half of the agency media directors as a consideration in the evaluation of online media. In fact, in the evaluation of online media, the media directors in this study sample evinced clear preference for such factors as click-through rates, number of page-views, ad impressions, and unique visitors, further reinforcing the differences in how media experts view offline and online media.

As the amount of media data available has continued to expand, the importance of media-exposure models has increased over time. As the media business becomes ever more complex, these models are likely to be perceived as even less accurate if no changes are made. It is also notable that reach still is one of the primary considerations and in particular the concept of “effective reach.” Thus, continuous development of more accurate media exposure models remains a priority. More recently, Schultz, Block, and Viswanathan (2018) call for consumer-driven media planning and buying and take individual media consumption habits into account. Individuals’ engagement towards a particular media and therefore medium influence rather than medium exposure are concepts that could reshape the media planning landscape.

As mentioned in the general introduction, one of our main research objective is to compare the relative effectiveness of multiple channels, so a natural theoretical framework is integrated marketing communication (IMC). IMC aims at putting together elements of the communication mix so that the strengths of one channel are used to complement the weaknesses of other channels; that is, synergy between different communication channels is created (Kitchen and Schultz, 1999). IMC begins with the customer and looks for the most appropriate and effective combination of channels through which persuasive programs can be used to build relationships with customers. In that sense, contributions in the field of IMC do converge with most recent contributions in the field of media planning (Schultz, Block, and Viswanathan, 2018). The concept of synergy in marketing communications refers to the coordination of messages for delivering more impact (Chang and Thorson, 2004). This impact is a result of the consumer receiving a consistent message from a variety of advertising channels (Wang, 2006). To provide such a consistent message, firms need to understand how consumers perceive the range of available communication channels. Several studies have dealt with synergy in traditional advertising media (e.g. Edell and Keller, 1989; Naik and Raman, 2003) and synergy between

traditional media and the digital ones (Dijkstra, Buijtels, and van Raaij 2005). Importantly, IMC brought a shared belief that media exposure does not mean advertising effectiveness, and suggested to consider the role of media engagement or sensitivity on effectiveness (Bezjian-Avery, Calder, and Iacobucci, 1998). Finally, whereas it is important to document the perceived advantages and disadvantages of traditional and new channels, managers are also interested in “bottom-line” effectiveness. Lasswell's (1948) classic definition of communication is *who* (source or sender), says *what* (message), in *which channel* (medium), to *whom* (audience or receiver), with *what effect*. The classic model of effective communication postulates that the sender's message will be most effective when the sender has correctly anticipated the needs and preferences of the receiver, that is, when the sender's encoding of the message corresponds with the receiver's decoding of it (Shannon, 1948). Whereas the Shannon-Weaver model of effective communication is about the message, in Durham and Kellner's book (1964), McLuhan's dictum that “*the medium is the message*” suggests that the correspondence recommendation should also apply to the medium or channel. Hence, for effective communication, the sender should also match the channel that the receiver prefers. Previous research has indeed demonstrated that receivers have distinct preferences for the channels, in which, certain types of messages, differing in their uses, are received and that senders of messages also have their own preferences for channels of communication. Hence, if senders go with their personal preference, they may choose a medium that does not match from the medium preferred by receivers. This induces the key challenge of people addressability (i.e. ability to address) across channels, media and steps of the funnel.

1.1.2 The funnel perspective, from media-planning to programmatic media buying: the challenge of people addressability

For long, brands have built their advertising strategies to serve several complementary objectives. Each of these complementary objectives constitutes research streams. Such ones include (i) how brands could build consideration and awareness, (ii) how brands may interact with their prospects and customers to move them from consideration to purchase intention and (iii) how to boost the volume transactions to improve profitability. These objectives are in line with consumers' decision process from need recognition to brand choice and purchase often mentioned as customers' path to purchase (P2P) and the funnel model (Figure 13). Most research, in this context, either has focused on a specific brand objective (from a brand strategy

perspective) or on a specific stage of consumers' decision process (from a consumer behavior perspective).

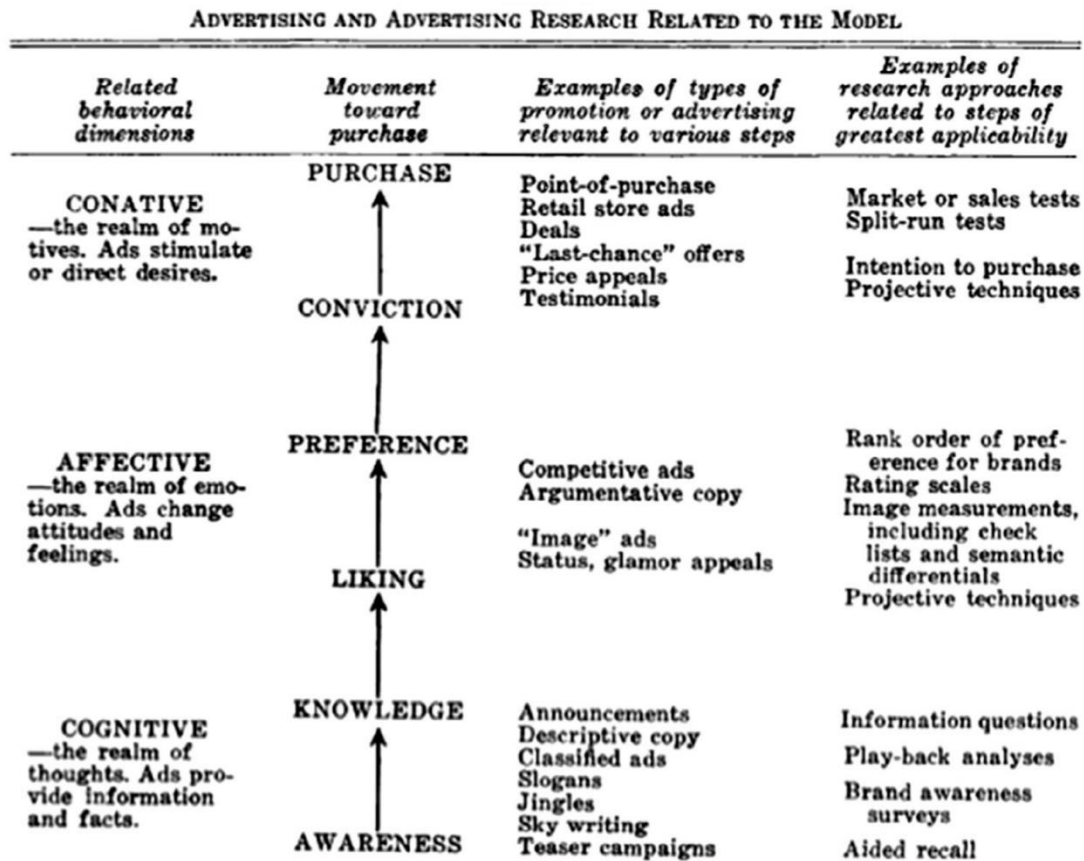


Figure 13: Lavidge and Steiner's (1961) Hierarchy of Effects model.

More specifically, every objective mentioned above has traditionally taken advantage of specific communication channels thanks to their intrinsic characteristics. Indeed, building brand consideration and awareness – also known as the upper funnel steps – has mainly benefited from mass media channels that enable to cover large audiences that are not qualified at the individual level. The next objective, moving consumers from consideration to purchase intention (i.e., the mid funnel steps) has benefited from more individually activable channels that are mostly based on a prior consumer consent, that is called opt-in. This objective has been widely studied in the relationship marketing literature. Finally, the last objective that we mention, driving transactions and revenue, has benefited from performance-oriented channels and touchpoints that enable personalization and trigger responsiveness by brands and retailers

For both researchers and practitioners, the split between above-the-line and below-the-line marketing has even more contributed to this vision in multiple silos at the different steps of

the purchase funnel. As a result, we can notice a strong correlation between, on one side, the objective of communication set by brands, and on the other side, the choice of channels to activate to serve this objective: a channel-centric approach (Table 6).

Channels activated	Expected channels exposures					Main metric managed	Typical efficiency measurement
Channel A	Touch point A1	Touch point A2	Touch point A3	...	Touch point An	Channel A main objective (e.g., awareness)	Channel A cumulated effect
Channel B	Touch point B1	Touch point B2	Touch point B3	...	Touch point Bn	Channel B main objective (e.g., purchase intention)	Channel B cumulated effect
Channel C	Touch point C1	Touch point C2	Touch point C3	...	Touch point Cn	Channel C main objective (e.g., transactions)	Channel C cumulated effect
Channel X	Touch point X1	Touch point X2	Touch point X3	...	Touch point Xn	Channel X main objective	Channel X cumulated effect

Table 6: The channel centric contact strategy

In particular, such channel-centric approaches, which aim at understanding channels' contribution to a communication objective, do not enable to understand:

- To what extent individuals who are already customers (who have already purchased from a given brand or retailer) may respond differently to the activation of specific channel than prospects (who never purchased from a given brand or retailer)

- To what extent a given communication channel may contribute to move consumers forward in their path to purchase across multiple steps of the decision making.

At the upper and mid funnel steps, most channels activated are usually measured thanks to attitudinal metrics collected through survey and aggregate data like the GRP - Gross Rating Point – which is calculated by multiplying the reach (in volume) and the exposure repetition (number of exposure occurrences) (Malthouse, Maslowska, and Franks, 2018). At the lower funnel step, brands and retailers aim at boosting transactions by activating performance-oriented channels such as email to opt-in customers. The efficiency of such channel are usually measured thanks to individual-level behavioral data like the conversion rate which is calculated as the volume of customers who purchase for every hundred messages sent (Figure 14). This figure relates to the “classic journey” as mentioned by Edelman and Singer (2015) and translates clearly into brand contact strategy.

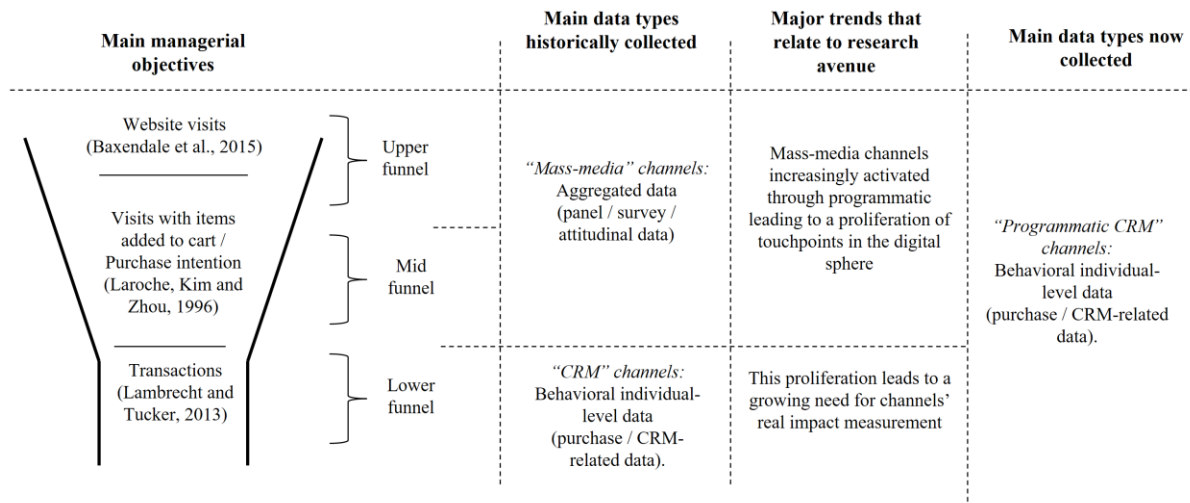


Figure 14: The funnel steps from a brand perspective (personal figure)

As a result, brands’ contact strategies across multiple channels raise several challenges that motivate further investigation. The first research motivation is that, because brands and retailers have to deal with a growing number of channels (Brynjolfsson, Hu, and Rahman, 2013), the fragmentation of audiences due to overlaps across channels becomes a key concern. This relates to the research stream of media consumption habits (Webster and Ksiazek, 2012; Taneja et al., 2012) and multiple calls for “audience-centric” research, rather than channel-centric studies. The growing access to individual exposure and response data across heterogeneous channels enables to respond to these calls and pursue the goal of a people-based approach of omni-channel communication.

1.1.3 The measurement perspective: how programmatic media buying enables individual response measurement across a growing number of channels?

The efficiency measurement of brand advertising investments has been very dependent of the type and granularity of the data that each of these channels enables to collect. Indeed, many brands manage upper funnel objectives (e.g., awareness) through aggregate attitudinal data: consideration (Baxendale et al., 2015) or purchase intention (Laroche, Kim and Zhou, 1996). Most brands, at the opposite, manage lower funnel objectives (e.g., performance) via individual-level and behavioral data: transactions, revenue per contact or ROI (Lambrecht and Tucker, 2013).

As a matter of fact, the major industry trend of programmatic media buying (Busch, 2016) that we describe in the general introduction enables brands and retailers to activate at the individual level media channels that were previously addressing mass audiences.

Programmatic advertising defines as “*the automated serving of digital ads in real time based on individual ad impressions opportunities*” (Busch, 2016). This new individual targeting capability at upper funnel steps of the path to purchase (Malthouse, Maslowska, and Franks, 2018) invites researchers to understand how brands may fully optimize the performance of omni-channel communication by incorporating a growing number of individually activable channels within their contact strategies (Table 7).

Malthouse and al. (2018), highlight this phenomenon by the coexistence of two different and competing approaches to buying/selling advertising media: the mass approach versus the computational advertising approach. The historical mass approach describes the fact that publishers (i.e. media companies that own ad inventory) sell mass audiences to advertisers (i.e. brands and retailers) who “*inform their decisions with probability samples such as Nielsen panel data*”. On the other hand, the computational advertising approach describes the fact the advertisers purchase individual ad exposures (or impressions) informed “*by whatever data may be available about the device, cookie, household, etc.*” Supply and demand meet on an ad exchange in real time and behavioral responses can be tracked. Malthouse and al. (2018) underline that the computational approach has been created by the tech community and has been mostly studied on the academic side by computer science scholars (Wang, Zhang, and Yuan, 2016 ; Leskovec, Rajaraman, and Ullman, 2014).

Funnel steps	Main data types historically collected	Major trends that relates to research avenues	Main data types now collected
Upper funnel	Aggregated data (panel / survey / attitudinal data)	Mass-media channels increasingly activated through programmatic leading to a proliferation of channels in the digital sphere	Behavioral individual-level data (purchase / CRM-related data)
Mid funnel			
Lower funnel	Behavioral individual-level data (purchase / CRM-related data)	This proliferation leads to a growing need for channels' real impact measurement	

Table 7: The addressability along of the funnel thanks to programmatic

Otherwise, in digital contexts, most research on the effects of channels on customers' response has focused on customers already engaged in a path to purchase. That is to say customers who have interacted with the brand through digital touchpoints such as search, social media or websites (Srinivasan et al. 2016). Such customer-initiated interactions reveal that a decision process has already started. Therefore, a gap remains regarding the understanding of such response for customers who are not engaged in the decision process as suggest by the works of Court et al. (2009) and Edelman & Singer (2015). These authors argue for the benefits of designing streamlined customer journeys that compress the consideration and evaluation steps to engage and lock-in customers in a "loyalty loop". In a context of increasing complexity implied by the management and the combination of traditional, digital and mobile channels, there is limited knowledge to how a better orchestration of channels and touchpoints can

contribute to engage customers in such a loyalty loop. A loyalty loop is made possible when brands proactively activate their customer base, most of the time through multiple channels as customers may be opt-in to several channels such as print, email and SMS. More importantly, the increasing use of programmatic media buying enables brands to individually target known customers through former mass-media, that is to say to activate customers with higher granularity in targeting at upper funnel steps of the decision-making process and collect individual behavioral response data. Understanding how the activation of mass-media channels towards already know customers may interact with lower-funnel channels to engage customers in a loyalty loop is an under investigated area.

One contribution of this work is the understanding of several brand channels' contribution to engage customers in a loyalty loop in the context of combination of programmatic and opt-in channels.

1.1.4 Measuring customers behavioral response to brand advertising across the multiple steps of the path to purchase (visit, engaged visit and transaction)

Few researches have examined firms' capability to leverage individual targeting across heterogeneous channels and therefore improve the ability to address individually their marketing communication actions. This is even more obvious when it comes to combine media channels that brands can activate through behavioral browsing data (e.g., a cookie-based targeting) with direct-opt-in channels that brands activated through PII-based data (e.g., email or SMS targeting).

Our research aims at evaluating how mass media and CRM may converge resulting in non-relevant boundaries for customer activation and development. Two main trends may explain this convergence phenomenon.

The first one is *programmatic media buying* (Heinemann, 2015) that enables firms to identify much earlier in the funnel their prospects and customers. The second one is a growing need for communication performance metrics that can be leveraged for every channel with the aim of a better resources allocation across channels.

Indeed, Malthouse, Maslowska, and Franks (2018) mention that programmatic “*has much in common with direct marketing and customer relationship management (CRM), in that it makes decisions at the customer level informed by customer databases and increasingly machine learning, and directly observes outcomes such as conversion.*”

On the one hand, a high priority and advantage for the mass approach is to reach a large audience with many exposures (GRPs) at lower cost: this could fall under the umbrella of effectiveness (Smith and Park, 1992). On the other hand, one of the main selling points of the programmatic CRM approach is the ability to expose only the most sensitive customers with a message that is relevant, sent at the right time through the most impactful channel. Instead of reaching a large audience at low cost, the ultimate goal is more about the return on investment over time (Customer Lifetime Value), which was also the goal of direct marketing and CRM: this could be called efficiency.

We advance two metrics to measure the impact of each channel in the funnel to conversion: *addressability* and *incrementality*.

The people-based marketing vision (Table 8) that helps firms build a non-siloed omni-channel contact strategy makes possible an improved *addressability*. Recent technology advances enable firms to improve addressability by linking PII data and non-PII data at the individual level (i.e. such as an email-cookie matching procedure). The programmatic buying mode of multiple mass media such as Radio, Display and TV enables brands to collect individual-level data about customers’ exposure and interactions with every ad impression. By doing so, firms may extend their CRM strategies to media channels such as display advertising. On the other hand, the heterogeneity of “opt-in channels” (email, mobile or print communication) has resulted in many different performance metrics that are difficult to compare. Valuing the *incremental* impact of each channel appears to be a relevant shared metrics in this context (Kannan, Reinartz & Verhoef, 2016).

All in all, this literature review opens essential research avenues in a context where the abundance of data enables to measure and understand the real impact of every channel on communication effectiveness.

Target audience	Experimental populations	Possible activated channels	Exposure to touchpoints				
	Population 1a	No activation	No exposure				
Audience 1	Population 1b	Channel A	Touch point A1	Touch point A2	Touch point A3	...	Touch point An
	Population 2a	Channel B	Touch point B1	Touch point B2	Touch point B3	...	Touch point Bn
Audience 2	Population 2b	Channels A+B	Touch points A1+B1	Touch points A2+B2	Touch points A3+B3	...	Touch points An+Bn
	Population 3a	Channel B	Touch point B1	Touch point B2	Touch point B3	...	Touch point Bn
Audience 3	Population 3b	Channels A+B	Touch points A1+B1	Touch points A2+B2	Touch points A3+B3	...	Touch points An+Bn
	Population 3c	Channels A+B+C	Touch points A1+B1+C1	Touch points A2+B2+C2	Touch points A2+B2+C2	...	Touch points An+Bn+Cn

Table 8: A people-based approach of omni-channel contact strategy

Several research questions emerge from this new contact strategy ecosystem:

- i. How do customers respond to a rise a contact frequency due to the multiplication of brand-initiated communication channels along the different stages of their online paths to purchase?
- ii. To what extent is the marginal cost of additional channels covered by incremental revenue driven by customers' purchasing behaviors (e.g., purchase frequency, average order basket and buyers rate)?

Answering to these questions may help to understand how to implement efficient omni-channel communication strategies. The role of a medium in marketing communications practices shifts from the execution of message strategies into an extension of consumer understanding. All in all, media planning could be replaced by a dynamic, automated process that serves ads based on information streams of consumer intentions and actions. Several of the core principles of IMC – consumer insight, data-driven decision-making, cross-media integration and communications with multiple stakeholders – represent an improved framework for managing communications in a digital world.

1.1.5 From channel-centric contact strategies to people-based activation

We have discussed that, traditionally, brands have faced a significant lack of audience qualification at upper funnel steps as most of the activated channels to build awareness and consideration were rather data-poor and did not enable an individual-level tracking of ad exposure. On the other hand, performance-oriented channels touchpoints, which lower funnel steps benefit from, are usually individual-based channels, often based on customer opt-in consent that enables an accurate tracking and efficiency measurement. The great heterogeneity of channels and therefore data types and metrics explains the complexity of brand contact strategies from upper to lower funnel stages. In particular, two main problems arise:

- i. The difficulty to maintain a people-based vision across multiple channels and causally connect investments with individual behavioral responses and revenue.
- ii. The understanding of customers' response behaviors to multiple channels at multiple stages of their purchase journey to identify what drives the revenue generated by omni-channel communication campaign.

The funnel perspective enables to evaluate the interest to activate multiple channels within a contact strategy. Because every step of the funnel usually benefits from specific channels, most campaigns' efficiency measurement are channel-centric. Doing so results in siloed activation of every channel. It does not take into account two effects when activating different channels:

- i. the audience overlaps that is to say the extent to which one individual may be exposed to multiple channels throughout the funnel.
- ii. the interactions between channels (and synergies) that is to say the extent to which two channels simultaneously activated exceed the performance of their individual effects.

The audience overlaps between multiple channels raise questions to identify the most decisive one in driving the transaction. In other words, if one individual is exposed to channel A, then channel B and purchases, which of both channels has been decisive in triggering the transaction? As channel B constitute a marginal marketing investment, what is the incremental impact to expect from its activation?

Channel interactions and synergies raised questions about the direct or indirect impact of the activation of one channel on transaction. Then the following question can be asked: is channel A efficient by itself because it generates a direct impact on customers response or is channel A efficient because the activation of channel B enhances the efficiency of channel A on specific customers?

We advance that the concept of people-based marketing actions is critical in the context of omni-channel communication. Indeed, it is obvious that marketing communication should focus on people, and address consumers instead of channels, devices or multiple consumers' online identities. The omni-channel world puts forward the great challenge of people addressability in the context of fragmentation of:

- audiences (i.e. the idea that consumers spend more time on digital but on multiple channels through a great amount of touchpoints that do not necessarily enable to recognize them)
- technologies (i.e. the idea that brands have to deal with multiple identifications of a same person).

Being able to recognize and address with consistency people in an omni-channel view is both critical and challenging for brands and retailers. Even if such issues are not new for most

marketers, the development of programmatic media constitutes a major step that increases the interest to develop new investigation as suggested by Malthouse et al. (2018).

This opens an unprecedented research opportunity to better understand additional channel's real contribution to omni-channel communication performance and channels' interaction (Lemon and Verhoef, 2016).

1.2 Leveraging multiple channels and media options in the context of sales promotion

1.2.1 Efficient communication investments as a key driver of retailers' promotions return on investments

The literature on sales promotion also brings significant insights related to communication optimization. Determining an optimal mix of media and channels to maximize the impact of sales promotion has received noticeable attention. Indeed, evaluating the right communication and promotion budget and allocating that budget across different promotional tools are important marketing decisions, particularly in the consumer packaged goods (CPG) sector. From a retailer's viewpoint, manufacturer-spending decisions on consumer and trade promotions are critical as they affect their pricing and promotional policies. Brand manufacturers set their communication and promotion budgets based on different methods such as an objective or task, competitive parity and "percentage of sales" methods (Kotler and Keller 2009).

Sales promotions as defined by Blattberg and Neslin (1989) as "*action-focused marketing events whose purpose is to have a direct impact on the behavior of the firm's customer*". They constitute calls-to-action and are temporary. There is also an important distinction between sales promotions and a permanent price reduction. If customers do not take advantage of promotions within specified periods, they will lose the benefit offered by the promotions. Advertising and communication investments may enhance the efficiency of such operations by notifying customers of a time-limited price reduction. Sales promotions are almost always combined with some type of communication (e.g., a retailer ad) that the price is reduced and that the time period is limited (price is reduced only up to some point in time).

Promotional strategies are divided into two possible approaches: a predominantly pull or push strategy. The pull strategy aims at communicating directly to the end consumers to induce them

to seek the brand at the retail store, while the push strategy is based on offering incentives to the channel intermediaries such as retailers to actively sell the brand to the end consumers. The pull strategy is built around promotional tools such as advertising and consumer promotions, whereas the push strategy is centered on tools such as trade promotions and sales force. When a brand follows a pull strategy, it spends the majority of its promotional budget on advertising and consumer promotions, but when it pursues a push strategy, it expands its promotional budget mostly on trade promotions and sales force (Shankar, 2008). Understanding how multiple channel and media options can enhance the efficiency of pull promotional strategies - mainly leveraging communication to end consumer - is a fruitful research area. Among the different types of promotions, price reductions and discount (loyalty) cards appear to be the most used for pull promotional strategies while enabling individual-response data. Table 9 summarizes the main types of retailers' discount.

Type of Retail Promotion	Description
Price Reduction	Retailers temporarily decrease prices on product.
Retailer Coupon	Retailers issue coupons for product in their advertisement or on the shelf.
Free Goods	The consumer receives free goods as the discount. It includes buy one get one free (or buy X get Y free), as well as promotions where goods in complementary categories are given away.
Sweepstakes	The consumer is entered into a contest where they have the chance of winning cash or other prizes.
Free Trial	Consumers are given free samples of the product to encourage purchase of a new product.
N-for	The retailer offers a discounted price for the purchase of a set number (N) of items purchased, e.g., three for \$1.
Discount Card	Consumers sign up for a card that tracks their purchases. In return, the retailer provides discounted prices on some items in the store for only those consumers with the card.
Rebates	Consumers receive notices of a rebate at the shelf or display and then mail in proof of purchase and the rebate form.
Bundled Promotion	The retailer gives the consumer a discount for purchasing products from complementary categories.

Table 9. Common Types of Retailer Discounts

While these different types of promotions may have various effects, the vast majority of research on promotions involves price promotions with or without accompanying features or displays. Two main elements are considered regarding the efficiency of sales promotion: the content or design of the promotion itself and the communication effort to support the efficiency of the action. Working on the effectiveness of various design elements of retailers' weekly promotional flyers (Gijsbrechts, Campo, and Goossens 2003), as an example, examines how composition characteristics of the flyer affect store traffic and sales. They find that flyers featuring deeper discounts are more effective in driving traffic and sales. They also show that total flyer size does not seem to matter, but flyers featuring a larger proportion of food and private label promotions, and flyers featuring specialty categories like wines and delicatessen on the cover page are more effective in generating store traffic and store sales. Pieters, Wedel, and Zhang (2007) use eye-tracking technology to understand how attention to the ads on a flyer page is affected by the surface size of five design elements – brand, text, pictorial, price, and promotion. They find that the total surface size of a feature ad has a strong effect on attention, the size of the graphical element has the largest effect and the size of the text element has little to no effect. Such research work illustrates that, within a given medium (i.e. a flyer), the different design elements can drive different responses. Today's omni-channel landscape invites researchers to understand and measure these individual responses in the context where multiple channels may be activated simultaneously. We, then, may expect greater differences due to a medium change.

Specifically, retailer promotions induce key challenges (Blattberg and Neslin, 1989) such as the medium in which price discounts are offered, communications of sales promotions and objectives of the promotion. In particular, the issue related to which “*communication vehicles*” to use to maximize the performance of promotional campaigns remains an underexplored area. In particular, within advertising, firms allocate their investments between traditional media (e.g., TV, print, radio) and newer digital media (e.g., the Web, email, blog, display, social media, mobile media) (Shankar, 2008). Interestingly, the past two decades have seen a shift from advertising toward sales promotion. While the power of retailers and their easy access to transaction data explains such a shift, Shankar (2008) highlights the fragmentation of mass media communication vehicles as a key explanation. Beyond such a fragmentation emerges the issue of omni-channel measurement. Several research opportunities remain open in the field of sales promotions to identify the optimal media and channel mix. Specifically, more research is needed on the return on investment (ROI) of communication and promotional budgets and

campaigns, especially for retailers (e.g. Naik, Raman, and Winer, 2005). Due to its limitations to FMCG firms - and enabled by an early access to panel data - most research on sales promotion has focus on manufacturer promotion's budget allocation and efficiency. But many retailers also spend a significant portion of their marketing budget on advertising, apart from traditional promotion spending. Descriptive research is needed on how they make these budget decisions in practice as well as optimization models to prescribe how they should make these decisions.

All in all, a clear consensus that communication of the promotion is key emerges from the literature. In that context, retailers use in-store signage, displays and periodic (weekly) flyers / feature advertising to communicate discounts. Obviously, it is very important to communicate price discounts so shoppers recognize them with a most common objective to generate qualified traffic (customers visiting the store or the website).

1.2.2 Leveraging digital and omni-channel communication plans to serve sales promotion objectives

Retailers and manufacturers can use the Internet as a vehicle for targeting and reaching customers with promotions. Unlike direct mail, digital has brought a virtually zero-cost communication vehicle. If a customer is willing to provide his or her email address (i.e. opt-in), then the firm selling the goods or services can reach the customer at an unprecedented low-cost per contact. Offering highly targeted promotions, which were very expensive using mail or other distribution systems, becomes almost costless when leveraging digital channels.

Digital media and channels such as email, online display, video and mobile continue to grow in usage and popularity (Scheinbaum, 2012). Most CPG firms increasingly shift their budget allocation to digital and measurable media. For example, Procter & Gamble, the leading consumer goods marketing spender, hiked its spending on unmeasured media in 2006 by roughly 15% over 2005 compared to an increase of only 3.9% in measured media in the same period¹⁰. The same source reveals that by the end of year 2017, Procter & Gamble aimed to buy 70% of digital ads programmatically.

From a retailer standpoint, reallocation toward new media has important implications. Retailers themselves have started to use new digital media in different ways. Many retailers use email extensively to alert shoppers about new products, promotions, and store openings (Ailawadi et

¹⁰ Advertising Age, 2007

al., 2009). A study of 300 Internet and multichannel retailers revealed that the growth in consumer usage of the new media witnessed a shift in allocation of efforts from the ubiquitous free shipping promotion to more personalized promotions¹¹. Retailers surveyed by the study ranked email marketing as the most important demand-generation activity, followed by search engine marketing and search engine optimization. Research on retailer efforts in digital and omni-channel communication is limited. The online medium also offers greater potential for customized promotions targeted to individual consumers (Kopalle, Arora, and Kannan, 2001). Given the nascent and growing new media landscape, a number of research questions remain unanswered. Shankar and Hollinger (2012) suggest that traditional media communication is largely intrusive, whereas communication and promotion through the new media needs to be more non-intrusive or user-demanded. This argument suggests that promotion through the new media is likely to be more effective than through traditional media. However, several challenges, including measurement issues, audience reach, and content of promotion remain.

1.2.3 Behavioral Underpinnings of Sales Promotions

The psychological marketing literature is a stream of research that is important in understanding why promotions exist. Three foundational articles provide the basis for this stream of research and provide relevant managerial implications.

Smart Shopper

Schindler (1998) observes that price promotions are able to generate consumer responses that are far greater than the economic value of the money saved. In other words, one can look at the difference between a promotional price reduction and a regular price reduction and the response to the promotion, beyond just the temporal nature of the promotion, is far greater than the strict price reduction effect. Schindler posits the effect as consumers' perceiving themselves as "efficient, effective and smart shoppers." He argues that because consumers perceive their actions to be responsible for obtaining discounts; this will increase the non-economic component of the discount.

¹¹ Webtrends, 2006

Transactional Utility

A related explanation is offered by Thaler (1985) who introduced the concept of transaction utility. Transaction utility is defined as the gain (loss) of utility when the consumer pays less (more) than the reference price of the product. The reference price is not the same as the actual price of the product but the price the consumer believes the product is worth or the price the consumer would expect to pay for the good. Positive transaction utility occurs when the reference price is above the actual price paid. If promotions produce transactional utility, then the firm is better off using promotions than simply lowering regular price. The outcome will be a higher response to the promotion than to an equivalent reduction in everyday regular price. One of the key differences between Schindler's and Thaler's theories is the notion of reference price, or the perceived value of the good.

Reference Price

One of the earliest studies of reference price was Winer (1986) who defined reference price as a function of past brand and category prices and estimated an empirical choice model that demonstrated that the reference price effect could be measured. Reference price effects have been reliably found in experimental data (Niedrich, Sharma, and Wedell 2001; Chernev, 2006). When we combine the various behavioral theories, we understand that promotions affect sales differently than long-term price reductions.

1.2.4 How Promotions Affect Sales? A key challenge for retailers

Our doctoral work builds around the foundational finding in the literature – sales promotions are associated with large increases in consumer sales. The question this raises is “what are the sources of incremental volume?”

In general, the sources of volume from a sales promotion come from one or more of the followings (Blattberg & Briesch, 2012):

- 1) customers switching their purchases from other brands (brand switching),
- 2) current consumers purchasing more quantity of the brand for inventory (stockpiling),
- 3) current consumers accelerating their purchase of the good (purchase acceleration),

4) new consumers entering the market (primary demand expansion – also called category expansion).

Brand Switching

Earlier studies show a very high percentage of incremental promotional volume comes from switching. For example, Gupta (1988) showed that 84% of incremental sales was from switching. Other estimates have ranged from 43.8% to 93.9% (Bell, Chiang, and Padmanabhan, 1999).

Years after, in a study across many categories, Van Heerde, Gupta, and Wittink (2003) found that the percentage of the incremental volume attributable to brand switchers was only about one-third of the total incremental volume. They show that the difference in the percentage in their study versus previous studies arises from the fact that previous studies had not accounted for category growth in their calculations and hence overestimated the percentage attributed to brand switching. Van Heerde et al.'s findings have been supported by another study using store-level data (Pauwels et al., 2002).

For manufacturers, incremental volume coming from brand switching can be highly profitable because it is volume that the brand would not otherwise have. However, for retailers, incremental promotional volume from brand switching may or may not be profitable depending on the brands it comes from and their profitability. Because brand does not expand category volume, it is far less advantageous to a retailer than to a manufacturer.

Purchase Acceleration and Stockpiling

When a promotion is run, consumers can react by changing their purchase timing by purchasing earlier than they normally would (purchase acceleration) or by purchasing more units than they would normally purchase (stockpiling). Managers generally believe that purchase acceleration and stockpiling do not expand demand and are detrimental to both retailers and manufacturers. However, in categories in which consumption can expand due to product availability (e.g., candy), increasing household's inventory of the product or moving their purchase forward can increase consumption and long-run sales. Studies have found that promotions can increase consumption in categories where the consumption rate is related to the amount of the product consumers have in their pantry (Ailawadi and Neslin, 1998; Nijs et al., 2001), especially when the promotions involve strong brands (Sun, 2005). For instance, two categories that exhibit this pantry effect are carbonated beverages and ice cream. Bell et al. (1999) quantified the

proportion of the increase in sales due to a promotion that is attributable to purchase acceleration and increases in purchase quantity and found it ranged from 0.7 to 42.3%, with an average of 10.6% across 13 categories.

Because purchase acceleration and stockpiling shift consumer purchases, we would expect to see a post-promotion dip after a promotion. It is also possible to have a pre-promotion dip. Van Heerde et al (2000) found evidence of pre-promotion dips as well as post-promotion dips. Blattberg and Neslin (1989) summarized the literature and stated that post-promotional dips are rarely seen in store-level data. This seems paradoxical, as consumers should be consuming their inventory after a promotion instead of purchasing additional quantities. Subsequently, several papers investigated this issue and found either strong evidence of post-promotional dips (Van Heerde et al., 2000) or qualified support of post-promotional dips (Macé and Neslin, 2004). One clear implication of this finding is that inter-temporal substitution (i.e., quantity acceleration) may be overstated in the deal decomposition studies and promotions can be more profitable if this effect is taken into account.

Category Expansion

The issue of market-level category expansion due to promotions is extremely important because it benefits both retailers and manufacturers. The problem is that it is very difficult to measure, partly because of the data requirements and partly because of the complexity of the factors that need to be controlled such as store switching, brand switching and purchase timing effects. In general the literature has found no long-run effect of promotions on category volume, although short-term effects do exist (Ailawadi and Neslin, 1998).

There has been limited research into the profitability of promotions, in part, due to the lack of available data (cost-related data as well as individual exposure data). However, several papers have studied the impact of promotions on revenues and subsequent profits. Srinivasan et al (2004) find that promotions generally are profitable for manufacturers, but are not beneficial to retailers even when cross-category and store-traffic effects are considered. Similarly, in a study of promotions at the retailer CVS, Ailawadi et al. (2007) find that more than 50% of the promotions are not profitable. A way to summarize the results above is to see how different sources of volume affect manufacturers' and retailers' profitability as shown in Table 10.

Source	Manufacturer	Retailer
Brand Switching	Highly profitable if increased quantity covers cost of promotion.	Profitable if consumers purchase higher margin item
Purchase Acceleration and/or Stockpiling	Mostly unprofitable. Can be profitable if stockpiling increases consumption or takes purchases from competitors.	Mostly unprofitable. Can be profitable if increase future demand or consumption.
Category Expansion	Profitable if incremental volume covers cost of promotion.	Generally profitable.

Table 10: Sources of revenue and profitability of promotions

1.2.5 Evaluating customer's factors to understand behavioral response in the context of a restriction

Bell, Chiang, and Padmanabhan (1999) summarize this wide stream of literature employing models on panel data to measure market, segment or household response to promotions across classes of factors: brand choice, purchase incidence, or purchase quantity behaviors (Table 11).

Class of Factor	Consumer Behavior		
	Secondary Demand	Primary Demand	
	Brand Choice	Purchase Incidence	Purchase Quantity
Category Factors	Strong	Moderate	Strong
Brand Factors	Moderate	Moderate	Moderate
Consumer Factors	Weak	Weak	No Effect

Table 11: Main effects and factors of sales promotion

Category factors influence the consumer's budget allocation process. In particular, they capture consumer perceptions of the assortment on offer, and the economic benefits associated with buying in a particular product category.

Brand factors capture consumer perceptions of the brand equity. They include variables that reflect marketing effort and the brand's position in the marketplace. Interestingly, research has

not focused on the effects of boosting marketing efforts, typically through a multiplication of channels.

Consumer factors reflect the profile of the brand's clientele. They first have been summarized by the demographic characteristics of consumers who purchase the brand. Beyond demographics, consumer's purchase history or online interaction with a firm have not been much leveraged. Enabled by more recent data rich environments, their predicting and explanatory powers constitute a fruitful research area. The intensity and recency of purchase history and online interaction maintained by retailers (both online and offline through loyalty programs) are proved to be highly accurate and provide significant insight into consumer's purchase behavior and sensitivity to promotions. If firms keep accurate promotional history that includes non-responses to promotions, then firms have potentially a highly accurate, detailed dataset that can be used to measure individual promotional response behavior. Possible incremental outcomes mentioned above combined with such consumer factors reveal interesting insights. Indeed, beyond demographics, recency of purchase or interaction should better explain purchase acceleration behaviors with a more important effect on non-recent customers due to stockpiling effects. Therefore, drawing on results from Godfrey, Seiders & Voss (2011) and Chae, Bruno, and Feinberg (2019) our first hypotheses are :

H1: Recent buyers are less reactive to omni-channel communication of a promotion than non-recent buyers

H2: Recent website visitors are less reactive to omni-channel communication of a promotion than non-recent website visitors

The next frontier in promotional modeling has often been mentioned as using actual individual-level purchase histories rather than panel data. Two sources now exist. First, retailers offer loyalty - or relational - programs that record purchases from the retailer by product unit and shopping trip. Second, some direct-to-consumer sellers capture all of their customers' purchase histories. When a promotion is run, the firm can analyze what the impact is on the key pillars of relationship marketing: the acquisition of new customers, retention rates, spending levels and long-term purchase behavior.

New models are being developed to analyze these data such as hazard models with explanatory variables to capture retention rates, logit models to estimate the responsiveness of current

customers to promotions for additional products, and customer equity models to compute the long-term value of promoted versus not-promoted customers.

Hazard models study the likelihood a customer will defect given the customer has continued to be a customer up until a promotion occurs. This allows to address key issues such as how does a promotion change the likelihood a customer will defect or how does the customer acquisition method affect the defection rate? (Castéran and Meyer-Waarden, 2014; Blattberg, Malthouse, and Neslin, 2009).

Panel data, because of the limited sample sizes and problems with the availability of causal data, cannot easily answer many of key individual behavior questions. Long-term individual purchase history data can address these questions. Another area in which individual purchase histories can help a firm is in segmenting customers based on their behavior or sensitivity.

Inman, Peter, and Raghubir (1997) find that the presence of a restriction (e.g., purchase limit, purchase precondition, or time limit) serves to accentuate deal value and acts as a “promoter” of promotions. There are important behavioral mechanisms at play in limit and multiple unit promotions, with contingency effects that need more study. Furthermore, these papers have, to some extent found evidence of opposing effects. On the one hand, Inman et al. (1997) suggest that purchase incidence declines as the quantity limit increases. On the other hand, Wansink et al. suggest that average purchase quantity increases with the limit.

In line with an anchorage in FMCG and an access to panel data, total sales define as the number of shoppers buying the brand times the average purchase quantity per shopper. Average purchase quantity may be evaluated through average order value (AOV) and frequency of purchase over the promotional period. Therefore, our next hypotheses are:

H3a: Combining multiple channels enables an uplift of the number of buyers

H3b: Combining multiple channels enables an uplift of the average order value (AOV)

H3c: Combining multiple channels enables an uplift of the purchase frequency

Section 2: Research methodology and results

In line with our research objectives, we collected individual-level data (i.e. individual data matching between ad exposure and behavioral response including purchases) to measure and understand the causal impact of three types of channels on a firm's contact strategy performance. The experimental methodology on large samples enables to causally attribute any variations of the dependent variables thanks to a randomized distribution between control and test populations (Table 12)

Focus brand	A major French e-commerce website in the FMCG industry with a high frequency of purchase.
Data collection	The experiments have been carried out respectively on 329,151 opt-out individuals, 1,125,087 email opt-in individuals and 426,451 individuals opt-in on both email and SMS.
Data analysis	A chi-square test of homogeneity has been done for every comparative analysis between control and test groups. The significance thresholds (p-value) are mentioned for every test.

Table 12: Experimental design overview

We analyze the incremental volume of i) visitors, ii) add-to-cart visitors and iii) buyers observed during the period. This essay reports on three large-scale field experiments (Table 13) carried out over the same period of two-month period from April 15th 2016 to June 15th 2016, for a French FMCG e-commerce website. The three experiments fully cover the entire customer database and, for obvious legal reasons, each of them was designed to adapt a specific type of opt-in individuals. Most brands, indeed, have to deal with multiple opt-in types as a legacy of their historical customers' recruitment. While brands may collect email addresses and mobile phone numbers (that practitioners often mention as PII customer data), some individuals are opt-out as they did not give a prior consent to be contacted by the brands through these nominative channels. Other individuals may be opt-in to a single channel or to multiple channels. Being managerially relevant, each experiment addresses a specific type of opt-in

individuals: the first on 329,151 opt-out individuals, the second one on 1,125,087 email opt-in individuals and the third one on 426,451 email and mobile opt-in individuals.

Experiment	Population	Group	Volume	Channels activated
1	opt-out individuals	control 1	156,403	none
		test 1	172,748	programmatic display
2	email-opt-in individuals	control 2	538,812	email
		test 2	586,275	email + programmatic display
3	email-and-SMS-opt-in individuals	control 3	137,185	email
		test 3a	144,633	email + programmatic display
		test 3b	144,633	email + programmatic display + SMS

Table 13: Experimental design overview

Control and test groups were split using full randomization and a pre-test populations' description confirmed the inter-group comparability. A post-test populations' description confirmed a behavioral convergence of control and test groups (i.e. there has not been post treatments' dip in control groups) confirming a pure channel incremental effect.

To pursue our objective to explore customers' factors and catch customers' response heterogeneity, a two-dimension-based segmentation enables to identify customers based on their value and intensity of online activity. Such a segmentation makes three distinct segments emerge (Figure 15): recent buyers (customers who purchased within three months prior to the

experiment), recent visitors and non-buyers (customers who did not purchase within three months prior to the experiment but made a website visit) and non-visitors + non-buyers within this same time period.

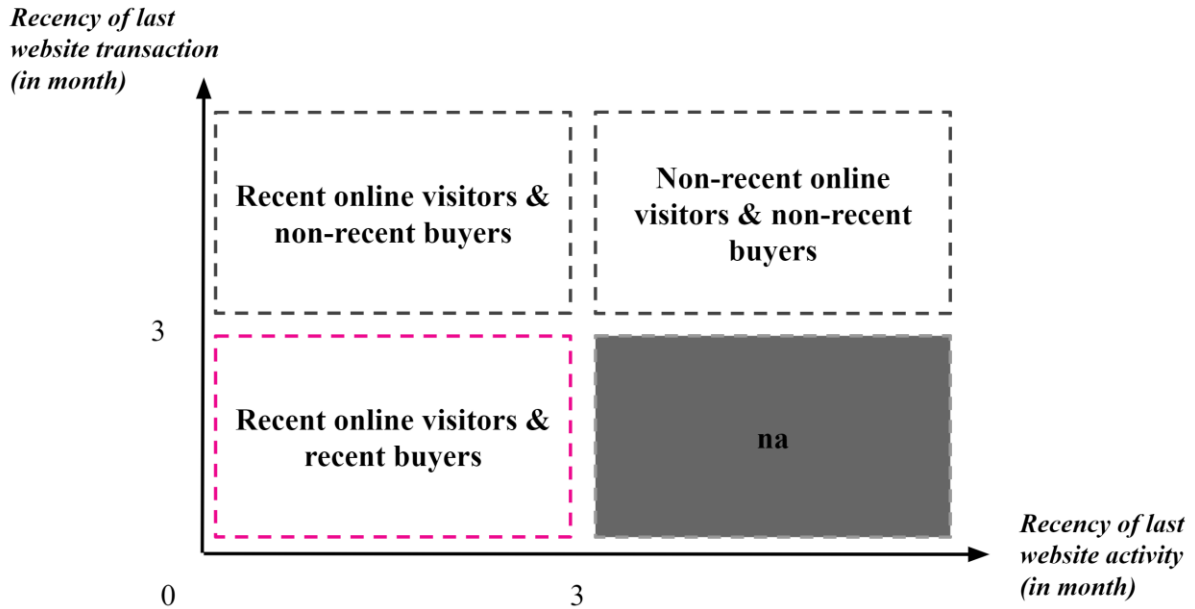


Figure 15: Behavioral segmentation of the customer base based on recency of online activity and recency of purchase

2.1 When combining PII and non-PII channels leads to a more exhaustive people-based vision

Recent advances in technology enables brand through a *data onboarding* procedure to match their customers’ email addresses with corresponding cookies. In *programmatic CRM* logic, such matching is made possible at several digital interactions over time such as (i) a prospect or customer who opening a brand email (a cookie is left on the browser in real-time) (ii) a prospect or customer browsing or purchasing on the brand website when logged-in with his email. Such email-cookie links could be stored in databases to leverage individual targeting across programmatic media channels. For several reasons, not all customers could be matched with a cookie identification (e.g. customers who had not browsed the web recently, customers who deleted their cookies etc...). Therefore, a first key analysis of omni-channel communication consists in measuring the ratio of customers that could be activated on programmatic media channels. An “email – cookie match rate” analysis enables to do so. It demonstrates that from 57% to 65% of customers identifiable through an email address could be individually activated through programmatic channels, in an omni-channel communication

campaign (Table 14). While such results are purposeful towards an omni-channel activation, linking email addresses with cookies also enables to measure its impact in non-logged-in environments to assess pre-purchase behavioral outcomes such as unique visitors. The combination of programmatic and nominative channels enables to reconcile at the individual level channels' exposure to create a useful audience.

Experiment	Population	Group	Volume of emails	Percentage of emails matched with activable cookie
1	opt-out individuals	test 1	172,748	61,5%
2	email-opt-in individuals	test 2	586,275	57,4%
3	email-and-SMS-opt-in individuals	test 3a	144,633	65,2%
		test 3b	144,633	65,3%

Table 14: PII/Non PII data onboarding procedure results

2.2 When channels significantly generate positive incremental responses along the path to purchase

2.2.1 A significant impact on early steps of the path to purchase: visitors' rates uplifts

In line with our objective to understand channels' effect through the multiple steps of the decision process, our first incremental analysis isolates every channel's effect on the volume of the retailer's website visitors (Table 15). For each experiment, and every additional channel tested, a significant incremental impact is observed: from 6% to 18% of incremental unique visitors depending on the control groups' baselines. The lower the baselines are, the greater the relative uplifts are. In absolute value, we observe a more stable positive effect, from +1,4 point to +2,1 points of increase in unique visitors rates.

Experiment	Population	Group	Volume	Unique visitors rate uplift		Significance
				Relative (100 index)	Absolute	
1	opt-out individuals	control 1	156,403			
		test 1	172,748	118	+1,4%	p<1%
2	email-opt-in individuals	control 2	538,812			
		test 2	586,275	109	+1,4%	p<1%
3	email-and-SMS-opt-in individuals	control 3	137,185			
		test 3a	144,633	106	+1,5%	p<1%
		test 3b	144,633	108	+2,1%	p<1%

Table 15: Volume of visitor rates' uplifts

2.2.2 A significant impact on visitors who fill-in a basket: add-to-cart visitors' rates uplifts

Our second incremental analysis isolates every channel's effect on the volume of website visitors who fill in a basket: our next step of customers' decision-making. For each experiment, and every additional channel tested, a significant incremental effect is observed: from 4% to 10% of incremental unique visitors who add an item to their cart, depending on the control groups' baselines. In absolute value, this translates into uplifts from +0,4 point to +1,1 point (Table 16). Incremental impacts at upper funnel stages drive lower funnel impacts.

Experiment	Population	Group	Volume	Unique shopping cart fillings rate uplift		Significance
				Relative (100 index)	Absolute	
1	opt-out individuals	control 1	156,403			
		test 1	172,748	110	+0,4%	p<1%
2	email-opt-in individuals	control 2	538,812			
		test 2	586,275	107	+0,7%	p<1%
3	email-and-SMS-opt-in individuals	control 3	137,185			
		test 3a	144,633	104	+0,6%	p<1%
		test 3b	144,633	107	+1,1%	p<1%

Table 16: Volume of add-to-cart rates' uplifts

2.2.3 A significant bottom-line impact on purchase: unique buyers' rates uplifts

Our third incremental analysis isolates every channel's effect on the volume of unique conversions: our final step of customers' decision-making. For each experiment, and every additional channel tested, a significant incremental effect is observed: from 4% to 11% of incremental unique buyers, depending on the control groups' baselines. In absolute value, this translates into uplifts from +0,4 point to +1,1 point (Table 17). Again, incremental impacts at upper funnel stages drive lower funnel impacts and direct revenue. In terms of revenue analysis, considering the marginal cost induced by every additional channel and the incremental revenue it generates, solid incremental ROI emerge. Incremental ROI is calculated by deducing total channel's costs from the incremental revenue of the test groups. An incremental ROI of 2 should, then, translates into: "every euro of marginal investment in an additional channel drive 2 euros of incremental revenue". While programmatic display activation generates from 13,1

to 30,8 of incremental ROI, SMS activation generates a 11,5 incremental ROI that translates a much heavier marginal cost compared to programmatic banners. Such an individual reconciliation enables to measure an incremental impact and return on investments.

Experiment	Population	Group	Volume	Unique conversion rate uplift		Significance	Incremental ROI
				Relative (100 index)	Absolute		
1	opt-out individuals	control 1	156,403				
		test 1	172,748	111	+0,4%	p<1%	16,1
2	email-opt-in individuals	control 2	538,812				
		test 2	586,275	108	+0,6%	p<1%	30,8
3	email-and-SMS-opt-in individuals	control 3	137,185				
		test 3a	144,633	104	+0,7%	p<1%	13,1
		test 3b	144,633	107	+1,1%	p<1%	11,5

Table 17: Volume of conversion rates' uplifts

2.3 Customers' segments make emerge a heterogeneity in purchase outcomes to omni-channel treatments

Pursuing our research objective to understand how different customer profiles may respond to such treatments, our methodology and data enable to build behavioral segments. Beyond demographic characteristics of customers, consumer's purchase history or online interaction with a firm (in terms of intensity and recency) have not been identified as key predictors. In line with findings from Godfrey, Seiders & Voss (2011) and Chae, Bruno & Feinberg (2018), the three customers' segments built by recency of the last purchase and by recency of the last online visit illustrate such heterogeneity in behavioral response.

An analysis of the mean uplift in buyer's rate (bottom-line measurement) by segment reveals a positive impact on less active customers (no purchase and no online visit within the prior three months) with a significant 5% uplift in unique buyers' rate ($p < 5\%$). We observe no significant impact on recent buyers and on recent visitors (more active customers) (Figure 16).

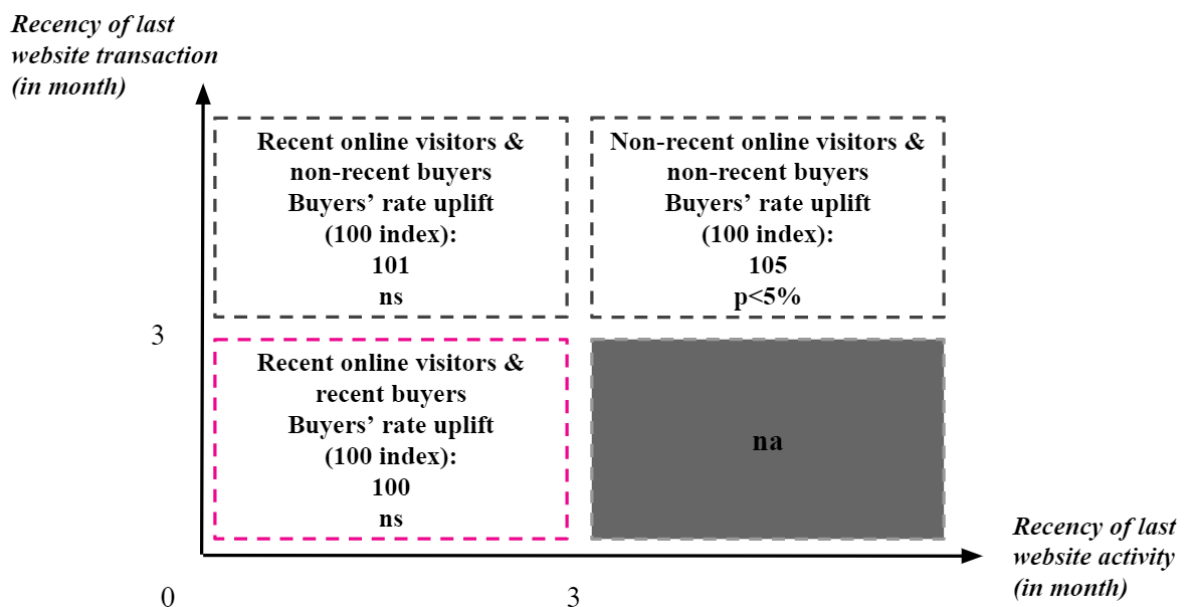


Figure 16: Mean buyer's rate uplifts by customer segment

The same analysis for every experiment reveals that test group 1 (experiment n°1) and test group n°3b (experiment n°3) tend to emerge as the most impacted to generate a buyer's rate uplift. On less active customers (no purchase and no online visit within the prior three months) we observe respectively an 8% ($p < 10\%$) and a 24% ($p < 5\%$) uplift in buyers' rates. On recent visitors but not recent buyers, we observe a 5% uplift in buyers' rate ($p < 5\%$). No significant uplifts are observed for other combinations of groups and treatments (Figure 17).

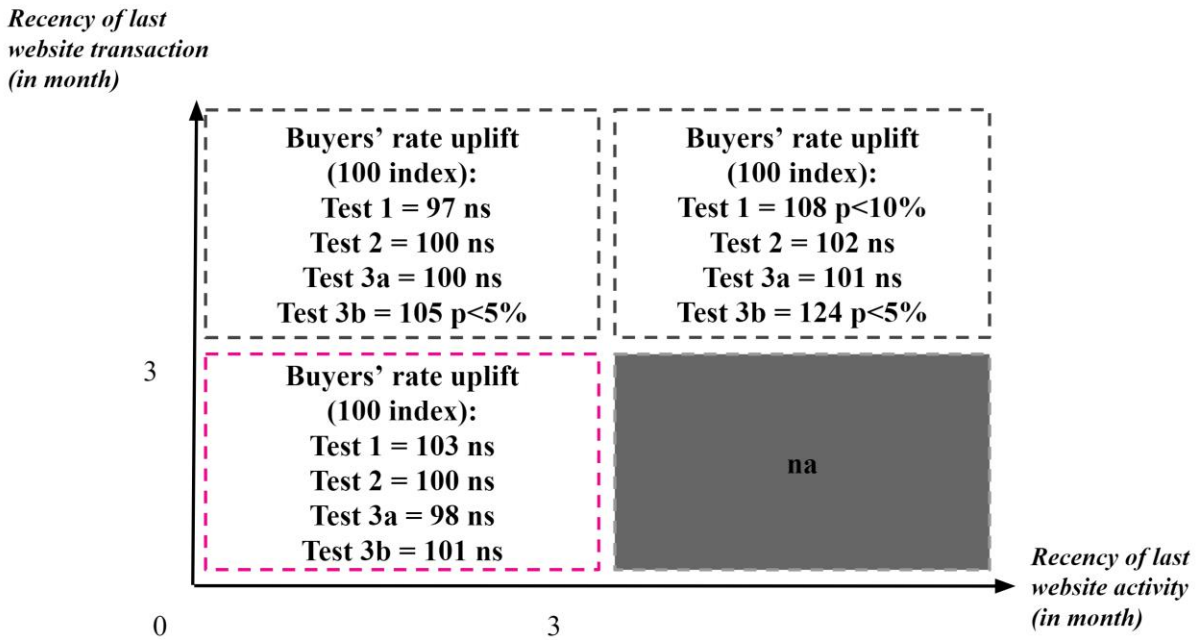


Figure 17: Buyer's rate uplifts by customer segment and by experiment

Such results invite to support H1 and H2:

H1: Recent buyers are less reactive to omni-channel communication of a promotion than non-recent buyers

H2: Recent website visitors are less reactive to omni-channel communication of a promotion than non-recent website visitors

2.4 Buyers' rate as a unique performance driver of an additional channel

In our objective to investigate the types of customers' response to additional channels, we have focused on the three main possible changes in customer purchasing behavior, in line with further contribution to understand loyalty loop lock-in. The three effects investigated are as follow:

- i. Does an additional channel drive more unique customers to purchase (a volume effect)?
- ii. Does an additional channel drive the same volume of customers to increase their average order basket when they purchase (an amount effect)?
- iii. Does an additional channel drive the same volume of customers to purchase more often (a frequency effect)?

Our results are strongly significant and clear (Table 18). Additional channels only drive more unique customers to purchase (the volume effect) and do not impact the average amount spent by customers nor frequency of purchase over the analysis period.

Experiment	Population	Group	Relative uplifts (100 index)			
			Conversion rates	Average order basket	Purchase frequency	
1	opt-out individuals	Test 1	uplift	111	99	101
			significance	p<0,01	ns	ns
2	email-opt-in individuals	Test 2	uplift	108	99	98
			significance	p<0,01	ns	ns
3	email-and-SMS-opt-in individuals	Test 3a	uplift	104	99	98
			significance	p<0,01	ns	ns
		Test 3b	uplift	107	99	99
			significance	p<0,01	ns	ns

Table 18: A split per revenue drivers

These results invite to support H3a:

H3a: Combining multiple channels enables an uplift of the number of buyers

These results invite to reject H3b and H3c:

H3b: Combining multiple channels enables an uplift of the average order value (AOV)

H3c: Combining multiple channels enables an uplift of the purchase frequency

Section 3: Discussion – When effective omni-channel communication implies to switch from a channel-centric to a people-based activation

3.1 When the upper funnel mimics the lower funnel thanks to digital addressability

Omni-channel communication has many drivers. We advance that one of this major drivers is the switch to programmatic as a mode of media buying. Indeed, major communication channels that brands and retailers used at upper funnel steps such as online display, radio and TV are mass media that were historically bought and activated based on an audience size.

These channels were rather limited in terms of individual targeting capability, as exposure to mass media did not generate individual response data. Programmatic media buying extends brands' ability to individual and behavioral targeting to new channels. Moreover, individual response data enable to measure communication efficiency through direct behavioral metrics at different levels:

- i. whether a customer has been effectively exposed to a channel,
- ii. whether a customer has interacted with a channel (thanks to click-through touchpoint data),
- iii. whether a customer actually converted or purchased.

This ability deeply changes the way brands and retailers can measure the efficiency of their contact strategies through a multiplicity of channels and touchpoints.

In this context, because omni-channel involves a reconciliation of the multiple customers' interactions with brands, we advance that customer activation must combine PII-based channels (i.e. the historical scope of relationship marketing) with non-PII-based channels (i.e. the extension to mass media thanks to programmatic) to build an extensive people-based strategy. A people-based approach is key to omni-channel communication.

Recent technology advances, such as CRM data onboarding or Data Management Platform (DMP) enable to link nominative customer identification (email, mobile...) with first-party non-nominative customer identification (cookie, device ID...).

3.2 Blurred lines in channels' objectives: towards an increasing access to behavioral response along the path to purchase

This essay provides original methodology and theoretical advances on communication addressability and channels incremental impact in an omni-channel context. This research identifies a fresh understanding for academia in the field of consumer response to communication across channels and devices as well as guidelines for practitioners to build a people-based marketing vision, to refine their omni-channel targeting strategies from upper to lower funnel.

We advance that assessing channels' impact in an omni-channel environment requires moving from attribution and correlation to incrementality and causality. Indeed, within relationship marketing, most customers' activation models recommend to concentrate the allocation of marketing resources to heavy and profitable customers.

A major question arises with omni-channel: are customers profitable thanks to greater marketing investments or do brands and retailers greatly invest on such customers because they are heavy? In a context where brands need to build contact strategies through an increasing number of channels and touchpoints, this question, that has been under investigated by researchers, calls for new models to efficiently allocate marketing resources across these channels. Moreover, most firms cannot afford a massive investment on every possible channel and tend to switch to lower costs channels to boost return on investments (ROI) without considering customers' response to more expensive in their ROI calculations: this is mainly due to a lack of shared and accurate metric to assess the real efficiency and contribution of channels and touchpoints.

Accurately measuring the efficiency of heterogeneous channels and touchpoints implies a shared metric and methodology. The first contribution of this essay is to propose a shared and behavioral metric that contributes to identify those trigger points along customers' path to purchase: incrementality.

Finally, incrementality enables a causality measurement between an omni-channel contact strategy and every touchpoint's real contribution to customers' behavioral response. Incremental and causal measurement is made possible by randomized field experiments.

Studying multiple stages of the customer decision-making process (from visits to conversions), this essay highlights that an impact on upper funnel metrics directly drive an impact on lower funnel metrics/

3.3 Performance understanding: from a channel-centric to a people-based perspective

The results finally provide an interesting contribution regarding the overall channel incremental impact. Indeed, the overall incremental revenue generated by an additional channel should be split between the three main drivers, not only unique conversions' rate but also purchase frequency and average order basket over the two-month period of the analysis. Precisely, we notice that no significant incremental impact is observed neither on average order basket nor on purchase frequency. Unique conversions' rates, therefore, result to be the single driver of performance to expect from an additional channel. In other words, a new channel contributes to convert a greater volume of customers but does not change purchasing behaviors of buyers over the period (e.g., up-sell or cross-sell behaviors). Finally, our results confirm an effect of purchase acceleration with a positive significant effect on non-recent customers and no significant impact on recent buyers or visitors, thus confirming the relevance of behavioral criteria that go beyond demographics to qualify customers' profiles.

These results seem very relevant in the context of loyalty loop. Indeed, incremental buyers are responsive to the new channel as they would not have bought without being exposed to it. In that sense, omni-channel may engage a higher volume of customers to purchase and therefore either accelerate the purchase cycle or at least reduce the phase of purchase inactivity and as a result decrease the probability the such customers consider an alternative brand for their next transaction. Omni-channel communication constitutes an accelerator of loyalty loop implementation.

Section 4: Conclusion, limitations and need for future research

This essay investigates a rather unexplored field: omni-channel from a communication perspective. It reveals the incremental effects of additional channels at multiple steps of customers' online decision-making process. In particular, it demonstrates that additional

channels impact both upper funnel and lower funnel steps of the journey. Impacts on upper funnel steps such as driving website traffic translate all along the journey until lower steps such as conversions. Measuring incremental behavioral response provides a common and shared metric to better understand channels' contribution. Our study responds to several calls for further research. It is among the very first research to investigate channels' impact at the customer-level across nominative and programmatic channels. It contributes to the design of effective omni-channel strategies to engage customers in a loyalty loop. Furthermore, we provide a research design that has been recognized as missing in the literature: randomized field experiment with holdout groups that truly identify causality effects. This approach is easily replicable in managerial settings by adapting the contact strategy to opt-in types

The benefits of adopting a people-based vision instead of a more common channel-centric approach are highlighted and this supports the bottom-up approach of Integrated Marketing Communication thanks to an agnostic approach of channels' contribution. Additional channels mainly contribute to a "*volume effect*" by driving more customers that are non-recent to conversion with no significant effects on purchase frequency or average basket amount.

Moreover, because omni-channel adoption implies to activate a growing number of communication channels, this essay adopts a marginal cost versus incremental approach. This enables to understand to what extent does an additional channel drive incremental ROI.

While the experimental design of the essay is based on behavioral data and a large sample size, some limitations, which constitute research avenues, can be highlighted. Firstly, these two experiments were carried out with the same retailer in only one country, which invites to reproduce them in order to reinforce their external validity. In addition, the single-channel setting of the observable transactions invites to further explore channel's impact in the case of multiple-channel distribution settings, in particular with online and offline transactions to fully capture channel's effect on path to purchase. Finally, the analysis accounts for customers' heterogeneity through two main variables (purchase and visit recency). While an additional channel positively affects overall communication performance globally, multiple types of responses should be explored depending on customers' responsiveness to serve clever omni-channel orchestration.

GENERAL INTRODUCTION

CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED
COMMUNICATION CHANNEL: A PEOPLE-BASED AND INCREMENTAL
APPROACH

**CHAPTER 2: BRAND CHANNELS' ORCHESTRATION: UNDERSTANDING THE
IMPACT OF DIGITAL, TRADITIONAL AND MOBILE CHANNELS ON
CUSTOMER JOURNEY**

CHAPTER 3: HOW TO COORDINATE DIGITAL AND MOBILE CHANNELS TO
GENERATE INCREMENTAL VALUE ACROSS CUSTOMERS HETEROGENEITY?

GENERAL CONCLUSION AND DISCUSSION

CHAPTER 2: BRAND CHANNELS’ ORCHESTRATION: UNDERSTANDING THE IMPACT OF DIGITAL, TRADITIONAL AND MOBILE CHANNELS ON CUSTOMER JOURNEY

Introduction

We discussed in the general introduction the idea that brands interact with their customers through a growing number of channels along their journey (Verhoef, Kannan, and Inman 2015). In this context, evaluating the impact of each specific channel on customers’ path to purchase has been identified as a critical issue for omni-channel research (Lemon and Verhoef 2016).

The literature, which helps understanding such an impact, mainly focused on customers’ behavior across channels. It aims at understanding how customers choose their retailing channels whilst shopping including online channel (Ansari, Mela, and Neslin, 2008) and mobile ones (Wang, Malthouse, and Krishnamurthi, 2015). This literature explains what leads customers to activate a specific channel or - as often mentioned in the marketing literature today (Court et al. 2009) - a specific “touchpoint” whilst shopping.

The explanations given about customers’ behavior are all the more important that recent research highlights that touchpoints are increasingly activated and often controlled by customers themselves (e.g., exposure to User Generated Content, Customer to Customer interactions...).

On the contrary, little research has been conducted to evaluate customers’ responses to specific touchpoints when they are activated through a channel managed by a brand in order to engage them to move forward in their path to purchase and to direct them to a specific purchase

channel. Evaluating such responses is also important managerially as communication channels are in competition for marketing resources allocation.

Activated either by customers or by brands on different devices and through several ways, touchpoints are becoming more and more abundant. Such a proliferation of touchpoints leads to more complex customer journeys in which mobile plays an important role as consumers rarely separate from their device. Today, implementing an efficient and pro-active omni-channel communication strategy has become a new challenge for companies. They must be able to select channels and touchpoints and orchestrate them so as to impact customer journeys in a profitable way. While the first essay of this doctoral work explores the effect of an increase in contact frequency due to additional channels, it is essential to measure a channel's incremental impact when it replaces another channel and then understanding its differential effect at equal contact frequency.

Such a pro-active omni-channel communication strategy is expected to increase customer probability to buy as well as customer intrinsic value as it has been shown in the multi-channel literature both in a US context (Rangaswamy and Van Bruggen 2005) and in a French one (Vanheems, 2009). However, it raises new important issues for multi-touch attribution across all media, digital and non-digital. As a matter of fact, brands need to evaluate and to understand how the activation of different channels may impact customers' journey across all channels.

The aim of the second essay is to evaluate, at equal contact frequency, the impact of different channels (traditional, digital and mobile) on customer journey.

This essay has two main objectives.

- It focuses on the impact of brand-initiated channels on customers paths to purchase and studies how such channels impact the likelihood of customers to continue their journey with the brand.
- It identifies the transaction channel they will use while pursuing their journey to purchase.

This essay is structured as followed. First, a literature review helps to understand how customers activate specific touchpoints or respond to firm-initiated channels. Then the research objectives and methodology are presented. The results and the discussion offer new directions for companies in terms of omni-channel customers' journey design. We finally conclude with the limitations and avenues for further research.

Section 1: Conceptual background and hypotheses: from understanding customer journey to designing brand-initiated contact strategy.

Research conducted in multi-channel retailing contexts explains the way customers use different channels while shopping. As most recent research focuses on touchpoints that are activated by customers, it becomes crucial to focus on how firms may activate channels (and leverage corresponding touchpoints) to influence customers in their journey. When implementing an omni-channel contact strategy, firms need not only to be able to select the most efficient channels but also to orchestrate them in order to impact customer journeys in a desirable and profitable way.

1.1 Customer purchasing behavior when dealing with multiple channels

1.1.1 When communication through multiple channels generates synergies

The question of the performance of omni-channel arises all the more since previous research on communication reveals that interactions between different media options generate synergies. Indeed, Naik and Raman (2003) have highlighted a phenomenon of synergy, particularly between television advertising and print mail. They define synergy as "*the combined effect of multiple activities that exceeds the sum of their individual effects*". Applied to the digital and mobile channels studied here, this theory invites us to study two phenomena leading to potential synergy. The first is the ability of an additional channel to increase the reach (i.e., the coverage of the defined target), that is to say to reach individuals who would not have been reached by the first channel, the second is the ability of that channel to re-expose individuals already reached by the first channel. In laboratory experiments (Edell and Keller, 1989), this second phenomenon has been addressed by studying the combined effect of advertising messages when they are sent across multiple channels, on television and radio. They show that consumers are more likely to memorize a radio message when they have been previously exposed to the television commercial. The additional channel would make it possible to steer the consumer further into a phase of information retrieval at the expense of an information processing phase. Examining the validity of this theory in the case of multiple

digital and mobile channels is an important contribution as these channels are now widely used.

The literature review highlights models of resource allocation across channels and identifies the drivers of performance generated by the activation of an additional communication channel. It reveals two potentially explaining factors for the performance of an omni-channel mechanism: the first relates to the consumer and the second is intrinsically linked to the activated additional channel (Table 19). As for consumers, the effects depend on (1) their value or development potential and (2) their channel preferences. As for the additional channel activated, there is a cumulative effect. This effect depends, on the one hand (3) on its ability to smartly integrate with other channels already in use and to generate potential synergies with them, and on the other hand (4) on a "volume effect" associated with a simple accumulation of channels. This could be called "overlapping effect" and "piling effect".

Effect n°1	Effect n°2
related to the targeted consumer	cumulative of the additional channel
Customer value or development potential (1)	Connections and synergies between channels (3)
Channel preference (2)	Piling or volume effect (4)

Table 19: Effects of an additional communication channel

With a view to helping managerial decision-making, this chapter proposes to study factors related to effect n°2: the synergy phenomenon linked to interactions between channels and devices (3) and the piling or volume effect (4), especially while controlling the frequency of contact (i.e. channel switch).

Therefore, we posit that:

H4: A change in firm-initiated channel (i.e. from channel A to channel B) generates a positive incremental customer's purchase response

1.1.2 Understanding the customer journey in a multiple channels' environment

The new marketing paradigms (Achrol and Kotler 2012) renders the idea of a linear consumer decision-making process as obsolete. In fact, digital channels have modified the ways

customers behave. Customers frequently use several channels (traditional and digital channels) at the different stages of their buying process. At each stage of this process, their channel choice depends on their shopping goals as well as their perceived usefulness of each channel (Balasubramanian, Raghunathan, and Mahajan 2005).

Substantial work has been done on consumer purchase behavior online versus offline. It shows that online shoppers are more convenience-conscious (Degeratu, Rangaswamy, and Wu 2000) and more brand loyal than offline shoppers (Danaher, Wilson, and Davis 2003; Shankar, Smith, and Rangaswamy 2003). They are more price sensitive when there is inadequate non-price information on the website (Degeratu et al. 2000). However, in the presence of non-price information, for example, on brand, quality, and product features, consumers are less price sensitive online than offline (Alba et al. 1997; Lynch and Ariely 2000; Shankar, Rangaswamy, and Pusateri 2001). These differences suggest that retailers should use different types of price promotions online versus offline.

The determinants of customer channel choice have been extensively treated in the literature. Neslin & al. (2006) summarize six determinants: firm marketing efforts, channel attributes, channel integration, social influence, situational variables, and individual differences.

Marketing efforts

Ansari, Mela, and Neslin (2005) and Knox (2005) found that emails and catalogs both influence channel choice; in particular, emails seem especially effective at guiding customers to the Internet channel. Various promotions or incentives can also encourage customers to use a certain channel (Burke 2002; Myers, Van Metre, and Pickersgill 2004; Teerling et al. 2005).

Channel attributes

Importantly, attributes (ease of use, price, search convenience to name a few) play different roles depending on the channel and stage of the customer decision process. For example, Verhoef, Neslin, and Vroomen (2005) found that privacy concerns have a stronger impact on using the Internet to purchase than on using a store. They also found that enjoyment is an important determinant of searching a catalog (i.e., customers like to browse through catalogs) but does not influence their propensity to purchase from it.

Channel integration

Montoya-Weiss, Voss, and Grewal (2003) as well as Bendoly and colleagues (2005) found that well-integrated channels encourage desirable customer behaviors. For example, if the firm allows products ordered on the Internet to be picked up at the store (e.g. click & collect), it

encourages Internet users to use the store as well. Burke (2002) pointed out that if the Internet promotes the store by providing store location information, it prompts customers to use the store.

Social influence

Verhoef, Neslin, and Vroomen (2005) found that customers' selection of channels is influenced by the belief that people similar to them use the channel. Keen and colleagues (2004) applied the "social norm" construct from attitude theory. Nicholson, Clarke, and Blakemore (2002), in field research, found that a mother bought an outfit for her child at a bricks-and-mortar store rather than from the Internet simply because the higher effort required to use the store was commensurate with the mother's care for her child.

Situational factors

Nicholson, Clarke, and Blakemore (2002) also identified five "situational factors" that can determine channel selection: physical setting (weather, crowding), social setting (shopping with friends), temporal issues (time of day, urgency of the purchase), task definition (type of product; see also Burke 2002; Thomas and Sullivan 2005a), and antecedent state (mood).

Mathwick, Malhotra, and Rigdon (2002) hypothesized that certain channels will be amenable to goal-directed shopping tasks, whereas others are suited for experiential tasks. Gupta, Su, and Walter (2004) argued that search goods are more likely to be bought on the Internet, whereas experience goods are more likely to be purchased at a store. Inman, Shankar, and Ferraro (2004) posited that customers develop category/channel associations based on previous experience with buying category *j* on channel *k* and the presumed assortment of category *j* in channel *k*. They note that situational variables are distinct from channel attributes. Belk (1974) defined situational variables as "*all those factors particular to a time and place of observation which do not follow from a knowledge of personal (intra-individual) or stimulus (choice alternative) attributes.*"

Individual differences

Digital experience, which differs substantially across customers, is clearly a determinant of Internet usage (Montoya-Weiss, Voss, and Grewal 2003), though demographics such as gender, age, education, income, family size, and region also influence choice (Ansari, Mela, and Neslin 2005; Gupta, Su, and Walter 2004; Inman, Shankar, and Ferraro 2004; Kushwaha and Shankar 2005; Verhoef, Neslin, and Vroomen 2005), as does the stage in the customer lifecycle (Thomas and Sullivan 2005).

Moreover, the coexistence of virtual and physical spheres leads to a “research shopping phenomenon” where customers look for information in one channel before purchasing in another one (Verhoef et al. 2007). Three mechanisms may explain this research shopping phenomenon and the use of several channels during the same buying process (Verhoef et al. 2007): (1) channels’ search and purchase attributes, (2) lack of lock-in in the channel during the purchase funnel, and (3) the willingness of customers to use different channels to minimize their effort, time and budget whilst shopping. Finally, channel inertia over time can explain customer loyalty to channels even if they have the choice between multiple channels (Gensler et al. 2012). Channel choice was studied extensively from a customer standpoint in order to understand the drivers of channel use at each stage of the buying process. In that sense, brands should adapt their strategies to better fit customers’ attitudes and behaviors across channels with a bottom-up strategy. Therefore, there has been less attention from researchers on how brands’ pro-active customers’ activation translates directly into behavioral changes in terms of channel choice with a top-down strategy (Batra and Keller, 2016). This question seems all the more crucial as the customer journey becomes more complex. In line with the research stream on marketing efforts as a determinant of channel choice, we can draw the following hypothesis:

H5: Activating an alternative communication channel will impact the channel used by customers for transaction.

1.1.2 When mobile channels impact the customer journey: understanding how channels’ proliferation impacts the customers’ response along the journey

Among the multiple points of contact between brands and customers, mobile plays a critical role as consumers rarely separate from their mobile, as evidenced by the concept of nomophobia highlighted by Clayton, Leshner, and Almond (2015).

Mobile channels induce even more complex customer journeys as they often directly interfere with other channels during the customers’ decision-making process. This is due to the fact that mobile is more suitable for search than for purchase stages and then induces more switching across channels (Brinker et al. 2012; De Haan et al. 2015). Thus, mobile channels could drive a customer to a channel that is more suitable for purchase (i.e. conversion). In addition, Shankar et al. (2016) highlight that “*measuring the effect of mobile and attributing results to mobile activities are still uncertain areas*”. Therefore, a research question emerges to understand how mobile could drive customers to specific conversion channels (particularly non-mobile ones).

In probably one of the most advanced research on the effect of mobile on customers' response, Nysveen et al. (2005) demonstrate that SMS and MMS channel additions have some performance-enhancing capabilities related to customer brand relationships. In particular, mobile's information accessibility, information personalization, and information dissemination were suggested as unique characteristics of SMS. This means that firms can use SMS to inform their customers anytime and anywhere about products and services available in their main channel (Watson et al. 2002). This leads to increased awareness and interest in the product presented in the brand's main channel, thus increasing brand main channel use. Increasing the availability of a brand by adding new channels with access to the brand gives the consumer better flexibility and increased freedom of choice. Mobile activations, which are time and location flexible, are highly valued by customers (Balasubramanian, Peterson, and Jarvenpaa 2002). By adding SMS as a new channel, the flexibility implies access to the brand independent of time and location—that is, increased information accessibility and increased perceived brand performance. In the current retail landscape, we can posit that:

H6: Replacing a digital channel (email) by a mobile channel (SMS) generates in-store (main channel) traffic and mainly drives offline incremental sales.

In addition, the personal characteristic of mobile devices, which makes it possible for customers to have a personal dialogue with the brand anytime and anywhere (Lot21 2001), should have the potential to increase customer satisfaction with the brand. The “send me signals” element noted by Doyle (2001) points out the possibilities a brand might have to notify the customer about special offers. This way of using SMS may help to organize customers' daily lives, thus increasing their satisfaction with the brand. Another perspective was offered by Riel, Liljander, and Jurriëns (2001). They argued that satisfaction with supplemental services, defined as services that are not part of the core service, would have the potential to strengthen customer perception of the core service.

Within omni-channel paths to purchase, Badot and Lemoine (2013) highlighted the new role of mobile as a facilitator of “on-the-go” or situational shopping rather than destination-based shopping. Therefore, if mobile can trigger conversions across channels, measuring its impact across online and offline channels constitutes a relevant research avenue for omni-channel customer journeys. Thus, mobile marketing is becoming increasingly important in retailing (Shankar and Balasubramanian 2009 and Shankar et al., 2010). These authors define mobile

marketing as “*the two-way or multi-way communication and promotion of an offer between a firm and its customers using a mobile medium, device or technology.*” More and more firms have started to integrate mobile marketing into their integrated marketing communications and develop promotional campaigns based on short message services (SMS) (Gauntt 2008; Xu, Liao, and Li 2008).

H7: Activating non-mobile customers through a mobile channel impacts more positively the probability to purchase than activating already-mobile customers

While research showed that both advertising and promotion influences customer attitudes and preferences (Venkatesan and Kumar 2004), this essay aims at bridging a gap that remains in the understanding of how each communication channel (traditional, digital and mobile) impacts paths to purchase.

1.1.3 Brand control over the path to purchase: how to leverage multiple firm-initiated channels?

Both researchers and practitioners indicate that the last decade has been marked by a multiplication of the ways brands and customers interact. The proliferation of channels leads researchers to make a distinction between brand-owned, partner-owned, customer-owned and social touchpoints (Lemon and Verhoef 2016).

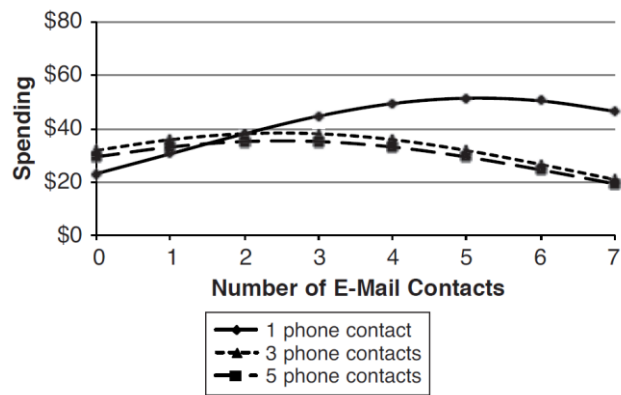
Such a classification shows the great heterogeneity in the channels customers may activate or to which they can be exposed whilst shopping. It also highlights that not every channel is under the firms’ control. Only brand-owned channels are customer interactions that are actually designed and managed by firms and under their control. These touchpoints typically include direct channels to opt-in individuals (i.e. prospects or customers who have given a prior consent to be contacted by a brand) and loyalty programs.

The proliferation and limited control over channels challenge the ability of the brand to impact customer journeys (Edelman and Singer 2015; Lemon and Verhoef 2016). In a context of a limited control over customers’ journey, the question of brands’ causal influence on shopping behaviors is even more central. As a matter of fact, firms need to identify the most impactful channels that drive their customers to the transaction. By “impactful”, the literature suggests to look either at:

- i. channel preference (i.e. through declarative data or through prior customers' consent and opt-in type) – (Westmyer et al., 1998; Flanagin and Metzger, 2001)
- ii. channel reactivity (i.e. through clickstream data such as open rates or click-through rates for digital channel such as email) – (Peppers & Rogers, 1993; Kumar, 2010)
- iii. conversion outcomes (i.e. sales-based behavioral response or impulse response) – (Zantedeschi, Feit, and Bradlow, 2016; Stone and Jacobs, 2008; Roberts and Berger, 1999; Chang and Zhang, 2016)

The founding article from Godfrey, Seiders, and Voss (2011) in the *Journal of Marketing* entitled “*Enough is enough!*” illustrates this issue. This article explores relational channels’ (print, phone and email) effects on repurchase spending over a three-year period. More importantly, it shows that multiple channels interact with each other and that matching customers’ preference in terms of channel of contact reinforces behavioral outcomes. It reveals how critical is the frequency of contact through digital channels (in particular emails) to build long-term value and highlights potential customers’ backlash when frequency of contact is too high. Indeed, their work highlights the existence of an ideal frequency of contacts **on each channel** and shows that interactions between multiple channels change the overall ideal frequency of contacts that maximizes customers’ response (measured through repurchase spending). Beyond this ideal frequency of contacts (Figure 18), consumers’ psychological reactance (Brehm, 1966) related to the perception of manipulation or control that would limit freedom of choice is observed. This reactance translates into a decrease in the level of customer level of purchase from the brand.

A: Telephone × E-Mail Interaction Effect on Repurchase Spending



B: Mail × E-Mail Interaction Effect on Repurchase Spending

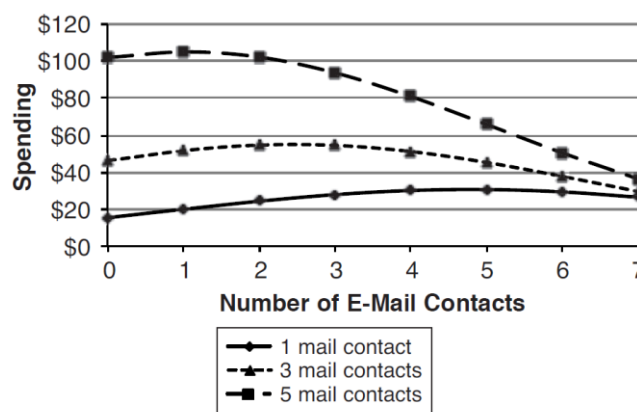


Figure 18: Consumers’ behavioral response to higher-frequency “*multi-channel communication*” (Godfrey, Seiders and Voss, 2011)

This pioneer research, by demonstrating both positive and negative customers’ response to omni-channel communication, opens a major research stream: the simultaneous management of multiple communication channels. Indeed, multiplying the number of communications often implies an increase in frequency of contacts (Essay n°1) that must be taken into consideration. Finally, it is now proven that channels interact with each other and that such interactions are critical to drive customers’ response. A novelty effect might exist to explain the positive effect of an alternative channel, therefore this research suggests to seek for smart interaction between channels enables greater long-term outcomes. In this context, the literature

of the past twenty years has evolved from studying multi-channel management to omni-channel orchestration. Therefore, our next hypothesis is:

H8: the incremental impact of an alternative channel decreases when the past frequency of contact on this channel increases

Today, firms are implementing new strategies by activating specific channels to communicate individually with their customers in order to generate profitable behaviors. The different channels a brand may activate combined with the multiple touchpoints a customer may use to search and purchase leads to increasingly complex journeys. But this complexity is not only explained by the number of touchpoints (Grewal et al. 2013) but also by the hybridization of channels' nature. Distribution channels are becoming communication' ones and inversely as "channels become blurred as the natural borders between channels begin to disappear" (Verhoef et al. 2015).

1.2 Designing contact strategies to generate more profitable customer journeys

Channel choice has been mainly studied from a customer viewpoint. Research has been conducted to explain both the reasons why customers activate specific touchpoints and the way they activate them during their journey. However as mentioned previously, touchpoints cannot only be activated by customers, but also by firms in a proactive way.

Analyzing the efficiency of each channel in an omni-channel communication campaign has become all the more crucial now that firms have to deal with a greater fragmentation of their audiences (Brynjolfsson et al. 2013; Verhoef et al. 2015).

Furthermore, channels are increasingly in competition for marketing investments. That is why being able to measure the impact of each channel on customer journey as well as its profitability is becoming crucial by taking into account the cost of its activation. A crucial objective is to evaluate the extent to which each communication channel may engage customers, drive them to a specific channel and trigger a conversion on that channel. Within firm-initiated channels, understanding how channels' types (traditional, digital and mobile) impact the customer journey is essential.

1.2.1 When a brand engages the customer and initiates his journey

Most research has focused on customers already engaged in a decision process. That is to say customers who have already got in touch with the brand through the use of search, social media, websites (Srinivasan et al. 2016). Such customer-initiated interactions reveal that a decision process has already started. Therefore, a gap remains related to customers who are not engaged in the decision process as suggest by more recent work of Edelman & Singer (2015). These authors argue for the benefits of designing new and shorter customer journeys that compress the consideration and evaluation steps to engage and lock-in customers in a “*loyalty loop*”. This loyalty loop is made possible when brands proactively activate their customer base, most of the time through multiple channels as customers may be opt-in to several channels such as print, email and SMS.

Such omni-channel strategies require orchestration and integration as evidenced by Batra and Keller (2016) who proposed a model that assesses the degree of integration of IMC (Integrated Marketing Communication). Based on the seven criteria (7C's) that we mentioned in the general introduction, the model proposes to evaluate: coverage, cost, contribution, commonality, complementarity, cross-effects and conformability of marketing communication. In particular, the “contribution” criterion reflects the main expected effects of a channel on customers’ attitudinal and behavioral responses (e.g., build awareness, enhance brand image, induce sales...). For every channel, this could be measured by comparing exposed versus non-exposed customers (e.g., through experimental design). The authors call for further research to enrich the scope of the seven criteria and to better reflect on the full range of outcomes that arise from customer exposure. Indeed, understanding the channel in which the conversion may occur enables a deeper reflection of possible communication outcomes. Drawing on Edelman & Singer (2015), we propose to enrich the understanding of each channel’s contribution. Indeed, as the concept of “*loyalty loop*” invites brands to activate channels that trigger conversion, it seems relevant to evaluate which is the conversion channel that most benefits from the communication channel exposure.

Additionally, understanding short-term behavioral consequences generated by firm-activated channels need an integration of the ‘purchase funnel’ and the “loyalty funnel” as suggested by the research agenda advanced by Lemon and Verhoef (2016) on customer journey analysis. Different questions must be raised:

- Do channels' types (print, digital or mobile) influence customers' response?
- Do some of them over perform to entice customers to continue their journey?
- Do they have an impact on the channel customers will choose to purchase?

This essay aims at addressing these questions that seem justified both conceptually and managerially.

1.2.2 Why evaluating own-channel and cross-channel effects is fundamental?

The way a touchpoint may drive a customer to another touchpoint can be highlighted by the literature on own and cross-channel effects. This literature helps to understand whether online and offline marketing efforts drive online and offline sales.

Working on attribution modeling with individual level data, Li and Kannan (2014) find spill-over effects from Display and email channels to search, referrals and website visits touchpoints. They focused on online channels (including for the purchase channel) and call for future research to control for customers selectivity bias (such as selective targeting of customers across channels). Dinner et al. (2014) then pointed out that offline communication drives offline sales, which has been called “own-channel effects”.

Therefore, our next research hypothesis stands as:

H9: Replacing a digital channel (email) by an offline channel (print mailing) mainly drives offline incremental sales

Dinner et al. (2014) also highlighted “cross-channel effects” as digital communication drives offline sales and reciprocally. They argued that measuring the impact of a touchpoint on a single channel does not fully reflect its total impact. They demonstrated that cross effects are particularly important for online communication, namely Search and Display on the offline channel. The comparable magnitude between cross and own effects suggest the importance of such measurements in evaluating communication investments ROI. Despite the interest of this research, it did not integrate mobile as a device and as a way to drive cross-channel behavior and to generate purchase on alternative channels. While mobile fosters switching behaviors across channels at a lower cost of activation than offline channel, such cross-channel effects could be key in the design of profitable customer's journeys. Furthermore, this research on cross-channel effects was based on descriptive data highlighting correlation rather than strict

causality. This is the reason why the authors called for further field research, in particular related to advertising expenditure optimization in light of cross-channel effects. Aiming at responding to such research directions related to the ROI of alternative channels' activation, we posit that:

H10: A customer journey including the activation of an offline channel (print mailing) is less profitable than one including digital channel (email) or mobile channel (SMS).

We respond to these calls with a field randomized experimental research that controls for selectivity bias, includes a mobile channel in addition to digital and traditional channels and finally provides a multiple-channel purchase measurement. All in all, we provide a channels' profitability analysis.

Section 2: objectives methodology and results of the research

2.1. Objectives and methodology of the research

End-to-end customer journey analysis focuses on customers' proactive interactions rather than on brand's option to activate specific channels to engage its customers in their journeys. One key element of complexity addressed in this essay is the combined effect of multiple channels (traditional, digital or mobile) on the customer journey. Lemon and Verhoef (2016) posit that "*firms should attempt to identify specific trigger points that lead customers to continue or discontinue in their purchase journey*".

Measuring how multiple channels, with different characteristics, may engage a customer to move forward from pre-purchase to a specific conversion channel is fundamental. Finally, from a customer journey perspective, understanding whether the value created by an additional customer channel is driven by online versus offline incremental sales is key to many brands.

Pursuing this objective implies a measurement that accounts for customer activity bias, which is made possible by experimental design combined with full randomization manipulations and an access to individual-level data to exploit variations in both ad exposures and conversions across channels.

This study has two key features: the first being the reconciliation of individual-level ad's targeting data across three brand-owned channels (email, print and SMS) with the purchase behavior of the same customers and the second one is the randomized field experiment that enables a causality measurement.

We collected individual-level data (i.e. individual data matching between communication channels exposure and purchase behavior at the same period of time) to measure and understand the causal impact of different channels' types on customers' paths to purchase. Any variations of the dependent variables are exogenous thanks to a full randomized distribution between control and test populations. To properly measure the impact of an additional communication channel on customer channel choice, we first analyze the incremental volume of conversions observed during the period (i.e. overall impact) and then analyze the ratio of online versus offline conversions for every population (i.e. baseline measurement). Finally, the analysis splits the overall incremental impact between online and offline conversions in order to assess how each new communication channel drives conversions across channels. For this research, we focus on the incremental value of a channel based on previous research on omni-channel communication measurement (Kannan et al. 2016).

2.2. Description of the experimental design

Two field experiments have been carried out from the customer database of a French click & mortar retailer from the personal equipment industry (Table 20). Control and test groups were split using full randomization and a pre-test populations' description confirmed the inter-group comparability. A post-test populations' description confirmed a behavioral convergence of control and test groups (Table 22)..

The first experiment aimed at measuring the impact of replacing an email by a print communication, across both online and offline purchase channels. It was built using a sample of 128,000 individuals, opt-ins on both email and print channels (70% in a control group, 30% in a test group).

The second experiment, strictly carried out over the same period, followed the same objectives but by replacing an email by a text message (SMS). It was built using a sample of 37,000 individuals, opt-ins on both email and mobile channels (50% control and 50% test groups).

The experimental design details are presented in tables 20 and 21. The sample was made up of 58% female and 42% male. 3% of individuals were under 20 years old, 8% between 20 and 34, 33% between 35 and 49, 35% between 50 and 64 and 21% above 65 years old.

The message content was strictly the same across every channel and the objectives of the campaign were to communicate a nine-day promotional operation with price discounts on a large array of products, both in-store and online. The experiment was carried out from May 28th 2016 to June 5th 2016.

Focus brand	A French click & mortar retailer specialized in fashion apparel that markets its products through both a physical store network and an e-commerce website.
Data collection	The experiments have been carried out respectively on 128,437 individuals and 37,782 individuals.
Data analysis	A chi-square test of homogeneity completed for every comparative analysis between control and test groups. The significance thresholds (p-value) are mentioned for every test. A modeling approach at the individual level, through a logistic regression to predict the purchase probability during the experimental period (Purchase / No purchase)

Table 20: Experiments' methodology

Experiment	Group	Volume	Touchpoint 1	Touchpoint 2	Touchpoint 3
1	control 1	18,931	email	email	email
	test 1	18,794	SMS	email	email
2	control 2	88,297	email	email	email
	test 2	39,765	print	email	email

Table 21: Experimental design and experience

Experiment	Group	Volume of customers	Average amount of transaction 12 months after experiment	Conversion rate 12 months after experiment	Average amount of transaction 12 months before experiment	Conversion rate 12 months before experiment	Average amount of transaction during experiment
1	Control Group	18 931	126.49	17.78%	130.58	41.39%	123.23
	Test Group	18 794	123.36	18.35%	131.77	42.27%	125.62
	Difference 95% CI		-3.13 (-6.91, 0.64)	0.0058 (-0.0020, 0.0135)	1.19 (-1.69, 4.08)	0.0088 (-0.0011, 0.0188)	2.39 (-9.33, 14.11)
2	Control Group	88 297	129.59	9.45%	132.48	13.05%	129.65
	Test Group	39 765	127.40	9.72%	132.37	12.83%	128.25
	Difference 95% CI		-2.19 (-5.38, 1.00)	0.0027 (-0.0008, 0.0062)	-0.11 (-3.24, 3.02)	-0.0021 (-0.0061, 0.0018)	-1.40 (-10.39, 7.59)

Table 22: Statistical description of experimental samples

Importantly, one control group was created for each experiment instead of one joint control group for both experiments. Indeed, each experiment addressed a specific type of opt-in customers (print-and-email opt-ins for the first one and mobile-and-email opt-ins for the second one) reflecting different levels of engagement with the brand. In line with recent findings by Wang et al. (2015), our figures revealed that a customer who gave a prior consent to be contacted through mobile was more engaged and valuable to the brand than print-opt-in customers.

As shown in table 23, the conversion and revenue baselines, therefore, were significantly different in the two experiments. Building two control groups was, then, essential to i) measure each group's natural purchasing behavior and ii) assess how each additional channel impacts this natural behavior across channels. Finally, because every channel came with a different cost for firms, we addressed one essential question: at which incremental cost may a firm generate incremental conversions? To do so, we also compared the additional cost per individual generated by each channel (print and mobile) to assess the return on investment –ROI– of those channels' activations. For confidentiality reasons, channel's cost per individual is not provided but it has been taken into account to calculate the activation ROI. Instead, we present an index-based comparison of the cost per individual.

Experiment	Group	Opt-in type	Additional channel activated	Baseline (100 index)		
				Conversion rate	Revenue per individual	Cost impact
1	control 1	email+print	print	100	100	100
2	control 2	email+SMS	SMS	223	226	11

Table 23: Comparative description of conversion, revenue and activation cost's baselines

2.3 Measures and justifications of the experiment

In line with our methodology, we provide a bottom line and incremental measurement (conversions' uplifts) to isolate the impact of every alternative channel that the firm activates.

Beyond conversion uplifts, we measured the uplift of revenue per individual, first without taking channels' cost into account and second by deducting the incremental cost per contact of each additional channel.

Our methodology goes without attribution models (i.e. attributing every conversion to a specific touchpoint) as, for a full impact measurement, we consider the total volume of conversions across all purchase channels during the analysis period. The incremental contribution of every channel to sales is then split to understand whether it drives customers to physical stores (offline sales) or the brand e-shop (online sales). This enables us to assess how much of the overall value generated by a new channel benefits to online versus offline sales and therefore how the firm's contact strategy may impact their customers' paths to purchase. Doing so, we are able to understand in which transaction channel every communication channel drives its incremental value.

A homogeneity test has been completed for each comparative analysis between test and control groups. The test builds on the chi-square law for independent samples and a nominal dependent variable. Significance (p-value) relative to each test is indicated.

The expansion of digital in advertising has translated into a massive use of email as a core channel of contact. We mention in the general introduction that, in Europe, 95.3% of marketing professionals use this channel¹². Its cost, ease of personalization and brands' opt-in collection capability explain the massive use of the channel. We thus considered a full email contact strategy as a baseline for the control groups. We address the research objective by assessing whether combining email with print or mobile communication channels for a same journey is more efficient than using an email-only strategy, and how the alternative channel's value may be created across channels. While few studies have been conducted on the impact of adding a new communication channel during the same buying journey; the more recent issue is to understand the efficiency of every additional channel within a contact strategy in terms of customer journey. In parallel of email communication, mobile and print communication may generate incremental conversions and revenue that cover the activation cost. This justifies, from a managerial perspective, the research design and the focus channels.

2.4 Incremental impact of channels in the customer journey

Our research shows different results and the more important are the following.

Firstly, both alternative channels (print in study n°1 and mobile in study n°2) generate significant conversion and revenue uplifts (customer count and total revenue) during the analysis period (Table 24). Indeed, replacing an email by a traditional (print) channel results in an 82% uplift in overall customer count ($p < 0.5\%$): reasoning incremental means that almost one in two customers during the period would not have purchased without the activation of the print channel. This customer count uplift was a key driver of revenue growth as an uplift of 92% of the revenue per individual was observed. Taking into account the incremental cost per contact of the print activation resulted in a net incremental revenue of +0.51€ per individual.

Replacing an email by a mobile (SMS) channel results in a 29% uplift in overall customer count ($p < 0.5\%$). Just as in the first experiment, this customer count uplift was a key driver of

¹² Cross-channel marketing survey, Experian, 2014

revenue growth as an uplift of 53% of the revenue per individual was observed. Taking into account the combined effect of a lower incremental cost per contact of mobile activation and a higher conversion baseline of the control group (Table 24), this resulted in a net incremental revenue of +1.14€ per individual. Our results strongly support H4 and H10:

H4: A change in firm-initiated channel (i.e. from channel A to channel B) generates a positive incremental customer’s purchase response

H10: A customer journey that includes the activation of an offline channel (print mailing) is less profitable than one including digital channel (email) or mobile channel (SMS).

Experiment	Group	uplift of conversion rate			uplift of revenue per individual	
		Relative (100 index)	Absolute	significance	Relative with no cost deduction (100 index)	Absolute after cost deduction
1	control 1					
	test 1	182	+0.6%	p<1%	192	+0.51€
2	control 2					
	test 2	129	+0.5%	p<1%	153	+1.14€

Table 24: Overall increments of conversion rates for experiments 1 and 2

2.5 How brand channels drive sales to specific channels

A preliminary analysis of web-versus-retail customers' ratio shows an impact of the activation of traditional versus mobile channels within the customer journey (Table 25).

Actually in experiment n°1 (a print mailing replaces an email in a series of three messages), 87.4% of conversions occurred offline in the control group and 91.3% in the test targeted via print. The activation of traditional channels mainly generates transactions in physical stores. Alternatively, in experiment n°2 (a SMS replaces an email in a series of three messages), 78.8% of conversions took place offline in the control group and 72.7% in the test targeted via SMS.

These results reinforce the relevance of building one control group per experiment as we observe different baselines of offline conversions. Mobile opt-ins customers seem indeed more inclined to online shopping. Our results strongly support H5:

H5: Activating an alternative communication channel impacts the channel used by customers for transaction

Experi- ment	Group	Touch point 1	Touch point 2	Touch point 3	% offline conversions	sig	% online conversions	sig
1	control 1	email	email	email	87.4%		12.6%	
	test 1	print	email	email	91.3%	p<5%	8.7%	p<5%
2	control 2	email	email	email	78.8%		21.2%	
	test 2	SMS	email	email	72.7%	p<5%	27.3%	p<5%

Table 25: Purchase channel distributions for experiments 1 and 2

Consistent with our focus on customer journey, an analysis of the offline versus online customer count uplift has been carried out for both experiments. This enables one to understand in which channel the different channels drive their most important impacts. It demonstrates that 96% of the print communication overall incremental value is driven by offline conversions and 4% by online conversions: a strong own-channel effect is visible.

More importantly, 54% of the mobile communication overall incremental value is driven by offline conversions and 46% by online conversions (Table 26): mobile seems to equally spread its impact online and offline and therefore generates a significant cross-channel effect. Therefore, our results invite to reject H6:

H6: Replacing a digital channel (email) by a mobile channel (SMS) mainly drives offline incremental sales

Our results support H9:

H9: Replacing a digital channel (email) by an offline channel (print mailing) mainly drives offline incremental sales

Experi- ment	Group	Touch point 1	Touch point 2	Touch point 3	Relative uplift of conversion rate	Share of lift driven by offline conversions	Share of lift driven by online conversions
1	control 1	email	email	email			
	test 1	print	email	email	+82%	96%	4%
2	control 2	email	email	email			
	test 2	SMS	email	email	+29%	54%	46%

Table 26: Share of lift distribution by purchase channel for experiments 1 and 2

2.6 Modeling the impact of an alternative channel on purchase probability

2.6.1 Preprocessing and creation of variables

The robust experimental dataset created combined with an access to previous customers purchase and CRM history brings us to develop a modeling approach to measure how an alternative channel may causally impact the probability to purchase for the experimental period. Such modeling approach implies an engineering stage where the data is processed, enriched and calibrated. The appendix provides insights related to such steps.

Three types of variable have been created. First, a *variable to explain* computed as a purchase event during the experiment taking two modalities: “Yes” if the customer has made a purchase during the experimental period of the brand and “No” otherwise.

Then, two *explanatory variables* derived from our experimental design:

- i. Print mailing received during the experiment - taking two modalities: « Yes » if the customer has received a print mailing during the experiment (test group) and “No” otherwise (control group)
- ii. SMS received during the experiment - taking two modalities: « Yes » if the customer has received an SMS (test group) during the experiment and “No” otherwise (control group)

Finally a set of *control variables* from the retailer’s customer database, summarized in Table 27.

Type of control variable	Control variable description
Customer information	Civility: Civility of the client (Mr., Mrs. and Miss)
	Distance to nearest store: Distance from customer to nearest brand store (based on the city or postal code of the customer)
	Segments of customer value: Heavy/Medium/Light - classification according to number and amount of orders placed over 12 months before the experiment
Purchasing activity	Number of days since last purchase before experiment
	Number of purchases over 3 months / 6 months / 12 months / 36 months before experiment
	Amount of purchases over 3 months / 6 months / 12 months / 36 months before experiment
	Difference, for the two points above, between the variable at 3 months and the other time periods (reducing to an amount / number per month) to study the potential dynamics of customer value
	Offline Customer: Customer who has already made a purchase in store
	Online Customer: Customer who has already made an online purchase
Emails activity	Number of emails received over 3 months / 6 months / 12 months before experiment
	Email opening rate over 3 months / 6 months / 12 months before experiment
	Email click through rate over 3 months / 6 months / 12 months before experiment
	Difference, for the three points above, between the variable at 3 months and the other periods of time (reducing to a number per month for emails received) to study potential recent dynamics
	Opening Devices: Device most used by the customer to open his emails (Desktop / Mobile / na)
SMS activity	Email reactivity over 3 months / 6 months / 12 months before experiment: "strong" if the customer has opened more than 50% of the brand's emails, "average" between 0% and 50% and "no reactivity" if no email has been opened
	Number of SMS received over 3 months / 6 months / 12 months before experiment
	Difference between the variable at 3 months and the other time periods (by reducing to a number per month) to study recent dynamics
Postal activity	Number of print communications received over 3 months / 6 months / 12 months / 36 months before experiment
	Difference between the variable at 3 months and the other time periods (by reducing to a number per month) to study recent dynamics

Table 27: Set of control variables implemented

After aggregating the data and building variables under SQL Server, the modeling phase was done in R, a programming language and free software for statistics and data science.

The objective of modelling is to test and measure three effects:

- i. the impact of offline (print mail) and mobile (SMS) channels versus a digital channel (email) – i.e. a direct incremental effect
- ii. the impact of the mobile channel (SMS) according to the customers' previous exposure on this channel – i.e. a habituation effect
- iii. the impact of offline (print mail) and mobile (SMS) channels depending on the previous reactivity of individuals to email (historical channel) – i.e. a channel interaction effect

We could not study the habituation effect for print mailing because of the small number of mailings sent during the previous period. We are interested in the case where the variable to explain is a binary variable, taking two modalities: purchase / no purchase during the experiment and we study the impact of quantitative or qualitative explanatory variables.

Therefore, the model we use to estimate these effects is a model of binary choice: a logistic regression with a logit link.

2.6.2 Modeling the impact of an alternative channel through logistic regression

The algorithm is detailed in the appendix with its principle, its different parameters and their estimation. As part of our modeling, for each individual, the variable to explain Y (Purchase / No purchase during experiment) follows a Bernoulli's law of the parameter p (Probability of purchase during experiment):

$$Y \sim \text{Bernoulli}(p)$$
$$g(\mathbb{P}(Y|X = x)) = \beta_0 + \beta_1 X$$

The natural link function of logistic regression is the logit function defined by:

$$g(p) = \log\left(\frac{p}{1-p}\right)$$

The quantity p expresses an odds i.e. an odds ratio or chance ratio.

We use odds $\frac{p}{1-p} = \frac{P(Y=1/X)}{P(Y=0/X)}$ ratio that define as the ratio between the odds ratio of the test group and the odds ratio of the control group, i.e.:

$$OR = \frac{odds(1)}{odds(0)} = \frac{P(Y = 1/1)}{P(Y = 0/1)} \times \frac{P(Y = 0/0)}{P(Y = 1/0)}$$

The random sampling of individuals for experiments supports the hypothesis of independence of observations. To study the different effects, we study four models.

Model 1: Direct measurement model

Model 1 is only applied to simple variables (1- variable to explain, 2- variable of interest and 3- control variables) to study the overall impact of the variable of interest (SMS or print mail sent for the experiment). The model is applied to the following:

$$\text{Purchase probability during experimental period} = \beta_0 + \beta_1 \times \text{SMS for the experimental period} + \beta \times \text{Control variables}$$

Model 2: Interaction model – Channel habituation effect (only applicable for experiment n•2 SMS/email)

Model 2 is applied with simple variables and an interaction term translating a “channel habituation effect” (variable of interest X number of SMS sent during the previous period) to study the impact of the variable of interest (SMS sent for the experiment) on individuals potentially accustomed to SMS (i.e. channel habituation). The model is applied to the following:

$$\text{Purchase probability during experimental period} = \beta_0 + \beta_1 \times \text{SMS for the experimental period} + \beta \times \text{Control variables} + \beta' \times \text{SMS for the experimental period} \times \text{Control variables}$$

Model 3: Interaction models – Channels’ interaction effect

Model 3 is applied with simple variables and a channels’ interaction term (variable of interest X individual email reactivity over the previous period) to study the differential impact of the variable of interest (SMS or mail sent for experiment) according to the past email reactivity of individuals.

Model 4: Interaction models – Channels and devices’ interaction effect (only applicable for experiment n°2 SMS/email)

Model 4 is applied with simple variables and a channels/devices’ interaction term (variable of interest X device of email reactivity over the previous period) to study the differential impact of the variable of interest (SMS sent for experiment) on individuals reacting to emails through a device of “routine” (desktop or mobile).

2.6.3 Models robustness and adjustment

Before applying the model, we need first go through three steps. First step is about calibrating learning and validation samples: we separate the data between a learning sample and a validation sample in order to validate the model's performance. The second step is a resampling stage: given the natural low buyers’ rate during experiment, we are studying resampling methods to improve the performance of logistics regression. The third step is about the variable selection: we select a part of the variables thanks to different processes in order to have a powerful and interpretable algorithm.

Learning and validation samples

This first step enables to ensure that our model can generalize, i.e. has the ability to make predictions not only on the data used for its learning, but also on new data.

In order to validate the performance of our models, we separate our data into:

- i. a learning sample, 75% of the data, on which we will carry out our different steps: resampling, selection of variables and estimation of the parameters of the logistic regression
- ii. a validation sample, 25% of the data, on which we will validate the performance of our models

Resampling methods

In classification problems, a disparity in the frequency of observed classes can have a significant negative impact on the adjustment of models. One technique to solve such a class unbalance is to resample the data.

Given the low buyers' rate during experiments, we are testing different resampling methods to study the possibility of improving the performance of logistics regression on our learning sample. A detailed view of the resampling methods tested is available in appendix.

Selection of variables

In the context of variables selection, our objective is to find the best compromise between three elements:

- i. the complexity of the model in order to avoid under-learning and to estimate the model coefficients with sufficient precision by obtaining sufficiently small confidence intervals
- ii. the model performance, i.e. the ability of the model to make predictions on new data, which comes back to the previous point to the bias / variance compromise
- iii. the interpretability of the model by ensuring that there is multicollinearity in the variables so that each explanatory variable can be interpreted reliably.

To make this compromise, we rely on three procedures that are available in appendix. The variables selected at the end of the process are:

- SMS during experiment
- Print mailing during experiment
- Offline customer (already purchased in-store)
- Distance to the nearest store
- Device used over the last 6 months
- Number of orders over the last 12 months
- Amount of orders over the last 12 months
- Number of days since last purchase
- Number of emails sent over the last 12 months
- Reactivity (emails) over the last 6 months
- Number of SMS messages sent over the last 12 months
- Number of print mailings sent over the last 12 months
- Number of days since the last print mailing was sent

The interactions studied are:

- SMS during experiment \times Number of SMS sent over the last 12 months (model 2)
- SMS during experiment \times Reactivity (emails) over the last 6 months (model 3)
- Print mailing during experiment \times Reactivity (emails) over the last 6 months (model 3)
- SMS during experiment \times device of email reactivity over the last 6 months (model 4)

2.6.4 Models results and validation for experiment n°1 (Print and email)

The below table (Table 28) presents the estimates of the coefficients of the logistic regression models for experiment n°1, estimated by the maximum likelihood (see detailed method in appendix). The significance of the variables is indicated by the p-value, the coefficients in the Z-test. Almost all variables are significant at more than 99% and therefore have an impact on purchase during the experiment and, in particular, the variable of interest and its interactions, in bold in the table 28. We observe a significant positive coefficient for our variable of interest and significant negative coefficients for the interaction variables. We did not study the habituation effect for print mailing due to a lack of volume in the number of mailings sent during the previous period. For the following parts, we focus on each model, and to make it more interpretable, we convert the coefficients in odds ratio with their interval 95% confidence (the formulas are detailed in the appendix).

	<i>Dependent variable:</i>	
	Achat	
	(1)	(2)
Postal for the experimental period (Yes)	0.765*** (0.012)	1.096*** (0.021)
Offline purchaser (Yes)	0.564*** (0.017)	0.562*** (0.017)
Distance to the nearest store (in meters)	-0.00001*** (0.00000)	-0.00001*** (0.00000)
Number of orders over the previous period	0.283*** (0.015)	0.288*** (0.015)
Amount of orders over the previous period	0.0004*** (0.0001)	0.0003*** (0.0001)
Number of days since last purchase	-0.001*** (0.00003)	-0.001*** (0.00003)
Number of emails sent over the previous period	-0.002*** (0.0004)	-0.002*** (0.0004)
Reactivity on previous period (Medium reactivity)	0.871*** (0.013)	1.081*** (0.018)
Reactivity on previous period (Great activity)	1.313*** (0.017)	1.516*** (0.021)
Number of SMS messages sent during the previous period	-0.104*** (0.013)	-0.105*** (0.013)
Number of direct mail sent over the previous period	0.351*** (0.007)	0.352*** (0.007)
Postal for the experimental period (Yes) : Reactivity on previous period (Medium reactivity)		-0.475*** (0.027)
Postal for the experimental period (Yes) : Reactivity on previous period (Great activity)		-0.473*** (0.034)
Constant	-0.582*** (0.038)	-0.733*** (0.039)
Observations	96,046	96,046
Log Likelihood	-94,771.260	-94,596.140
Akaike Inf. Crit.	189,566.500	189,220.300

Note :

*p<0.1; **p<0.05; ***p<0.01

Table 28: estimates of the coefficients of the logistic regression models for experiment n°1

Model 1: Direct incremental effect

We first study the model with simple variables (Table 29). The variable of interest (print mail received for the experiment) is significantly positive with an odds ratio of 2.150 (with a 95% confidence interval =[2.101, 2.200]): according to the model, print mailing for the experiment had a greater impact of 115.0% compared to the email sent to the control group.

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.559	0.519	0.602
Postal for the experimental period (Yes)	2.150	2.101	2.200
Offline purchaser (Yes)	1.758	1.701	1.818
Distance to the nearest store (in meters)	1.000	1.000	1.000
Number of orders over the previous period	1.327	1.289	1.366
Amount of orders over the previous period	1.000	1.000	1.001
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	0.998	0.997	0.999
Reactivity on previous period (Medium reactivity)	2.389	2.327	2.452
Reactivity on previous period (Great activity)	3.719	3.600	3.842
Number of SMS messages sent during the previous period	0.901	0.879	0.924
Number of direct mail sent over the previous period	1.421	1.403	1.439

Table 29: Model 1 (direct measurement) results

Model 3: Channels interaction effect – print mail and email

We study below (Table 30) the interaction model with the *variable of interest X email reactivity over the past 6 months* to analyze the impact of the variable of interest (print mail for the experiment) on individuals who are or are not reactive to emails sent over the 6 months prior to the test.

The interaction variable is significantly negative for two modalities of reactivity (High and Medium reactivity). Thus, according to the model, the more reactive an individual is to emails sent by the brand during the previous period, the less effect print mail had during the experiment.

The odds ratio for the interaction variable with the "High Reactivity" modality is 0.623 (with a 95% confidence interval = [0.583, 0.666]), the impact of print mail compared to email is therefore reduced by $1-0.623 = 37.7\%$ for very reactive individuals over the 6 months before the experiment.

To visualize this effect, we have plotted the probability of purchase during the experiment according to the reactivity over the previous period for each group (pink curve = test; blue curve = control)

The higher the email reactivity over the previous months is, the less print mail for our experiment has an impact on the probability of purchase compared to email. On the other hand, we notice that the probability of purchase increases for both curves due to the increasing coefficient according to the reactivity of the control variable "email reactivity over the last 6 months".

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.481	0.445	0.519
Postal for the experimental period (Yes)	2.993	2.871	3.121
Offline purchaser (Yes)	1.754	1.696	1.813
Distance to the nearest store (in meters)	1.000	1.000	1.000
Number of orders over the previous period	1.334	1.296	1.373
Amount of orders over the previous period	1.000	1.000	1.000
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	0.998	0.997	0.999
Reactivity on previous period (Medium reactivity)	2.947	2.846	3.053
Reactivity on previous period (Great activity)	4.554	4.366	4.749
Number of SMS messages sent during the previous period	0.900	0.878	0.924
Number of direct mail sent over the previous period	1.422	1.404	1.440
Postal for the experimental period (Yes) : Reactivity on previous period (Medium reactivity)	0.622	0.590	0.655
Postal for the experimental period (Yes) : Reactivity on previous period (Great activity)	0.623	0.583	0.666

Table 30: Model 3 (channels' interaction) results

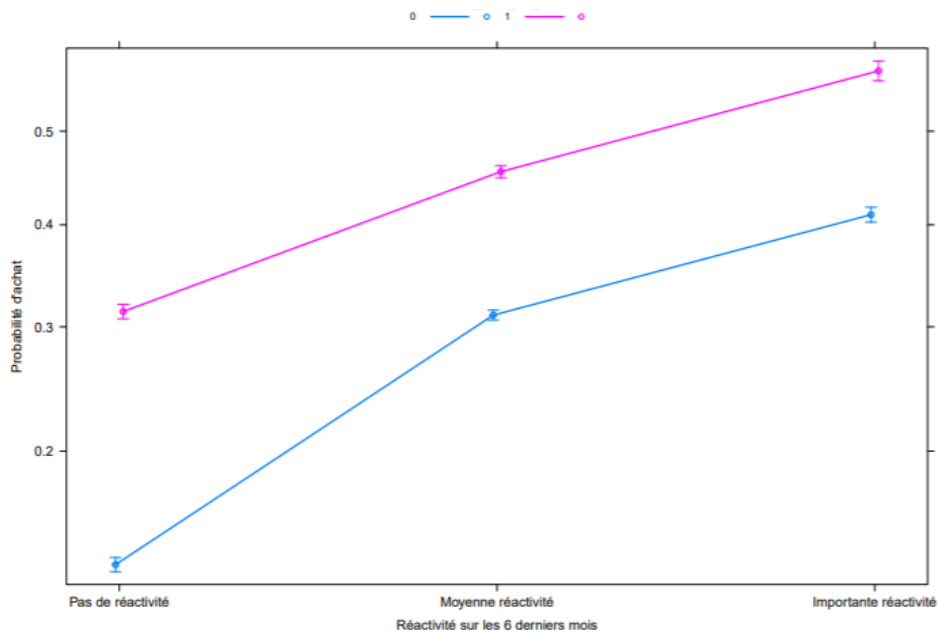


Chart 4: Purchase probability plotting by email reactivity. Print mail/email experiment

In order to analyze the performance of our models, we analyze the ROC curve and AUC criteria on the validation sample.

Validation of models for print mail/email

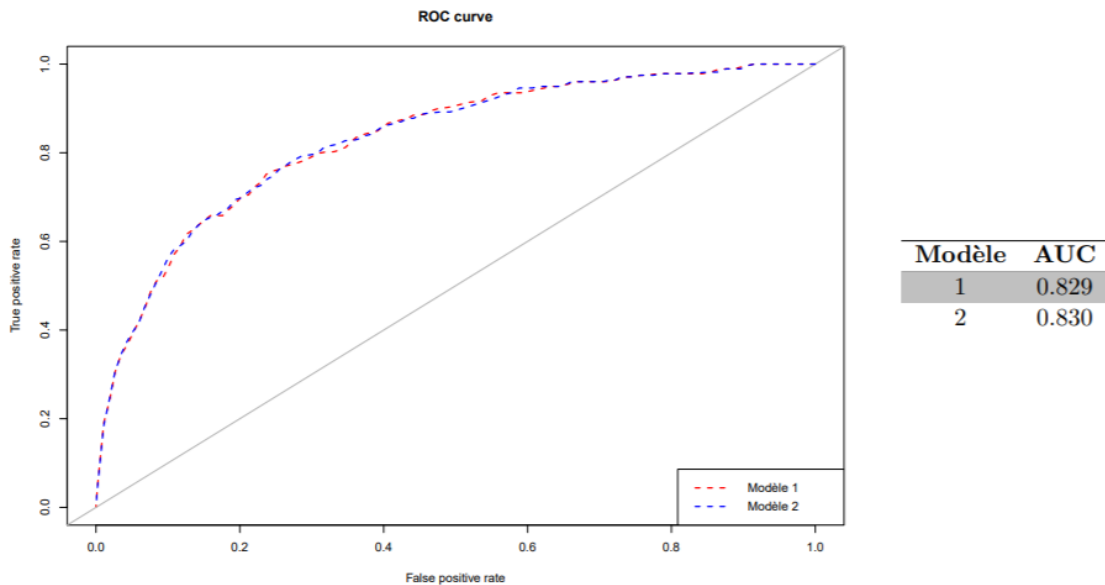


Chart 5: ROC curve for models 1 & 3. Print mail/email experiment.

First, we obtain AUC values of more than 0.80 that indicate a good model performance. Second, the results do not show any significant difference between the different models, which validates the effects of the above studies.

2.6.5 Models results and validation for experiment n°2 (SMS and email)

The table below (Table 31) presents the estimates of the coefficients of the logistic regression models for the SMS/email experiment (n°2), still estimated by the maximum likelihood (detailed method in the appendix). The significance of the variables is indicated by the p-value of the coefficients in the Z-test.

Almost all variables are significant at more than 99% and therefore have an impact on the purchase during the experimental period and, in particular, the variable of interest and its interactions, in bold in the table.

We observe a significant positive coefficient for our variable of interest (SMS during experiment) and significant negative coefficients for interaction variables. We, then, present the results of the different models. To make them more interpretable, coefficients are converted into odds ratio with their confidence intervals at 95%.

	<i>Dependent variable:</i>			
	Achat			
	(1)	(2)	(3)	(4)
SMS for the experimental period (Yes)	0.246*** (0.020)	0.437*** (0.054)	0.400*** (0.043)	0.478*** (0.038)
Offline purchaser (Yes)	-0.079*** (0.027)	-0.082*** (0.027)	-0.081*** (0.027)	-0.081*** (0.027)
Distance to the nearest store (in meters)	-0.00000*** (0.00000)	-0.00000*** (0.00000)	-0.00000*** (0.00000)	-0.00000*** (0.00000)
Device user over the previous period (Desktop)	0.069 (0.042)	0.066 (0.042)	0.068 (0.042)	0.206*** (0.052)
Device user over the previous period (Mobile)	0.051 (0.042)	0.049 (0.042)	0.048 (0.042)	0.270*** (0.050)
Number of orders over the previous period	0.406*** (0.017)	0.409*** (0.017)	0.406*** (0.017)	0.404*** (0.017)
Amount of orders over the previous period	0.0003*** (0.0001)	0.0003*** (0.0001)	0.0003*** (0.0001)	0.0003*** (0.0001)
Number of days since last purchase	-0.001*** (0.0001)	-0.001*** (0.0001)	-0.001*** (0.0001)	-0.001*** (0.0001)
Number of emails sent over the previous period	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)
Reactivity on previous period (Medium reactivity)	0.530*** (0.044)	0.530*** (0.044)	0.603*** (0.052)	0.522*** (0.044)
Reactivity on previous period (Great activity)	1.153*** (0.049)	1.152*** (0.049)	1.326*** (0.058)	1.142*** (0.049)
Number of SMS messages sent during the previous period	0.040*** (0.006)	0.059*** (0.008)	0.039*** (0.006)	0.039*** (0.006)
Number of direct mail sent over the previous period	0.170*** (0.020)	0.171*** (0.020)	0.175*** (0.020)	0.172*** (0.020)
Number of days since the last direct mail sent	-0.0002*** (0.00005)	-0.0002*** (0.00005)	-0.0002*** (0.00005)	-0.0002*** (0.00005)
SMS for the experimental period (Yes) : Number of SMS messages sent during the previous period		-0.034*** (0.009)		
SMS for the experimental period (Yes) : Reactivity on previous period (Medium reactivity)			-0.131** (0.051)	
SMS for the experimental period (Yes) : Reactivity on previous period (Great activity)			-0.323*** (0.058)	
SMS for the experimental period (Yes) : Device user over the previous period (Desktop)				-0.234*** (0.052)
SMS for the experimental period (Yes) : Device user over the previous period (Mobile user)				-0.393*** (0.049)
Constant	-1.298*** (0.075)	-1.404*** (0.080)	-1.390*** (0.078)	-1.419*** (0.077)
Observations	28,294	28,294	28,294	28,294
Log Likelihood	-30,001.720	-29,994.410	-29,985.430	-29,969.960
Akaike Inf. Crit.	60,033.430	60,020.820	60,004.860	59,973.920

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 31: estimates of the coefficients of the logistic regression models for experiment n°2

Model 1: Direct incremental effect

We study below (Table 32) the model with only simple variables (interest variable, SMS during experiment, and control variables) to study the impact of the interest variable. The variable of interest (SMS during experiment) is significantly positive with an odds ratio of 1,279 (with a 95% confidence interval = [1,230, 1,330]): according to the model, SMS during experiment had a greater impact of 28% compared to the email sent to the control group.

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.273	0.236	0.316
SMS for the experimental period (Yes)	1.279	1.230	1.330
Offline purchaser (Yes)	0.924	0.876	0.975
Distance to the nearest store (in meters)	1.000	1.000	1.000
Device user over the previous period (Desktop)	1.072	0.986	1.164
Device user over the previous period (Mobile)	1.052	0.970	1.142
Number of orders over the previous period	1.501	1.452	1.552
Amount of orders over the previous period	1.000	1.000	1.000
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	1.008	1.007	1.009
Reactivity on previous period (Medium reactivity)	1.698	1.559	1.850
Reactivity on previous period (Great activity)	3.167	2.877	3.485
Number of SMS messages sent during the previous period	1.040	1.029	1.052
Number of direct mail sent over the previous period	1.185	1.139	1.233
Number of days since the last direct mail sent	1.000	1.000	1.000

Table 32: Results of model 1 for SMS/Email experimentation: direct incremental effect

Model 2: Channel habituation effect

We study below (Table 33) the interaction model with the *variable of interest X Number of SMS messages sent over the last 12 months* to analyze the impact of the variable of interest (SMS during experiment) on individuals who are accustomed to receiving SMS from the focal brand.

The interaction variable is significantly negative. Thus, according to the model, the more SMS an individual received during the previous period, the less effect the SMS for the experiment had. The odds ratio is 0.966 (with a 95% confidence interval = [0.949, 0.983]), so the impact of SMS compared to email is reduced by $1-0.966 = 3.4\%$ for an additional received SMS over the previous 12 months.

To visualize this effect, we plotted the probability of purchase during the experiment according to the number of SMS received over the previous period and whether a SMS has been received (pink curve for the test group) or not (blue curve for the control group) during the experiment.

It can be seen that the higher the number of SMS messages received over the previous 12 months, the less SMS during experiment has an impact on the probability of purchase compared to email, represented by the difference between the two curves. Specifically, such model enables to demonstrate that a threshold in the frequency of contact does exist: after 10 contacts through SMS over the past 12 months, the channel does not bring incremental value anymore. On the other hand, we notice the probability of purchase increases for both curves due to the positive coefficient for the control variable "Number of SMS messages sent over the last 12 months". Therefore, our results strongly support H8:

H8: The incremental impact of an alternative channel decreases when the past frequency of contact on this channel increases

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.246	0.210	0.287
SMS for the experimental period (Yes)	1.548	1.393	1.721
Offline purchaser (Yes)	0.922	0.874	0.972
Distance to the nearest store (in meters)	1.000	1.000	1.000
Device user over the previous period (Desktop)	1.069	0.984	1.161
Device user over the previous period (Mobile)	1.050	0.967	1.140
Number of orders over the previous period	1.505	1.455	1.556
Amount of orders over the previous period	1.000	1.000	1.000
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	1.008	1.007	1.009
Reactivity on previous period (Medium reactivity)	1.698	1.559	1.849
Reactivity on previous period (Great activity)	3.166	2.876	3.484
Number of SMS messages sent during the previous period	1.061	1.045	1.077
Number of direct mail sent over the previous period	1.186	1.140	1.234
Number of days since the last direct mail sent	1.000	1.000	1.000
SMS for the experimental period (Yes)			
:Number of SMS messages sent during the previous period	0.966	0.950	0.983

Table 33: Results of model 2 for SMS/Email experimentation: habituation effect

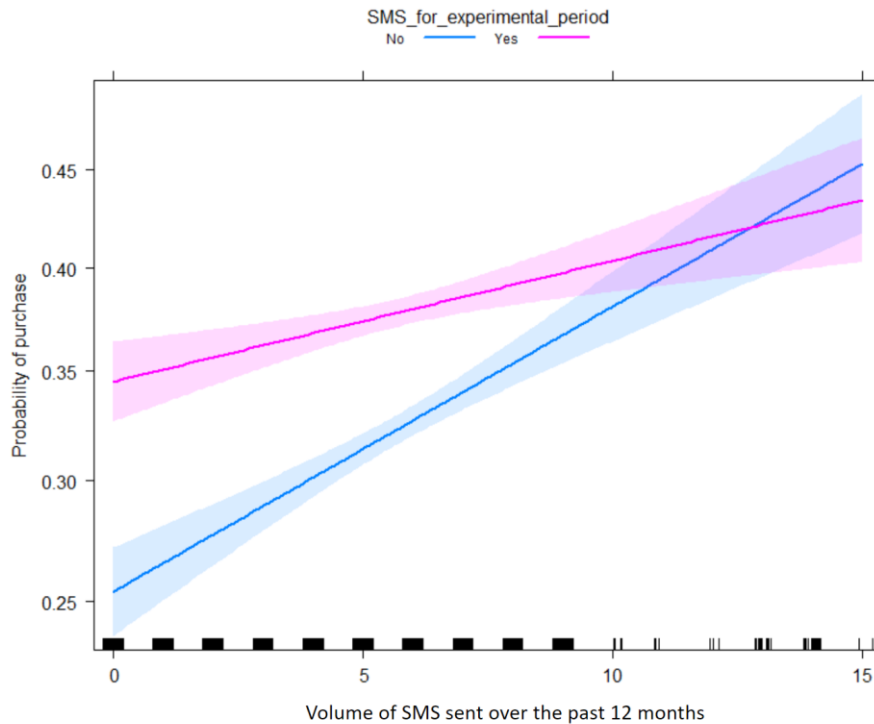


Chart 6: Purchase probability plotting by past frequency via SMS (habituation effect). SMS/email experiment

Model 3: Channel interaction effect – SMS and email

We study below (Table 34) the interaction model with the *variable of interest X email reactivity over the last 6 months* in order to analyze the impact of the variable of interest (SMS during experiment) on individuals reacting or not to emails sent over the 6 months preceding the experiment.

The interaction variable is significantly negative for two modalities of email reactivity (High and Medium reactivity). Thus, according to the model, the more reactive an individual is to emails sent by the brand during the previous period, the less the SMS for the experiment had an effect. The odds ratio for the variable of interaction with the modality "High reactivity" is 0.724 (with a confidence interval at 95% = [0.639, 0.802]), the impact of SMS compared to email is therefore decreased by $1 - 0.716 = 27.6\%$ for very reactive individuals over the 6 months preceding the experiment.

To visualize this effect, we have plotted the probability of purchase during the experiment according to the reactivity over the previous period and according to the SMS received (pink curve) or not (blue curve) for the experiment. We observe that the higher the reactivity over

the previous months, the less the SMS for the period of analysis has an impact on the probability of purchase versus the email, represented by the difference between the two curves. On the other hand, we notice the probability of purchase increases for both curves due to the increasing coefficient according to the control variable "*Reactivity over the last 6 months*".

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.249	0.214	0.290
SMS for the experimental period (Yes)	1.492	1.370	1.625
Offline purchaser (Yes)	0.922	0.875	0.973
Distance to the nearest store (in meters)	1.000	1.000	1.000
Device user over the previous period (Desktop)	1.070	0.985	1.163
Device user over the previous period (Mobile)	1.049	0.967	1.139
Number of orders over the previous period	1.500	1.451	1.551
Amount of orders over the previous period	1.000	1.000	1.000
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	1.008	1.007	1.009
Reactivity on previous period (Medium reactivity)	1.827	1.649	2.024
Reactivity on previous period (Great activity)	3.766	3.360	4.222
Number of SMS messages sent during the previous period	1.040	1.028	1.052
Number of direct mail sent over the previous period	1.192	1.145	1.240
Number of days since the last direct mail sent	1.000	1.000	1.000
SMS for the experimental period (Yes)			
:Reactivity on previous period (Medium reactivity)	0.877	0.793	0.970
SMS for the experimental period (Yes)			
:Reactivity on previous period (Great activity)	0.724	0.646	0.811

Table 34: Results of model 3 for SMS/Email experimentation: channels' interaction effect

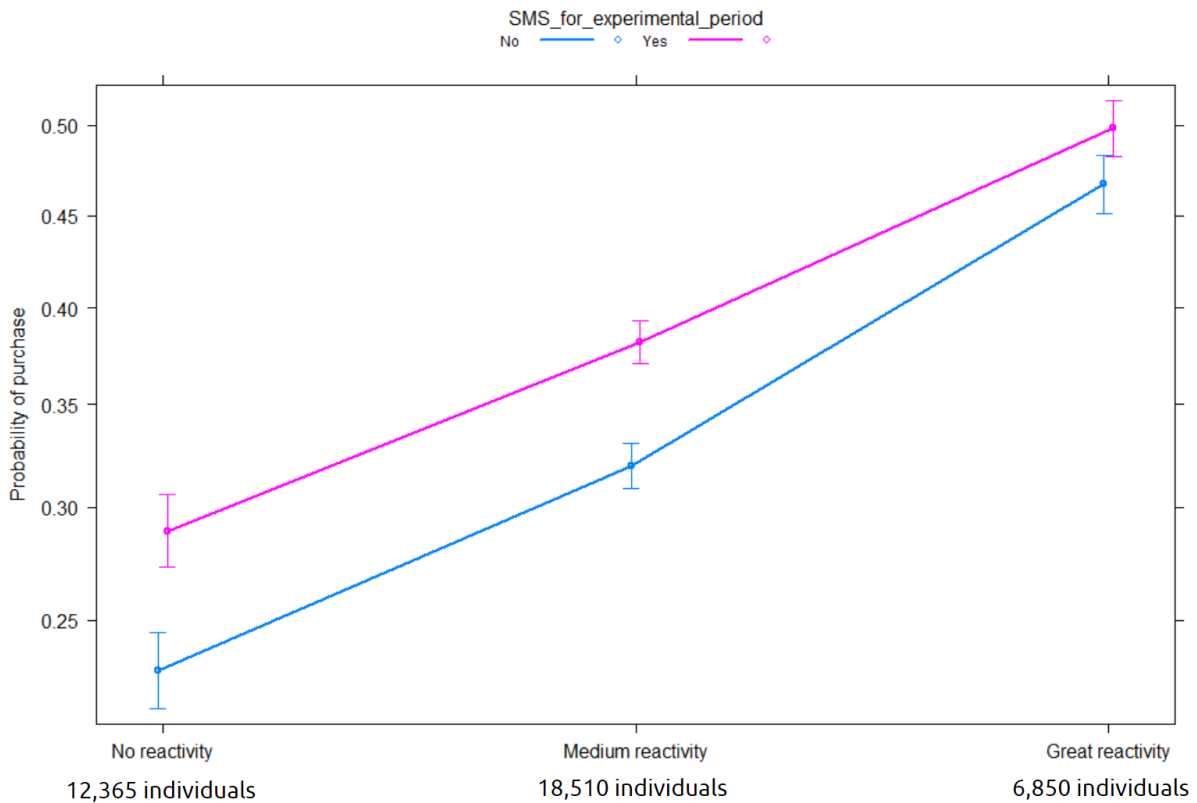


Chart 7: Purchase probability plotting by email reactivity (channels' interaction effect). SMS/email experiment

Model 4: Channels and devices' interaction effect

We study below (Table 35) the interaction model with the *variable of interest X device of email reactivity over the last 6 months* in order to analyze the impact of the variable of interest (SMS during experiment) on individuals reacting to emails through a device of “routine”.

The interaction variable is significantly negative for two modalities of device email reactivity (Mobile user and Desktop user). Thus, according to the model, the more mobile-reactive an individual is during the previous period, the less the SMS for the experiment had an effect. The odds ratio for the variable of interaction with the modality "Mobile reactivity" is 0.675 (with a confidence interval at 95% = [0.613, 0.744]), the impact of SMS compared to email is therefore decreased by $1 - 0.675 = 32.5\%$ for mobile-oriented individuals over the 6 months preceding the experiment.

To visualize this effect, we have plotted the probability of purchase during the experiment according to the device of reactivity over the previous period and according to the SMS

received (pink curve) or not (blue curve) for the experiment. We observe that the more mobile a customer is over the previous months, the less the SMS for period of analysis has an impact on the probability of purchase versus the email, represented by the difference between the two curves. Therefore, our results support H7:

H7: Activating a mobile channel (SMS) impacts more positively the probability to purchase of non-mobile customers than such probability on already-mobile customers

	Odds ratio	2.5 %	97.5 %
(Intercept)	0.242	0.208	0.281
SMS for the experimental period (Yes)	1.613	1.497	1.737
Offline purchaser (Yes)	0.923	0.875	0.973
Distance to the nearest store (in meters)	1.000	1.000	1.000
Device user over the previous period (Desktop)	1.229	1.111	1.360
Device user over the previous period (Mobile)	1.310	1.187	1.445
Number of orders over the previous period	1.498	1.449	1.549
Amount of orders over the previous period	1.000	1.000	1.000
Number of days since last purchase	0.999	0.999	0.999
Number of emails sent over the previous period	1.008	1.007	1.009
Reactivity on previous period (Medium reactivity)	1.685	1.547	1.836
Reactivity on previous period (Great activity)	3.134	2.846	3.450
Number of SMS messages sent during the previous period	1.039	1.028	1.051
Number of direct mail sent over the previous period	1.187	1.141	1.235
Number of days since the last direct mail sent	1.000	1.000	1.000
SMS for the experimental period (Yes)			
:Device user over the previous period (Desktop)	0.791	0.715	0.875
SMS for the experimental period (Yes)			
:Device user over the previous period (Mobile user)	0.675	0.613	0.744

Table 35: Results of model 4 for SMS/Email experimentation: channels and devices' interaction effect

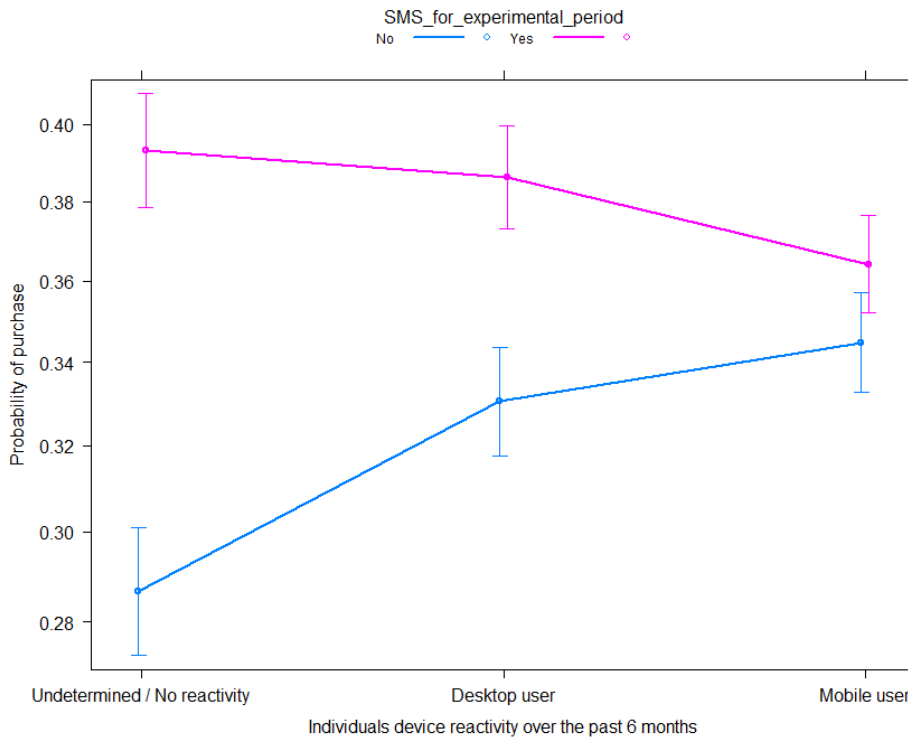
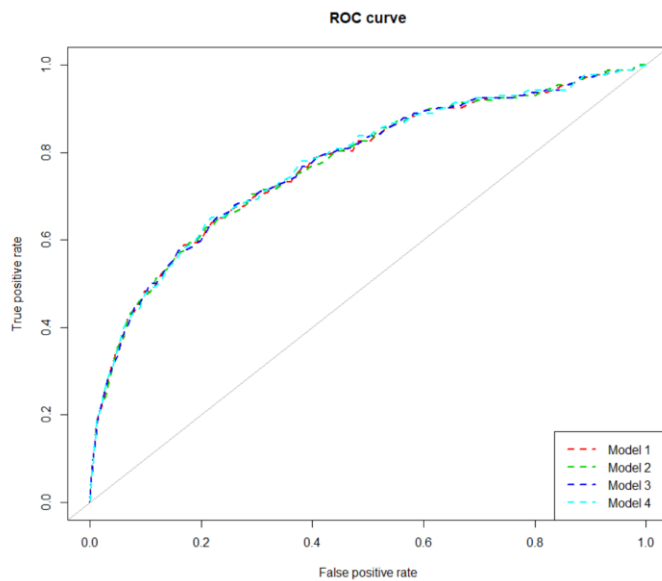


Chart 8: Purchase probability plotting by device of reactivity on emails (channels and devices' interaction effect). SMS/email experiment

Validation of models for SMS/email

In order to analyze the performance of our models, we analyze the ROC curve and criteria AUC on the validation sample.



Model	AUC
1	0.771
2	0.771
3	0.771
4	0.773

Chart 9: ROC curves and AUC criteria of the models for SMS/Email.

First, we obtain AUC values of more than 0.70, which attest to the good performance of the models. Second, the results do not show any significant difference between the different models, which makes it possible to validate the effects studied above.

Section 3: Discussion – towards a better understanding of channels’ impact on the path to purchase

3.1 The impact of specific channel on customers’ path to purchase and profitability

Existing studies mainly focus on customer proactive behaviors across channels. They also emphasize on “*destination-based shopping*”, where customers are already engaged in a decision process: the journey is often planned and customers steer to a channel to enjoy a corresponding experience.

On the contrary, there has been little work so far on the study of the characteristics of brand-initiated channels as means to guide customers to a specific conversion channel. The results reveal key insights related to the impact of brand-initiated channels on customer journey. While the use of specific conversion channels has been extensively studied from a customer perspective (e.g., channel inertia of customers, lack of lock-in in the funnel...), our research highlights the impact of brands proactive contact strategies on customers’ choice of conversion channels.

Our experimental approach combined with individual-level data collection allows to evaluate whether brand-initiated channels impact 1) the likelihood that a customer continues his journey 2) the purchase channel in which the conversion may occur when he continues his journey. We measure and understand how every channel drives sales across the different purchase channels: the online versus offline share of conversion lift.

This research firstly reveals the importance of measuring the impact of one specific communication channel on customer behavior across other channels. Actually, the results confirm that the exposure to one alternative channel may impact customers’ likelihood to choose a specific channel when pursuing their buying process. While enriching a digital contact strategy with an offline print channel, the overall uplift in customer count (+82%) almost only benefits the offline purchase channel. In contrast, the incremental value of the mobile channel

is an uplift of customer count of +29% that benefits almost equally to online and offline purchase channels.

These results secondly highlight the need to consider both the incremental cost and the incremental revenue that an additional channel generates. Indeed, this research endorses the design of a “touchpoints’ sequencing” that focuses on impacting a baseline behavior instead of reducing costs. Though it may be more costly, an additional channel could eventually be profitable when it generates strong-enough uplift (Table 24).

Finally, our results demonstrate the importance of baselines’ measurement (made possible by randomization in the experimental design) because they enable to evaluate the incremental impact to expect from an additional channel. Doing without attribution models, these results could help brands in the design of omni-channel contact strategies based on channels’ incremental contribution (i.e. conversion and revenue), and incremental cost of activation.

3.2 How channels types affect own-channel and cross-channel effects

The study confirms that offline channels are more likely to generate own-channel effects. Indeed, the audience exposed is not in mobility and had more ad exposure occasions during the period (i.e. possibly had a look several times to the print mailing). The exposure context seems to play a key role in customers’ response. Channels that expose a sedentary audience (i.e. print) may lead to destination-shopping flows.

This research also provides an extension to Dinner, Van Heerde and Neslin (2014), by measuring how a mobile channel may drive online and offline sales compared to a traditional channel such as print. In our study, mobile channels appear to foster cross-channel effects as the value provided by mobile favors equally online and offline conversion channels. In that sense, mobile seems to play a previously unseen role within the journey. Beyond enhancing the brand presence, it maximizes the probability that the brand finally gets the conversion as a customer moves forwards in its journey. Channels that may expose a nomadic audience (i.e. mobile) may lead to deviation-shopping flows in which the purchase may be unplanned, and may be realized in any conversion channel.

Designing a loyalty loop justifies an omni-channel contact strategy that must take “touchpoints’ responsiveness” data into account. Indeed, our research gives evidence for the presence of customers’ segments that should be more sensitive to an alternative channel (Bothorel, Vanheems and Guérin, 2015) and this is a key insight for brands that try to engage and initiate

a journey with their customers. Finally, the design of loyalty loops should be facilitated by a form of relevant customers' guidance to a preferred channel (from a bottom-up approach) or strategic channel (from a top-down approach) to conversion.

3.3 Channels' specificity: encouraging destination-based versus leveraging on-the-go shopping

As a matter of fact, our results demonstrate that, while traditional channels such as print mailings encourage destination-based shopping, mobile channels such as SMS trigger a newer form of shopping that is more "situational". The journey is more likely to be unplanned, not necessarily focused on experience but on ease of purchase and with a much different spatiotemporal dimension. For brands and retailers, a new issue becomes the capacity to attract, thanks to mobile channels, flows of shoppers to one of its channels. Yet, print ads may still drive planned and destination-based shopping for customers who seek retail experience rather than seeking convenience. Although brand control over the customer journey is more limited, brand-owned channels appear to have a significant influence on key customer outcomes. For promotional operations with strong business importance, such channels may enable a brand to get back a greater control over customer journey.

Moreover, depending on their strategy or tactical decisions, brands may have an interest in encouraging their customers to use a specific conversion channel. For instance, physical stores may contribute to create a memorable experience that could build brand equity and loyalty. In that sense, brands may identify relevant moments to guide customers to one of their physical stores thanks to specific channels as part of a long-term relationship building.

Finally, the notion of control over the journey may be challenged. For many brands, the question is no longer: how to control end-to-end journeys, but more importantly, how to trigger firm-initiated touchpoints at key moments. In that sense, our results confirm that customers may develop a habituation effect to a channel, in particular we notice that the incremental impact of a SMS decreases as the past frequency on this channel increases. Our results also demonstrates strong interactions between the channel activated and the actual device of exposure, in particular we notice that making the contact strategy more mobile thanks to SMS is useful for non-mobile customers but does not impact baseline behaviors of already-mobile customers. All in all, two strategic criteria for channel activation emerge: first, activating a channel because it brings a "novelty effect" to avoid any habituation effect; second, activating a channel because it fosters a switch in the device of exposure for the customers.

We advance that, in different ways, mobile and print firm-initiated channels constitute strategic trigger points in the loyalty loop that firms aim at designing.

Section 4: Conclusion, limitations and need for future research

This research reveals key insights related to channels' orchestration that we discuss and that give avenues for further research. We address two research objectives that contribute to a better understanding of how firm-initiated channels impact:

- i. the likelihood that customers continue their journey. We assess the causal impact of different channels on effective buying behavior with a bottom line measurement: incremental conversions and revenue.
- ii. the purchase channel in which the conversion may occur when customers continue their journey. We measure and understand how every channel drives its impact across the different distribution channels: the online versus offline share of conversion lift.

We demonstrate that the type of firm-initiated channels has a significant influence on customer journey, both in terms of incremental buyers and channel-specific distribution of customers. Our results highlight the role of mobile channels as means to facilitate “on-the-go” shopping and trigger conversion when activated appropriately in the loyalty loop. Then, the strong interferences of mobile with other channels justify an omni-channel measurement impact. In addition, designing an efficient omni-channel contact strategy must take “touchpoints’ responsiveness” data into account as this essay gives evidence for the presence of segments that should be more sensitive to an alternative channel. Finally, our study may pave the way to both academic and managerial studies that would deeper understand how customers may be relevantly guided in its journey by brands.

Some research limitations must be mentioned, creating new research avenues.

First, our study focuses on the impact of channels on a short-term basis. More research is needed to confirm on the long term the observed effects. In particular: does channel usage significantly change over time? If so, what are the consequences in terms of repurchase and customer value? Taking into account customers' habits regarding historical channel use (i.e. web only, store-focused and multi-channel customers) could enrich the learning of the research.

The study was carried out in one country during a promotional operation that may have a trigger effect on purchase. It would be useful to validate the effects of mobile, digital and traditional channels with different communication objectives (relational or service-oriented) and in different countries and to take carry-over effects into account to serve the need for a long-term measurement.

Furthermore, as the historical steps of the journey may be mixed up in the loyalty loop designed by many brands, an interesting avenue for future research could be to analyze customers' level of engagement within the conversion funnel. In particular, the increasing collection of browsing data could help firms identify visitors, clickers or users who abandoned a basket online over a period a time to design a touchpoints' combination that depends on the level of engagement of each customer.

As a further extension of research on cross-channel effects, mobile could be isolated, not only as a communication but also as a conversion channel, to measure whether online sales are desktop or mobile driven. Moreover, considering the moderating effect of the retailer's geographical coverage (network size and store location) to measure cross-channel effects would be useful.

Finally, research exploring advertising expenditures optimization in cross-channel effect settings would be useful. In particular, any contribution regarding purchase channels profit margins could lead to new insights on customers' strategic guidance on their paths to purchase. Optimizing the combination of touchpoints that directs the most strategic customers to the highest-margin channel appears to be fruitful area for further research.

GENERAL INTRODUCTION

CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED
COMMUNICATION CHANNEL: A PEOPLE-BASED AND INCREMENTAL
APPROACH

CHAPTER 2: BRAND CHANNELS' ORCHESTRATION: UNDERSTANDING THE
IMPACT OF DIGITAL, TRADITIONAL AND MOBILE CHANNELS ON CUSTOMER
JOURNEY

**CHAPTER 3: HOW TO COORDINATE DIGITAL AND MOBILE CHANNELS TO
GENERATE INCREMENTAL VALUE ACROSS CUSTOMERS
HETEROGENEITY?**

GENERAL CONCLUSION AND DISCUSSION

CHAPTER 3: HOW TO COORDINATE DIGITAL AND MOBILE CHANNELS TO GENERATE INCREMENTAL VALUE ACROSS CUSTOMERS HETEROGENEITY?

Introduction

While the interest of a “*multi-channel distribution*” to improve a company's commercial performance has been the subject of various research (Rangaswamy et Van Bruggen, 2005; Vanheems, 2009), few studies have analyzed the interest of using several communication channels on specific customers’ profiles to increase the performance of a communication campaign. However, the Internet and the multiplicity of devices have contributed to a proliferation of new digital communication channels that raise new questions for brands and retailers:

What are the effects of leveraging multiple channels on multiple customers’ profiles?

How can we orchestrate them in a smart way so that together they can achieve the objectives of a communication campaign?

What are the customers’ profiles that best respond to the exposure to an additional channel?

Answering these questions involves being able to assess the impact of activating an additional communication channel on transaction volume, but also identifying for which targets and in which situations customers are more reactive to each specific combination of channels. The purpose of this essay is to answer these questions by analyzing the effect of using an additional communication channel on the volume of offline and online transactions generated by a company during an omni-channel communication campaign.

In this perspective, it aims at better understanding the interactions between multiple digital channels. Especially, how these interactions can generate synergies and thereby significantly improve the performance of a communication campaign. In this essay, we explore three main

variables related to customer's knowledge that brands and retailers build over time: customer value through a segmentation based on past purchases, customer reactivity to solicitation through an historical channel and customer's situation of mobility. These three variables related to customers' behavioral response to solicitation are essential from a conceptual perspective. In particular, mobile is given a key importance in this essay, because of its influence in any location and prior to the purchase, it could indeed constitute a major strategic lever for brand and retailer's communication.

The essay is organized as below. First, it provides a literature review in which advertisers' models and concepts for improving the performance of their communication mechanisms are presented. Beyond customer value-based targeting models from Customer Relationship Management (CRM), the analysis of channels' interactions and synergies and the analysis of customers' preference for channels help to understand the effects of a contact strategy involving multiple channels at an individual level. The literature review also highlights the inadequacy of the models and metrics available to isolate, measure and understand the specific effect of a channel within an omni-channel design. The empirical section is then presented. Beyond confirming the real contribution of several digital channels (email, SMS and banners) to the volume of transactions, its purpose is to better understand customers' response heterogeneity to omni-channel communication strategy. The results of two experiments carried out respectively on more than 300,000 and 700,000 individuals during short-term commercial operations and based on real behavioral data are presented. The essay concludes with a discussion of the results and presents the managerial implications.

Section 1: Conceptual foundations and hypotheses: Adapting omni-channel communication to customers' profiles to drive performance

Customer value is identified as a key variable in multi-channel research. Neslin et alli (2006) defined multi-channel management as the « *the design, deployment, coordination, and evaluation of channels to enhance customer value through effective customer acquisition, retention, and development* ». This research is part of a significant conceptual evolution brought about by the shift from the multi-channel era to the omni-channel era, where the

definition of the term channel broadens to include all touchpoints between the brand and the consumer. In this respect, Verhoef, Kannan et Inman (2015) point out that, in light of the expansion of digital and mobile, the boundary between distribution and communication channels is becoming blurred. Omni-channel, i.e. the nesting of multiple channels within a given shopping experience, invites to measure the impact of each channel's use on brand performance. Omni-channel management is thus defined as « *the synergetic management of the numerous available channels and customer touchpoints, in such a way that the customer experience across channels and the performance over channels is optimized*» (Verhoef, Kannan et Inman, 2015).

1.1 The traditional models of CRM: channels' use based on targets' profitability and reactivity to communication actions

The interest of mobilizing several communication channels can be studied in the light of models from Customer Relationship Management. Actually, in order to improve the effectiveness of their communication campaigns, many companies have implemented customer value segmentation based on past or predicted value and allocate marketing investments based on this criterion (Thomas and Sullivan, 2005). The past value of a customer is frequently measured using the RFM (Recency, Frequency, Amount) or value segments (Light, Medium, Heavy Customers) models, while the predicted value is measured using Customer Lifetime Value. The models used to take decisions, whether retrospective or projected, aim at allocating more resources to the most valuable customers in order to optimize the performance of future communication actions. In the context of promotional communication, Volle (2001) invites, beyond value, to examine customer potential by demonstrating increased performance on customers whose loyalty level is moderate. In line with the founding works of Peppers & Rogers (1993), Kumar (2010) proposes a projective approach to assess customer potential: Customer Lifetime Value (CLV), in which the expected profitability of the customer is crucial. The author crosses the CLV with a construct describing the marginal impact of communications - i.e. the turnover generated by every additional euro invested in communication -. The intersection of these two dimensions makes it possible to identify four segments of individuals (Figure 19).

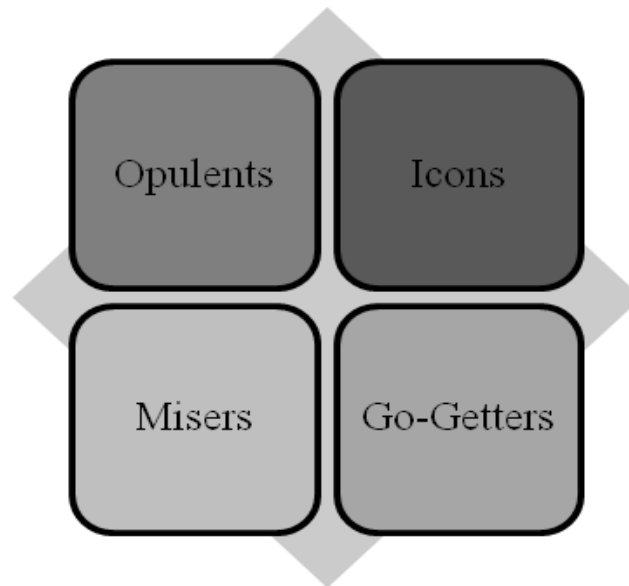


Figure 19. Model of contact strategies' differentiation based on CLV and customers' responsiveness to communications

Among customers with low predicted value, Go-Getters are customers for whom an increased communication effort will lead to an increase in their predicted value, which is not the case for Misers. For clients with high-predicted value, the same distinction is made between the Icons and the Opulents. Thus, it is suggested that customers with lower predicted value should be directed to the less expensive channels, less personalized channels, with a lower relational pressure. The communication efforts made must be directed towards customers for whom the marginal impact of communications is highest, i. e. in order of priority, to the Icons, then to the Go-Getters, then to the Opulents and finally to the Misers. Customers' strategic targeting models (Volle, 2012) and the Lifetime Value-based marketing resources allocation models are actually relatively convergent with the CLV model in terms of customer segmentation. Apart from its cost, the specificity of each channel is not taken into account in terms of its intrinsic ability to develop a customer's profitability or improve its reach. While Kumar et alli (2008) point out the importance of measuring the influence of each channel on the purchase probability, Lifetime Value makes it difficult to take into account the heterogeneity of customer responses to each channel. Therefore, could a customer's low value be explained by a weak reactivity to the channel through which he is usually contacted? While some advice to stop investing on this customer, on the contrary, channel reactivity suggests to maintain or even increase investments by allocating them to an alternative channel that could likely generate a reaction and a more positive response.

Indeed, a major question arises with omni-channel: are customers profitable thanks to greater reactivity to marginal marketing investments or do brands and retailers greatly invest on such customers because they are more profitable? In a context where brands need to imagine contact strategies through an increasing number of channels and touchpoints, this question, that has been under investigated by researchers, calls for new models to efficiently allocate marketing resources across these channels. Moreover, most firms cannot afford a massive investment on every possible channel and tend to switch to lower costs channels to boost return on investments (ROI). Often, this is made without considering customers' response to more expensive channels in their ROI calculations: this is mainly due to a lack of shared and accurate metric to assess the real efficiency and contribution of channels and touchpoints. After an invitation to focus on customers with the most value (Roberts and Berger 1999; Thomas and Sullivan 2005; Haenlein, Kaplan, and Schoder 2006), and then on customers who react best to a growth in the volume of communication (Kumar, 2010) the era of the omni-channel may call for new forms of action. In the first approach, channels are being selected based on their costs, with the least expensive channels being allocated to the least profitable customers. According to the second one, the decision to communicate depends on the ROI generated by an increased investment. The multiplication of channels reveals a third original way. Customers may actually be unresponsive to communication actions because the channels used for these actions do not align with their preferred channels (Godfrey, Seiders and Voss, 2011). This observation, as recently mentioned by Verhoef, Kannan and Inman (2015), calls for an assessment of the consumer's responsiveness, no longer to a communication campaign, but to each channel to which he has been exposed during the campaign. We therefore link such an objective with the IMC theory (Batra and Keller, 2016), in particular with the concept of "Conformability" that refers to the idea that "any particular message may be new to some consumers, but not to others. It refers to communication versatility and the extent to which a particular marketing communication "works" for many target consumers in many times and places". This dimension relates to customers heterogeneity and translates the idea that not all customers would respond in the same way to a given treatment (e.g. a given channel). We may expect a more positive response to an alternative from customers who are not reactive to historical channel that they have been exposed to. Understanding this heterogeneity is an important research avenue for omni-channel orchestration. Therefore, we posit that:

H11: The incremental impact of an alternative channel is stronger on customers who are non-reactive to the historical channel.

We aim at responding to these calls with a field research that controls for selectivity bias, isolates the effect of an additional channel and assesses its effect through incrementality measurement to contribute to the design of not only efficient, but effective omni-channel communication. Such contribution would provide significant extension to research on customers' journey (Dinner, Van Heerde, and Neslin 2014; Srinivasan, Rutz, and Pauwels 2015; Lemon and Verhoef 2016), and brand promotion across the heterogeneity in customers' behavioral response to marketing solicitations (Belch and Belch 1998; Volle 2001; Andrews et al. 2016). Haenlein, Kaplan et Schoder (2006) studied this option of abandoning marketing efforts towards customers who are not profitable to the brand through a Real Options Analysis - ROA - applied to CLV. The future options estimated by the ROA therefore assess a brand's managerial flexibility in its communication strategy and contribute to improve estimates of a customer's value. Unlike an abandonment option, evaluating the effects of a growth-of-effort option related to the activation of new digital or mobile channels is an interesting contribution. Activating a new communication channel - even if it is more expensive - could thereby develop a customer's potential and generate increased performance. In line with such customer value-based theories, we posit that:

*H12: The incremental impact of an alternative channel is stronger
(weaker) on high-value (low-value) customers*

1.2 Effects of multiple channels' activation: from individual preferences to reciprocity and reactance phenomena

Godfrey, Seiders and Voss (2011) demonstrated that adapting the communication channel to each customer's preferences results in an increased re-purchase rate. In this respect, mobile is receiving increasing attention from researchers but more as a transactional channel (Wang, Malthouse & Krishnamurthi, 2015) than as a communication channel (Nysveen et al., 2005). The ability of mobile to encourage a customer to make a deviation towards the physical locations of a retailer, especially as the distance to the point of sale is limited, encourages an understanding of its effects especially when the customer has a choice between the retailer's store and the website to make a purchase. Therefore, we posit that:

H13: The incremental impact of a mobile channel (SMS) decreases as the distance between the point of sale and the customer increases.

While traditionally the customer has integrated the commercial sphere, mobile has contributed to a paradigm shift as the brand now has the opportunity to integrate the private sphere. Although mobile can develop brand satisfaction (Nysveen et al., 2005), the intimate and personal nature of mobile can be a source of resistance and invites to better understand its effects. Extant research on mobile devices has essentially focused on the effectiveness of mobile promotions (i.e. inherent to mobile intrinsic characteristics) and mobile channel usage (i.e. proactive usage by customers) on purchase behavior outcomes. Luo et al. (2014) examine the effectiveness of location based targeting. Fong, Fang and Luo (2015) extend this study by including competitive location based targeting, and Dubé et al. (2017), in turn, build on this study by including competitors' reactions in terms of targeting. While context variables are essential, Li et al. (2017) investigate how changes in weather forecasts impact the effectiveness of mobile targeting.

Linking mobile usage with performance outcomes, Wang, Malthouse, and Krishnamurthy (2015) investigate how the adoption of mobile shopping influences online shopping behavior and Kim, Wang, and Malthouse (2015) investigate the adoption of a brand's mobile application on brand purchase behavior. Beyond channel usage, device switching behaviors have been studied by Xu et al. (2017) who show that tablets mainly act as substitutes for PCs and complements to smartphones. In terms of purchases, after consumers adopt tablets to visit an online retailer's website, an increase in overall sales can be observed. Although the sales through PCs drops after adopting the tablet (i.e., the substitute effect), sales through smartphones increase, indicating that there is a positive synergy between these devices. Xu et al. (2017), then De Haan et al. (2018), furthermore find that browsing, when it is cross-device, significantly relates to sales revenue. Such literature inputs highlight the key role of mobile channels when used at upper funnel steps as a key finding is that revenue increase only occurs when shoppers go from a smaller to a larger device (i.e., from a more mobile device to a less mobile device), while a negative effect is found when people switch from a larger (less mobile) to a smaller (more mobile) device. While Xu et al. (2017) have shown that there is a relation between device switching behaviors and conversions, no research has taken the perspective of firms' proactive device switching when it comes to activate through multiple channels their customer base. Xu et al. (2017) consider cross-device browsing "as instances where users browse on two different devices within a one-hour time window" and therefore do not focus

on potential effects of a device switch when it is initiated by the firm. All of this allows us to obtain important insights into the relationship between device switching and purchases. Therefore, our next hypothesis is:

H14: The incremental impact of an alternative channel is stronger when it implies a switch (i.e. migration) of device for the customer.

The proliferation of channels is also prompting brands to question the effects of increased communication volumes upon their customers. Studying the influence of the volume of communication and the mix of three communication channels (print, phone and email) on long-term repurchase, Godfrey, Seiders et Voss (2011) identified interaction effects between these three channels, both positive and negative. Their work reveals the existence of an ideal volume of contacts on each channel. Interactions between multiple channels change both the ideal volume of communication and the level of re-purchase. Before this ideal volume is reached, re-purchase increases due to a reciprocity phenomenon based on the Social Norm Theory (Bagozzi, 1995; Becker, 1990). Reciprocity is based on the fact that communication on different channels contributes to improve the perceived quality of the relationship or the feeling of gratitude towards the brand. Beyond this ideal volume, a psychological reactance (Brehm, 1966) related to the perception of manipulation or control that would limit freedom of choice is observed. This translates into a decrease in the level of customer level of purchase from the brand.

1.3 Inadequacy of models and metrics to measure the specific effect of a channel

While the objective of omni-channel communication is to diversify the channels of communication on certain populations likely to generate a value increase, the traditional indicators that measure communication response suffer from several limitations. Firstly, they do not take into account the consumer's sensitivity to the different channels and the complementarity between them. Moreover, frequently used indicators are channel-specific and heterogeneous. As an example, let's mention the open rate or the reactivity rate for email, the cost per mile - CPM - or the cost per click - CPC - for the display, which is the budget allocated related to the number of clicks on a banner. This heterogeneity of performance indicators and the wide choice of activable channels make it more complex to analyse channel performance and channel interactions during communication campaigns. Analyzing the impact of each

channel on each customer segment with greater precision is a crucial challenge for the implementation of an effective omni-channel communication strategy: assessing the consumer's responsiveness, no longer to a communication campaign, but to each channel to which he was exposed during the campaign, becomes fundamental (Verhoef, Kannan and Inman, 2015).

Section 2: Objectives, methodology and results of the research

As the matter of fact, the issue today is to be able to evaluate the consumer's responsiveness to each channel during the campaign. Thus, the objective is to be able to measure the contribution of the additional channel in achieving the communication objectives set by the company.

2.1. Experimental design of the research

Two complementary experiments were carried out using a full randomization design. Given that email is widely endorsed by brands in Europe (95.3% of marketing professionals use it)¹³, the experiments (Table 36) aim at comparing a single-channel scenario combining a first email followed by a second email to:

- a scenario combining an email followed by an SMS (experiment 1)
- a scenario combining an email and RTB display - Real Time Bidding - (experiment 2): these are online banners targeted and bought at real-time bids. RTB is an emerging and little explored research channel (Essay's appendices, Box 2)

The objective is therefore to analyze whether the results obtained by combining email and SMS are retrieved by combining email and display in RTB. Moreover, the choice of these "*push*" channels, SMS and display, is justified by a willingness to analyze all customers, including inactive and low value ones who do not or rarely interact with the brand's "*pull*" channels.

¹³ Enquête sur le marketing cross-canal, Experian, 2014

Experiment	Group	Volume	Channel of 1st message D-2	Channel of 2nd message D-Day
1	Control 1	60,567	email	email
	Experimental 1	60,594	email	SMS
2	Control 2	309,608	email	email
	Experimental 2	729,088	email	email + RTB display (from D to D+22)

Table 36: Experimental designs

We note that the experimental methodology on large samples allows to exploit individual behavioral data by making the variation of the dependent variable exogenous through a fully randomized distribution of individuals between control and experimental groups. The experiment was carried out from April 15th 2015 to May 05th 2015. The field study is summarized in table 37.

Focus brand	A French click & mortar retailer specialized in personal equipment that markets its products through both a physical store network and an e-commerce website.
Data collection	The experiments have been carried out respectively on 121,161 individuals and 1,038,696 individuals.
Data analysis	A chi-square test of homogeneity has been done for every comparative analysis between control and test groups. The significance thresholds (p-value) are mentioned for every test.

Table 37: Experiments' methodology

The dependent variable to measure the performance associated with the additional channel is the uplift of the online and offline transaction volume.

2.2 A performance depending on customer value

Customer value plays a significant role in the performance generated by the addition of a channel. The results of the two experiments converge (Tables 38 and 39). The addition of a channel does not significantly influence the buying behavior of higher value customers (heavy customers). On the other hand, the incremental performance of an additional channel is maximal for customers with lower value for the brand. Thus, the addition of SMS generates 32% of incremental conversions for light customers, while the addition of RTB display generates 22% of incremental conversions for inactive customers who have not made a purchase over the past twelve months or more.

Our results invite to reject H12:

H12: The incremental impact of an alternative channel is stronger (weaker) on high-value (low-value) customers

Group	Customer value segment	Uplift of	Uplift of	Significance
		conversion rate at D+4 (100 index)	conversion rate at D+22 (100 index)	
Experimental n°1	Heavy	103	107	n.s
	Medium	120	110	p<5%
D-2:email	Light	132	117	p<1%
D: SMS	Inactive	123	105	p<10%

Table 38: Conversion rate increment by segment between control group n°1 (email only) and experimental group n°1 (email+SMS).

Group	Customer value segment	Uplift of conversion rate at	
		D+22 (100 index)	Significance
Experimental n°2	Heavy	106	n.s
D-2: email	Medium	115	p<1%
D: email	Light	112	p<5%
D-D+22: <i>RTB</i> display	Inactive	122	p<1%

Table 39: Conversion rate increment by segment between control group n°2 (email only) and experimental group n°2 (email+display RTB).

2.3 A heterogeneity in reactivity to activated channels

The customer's response to a brand contact differs significantly depending on the channel of contact used. The incremental impact of SMS is only statistically observed for individuals who are not reactive to emails (i. e. who have not opened any of the brand's emails over the six months prior to analysis). The addition of SMS then generates 42% of incremental conversions (Table 40). The addition of the display is, on the opposite, efficient for individuals who are reactive to emails (Table 41). Our results, therefore, support H11:

H11: The incremental impact of an alternative channel is stronger on customers who are non-reactive to the historical channel.

Group	Reactivity to email over past 6 months	Uplift of conversion rate at D+4 (100 index)	Uplift of conversion rate at D+22 (100 index)	Significance
Experimental n°1	Non reactivities	142	117	p<1%
D-2:email				
D: SMS	Reactivities	109	107	n.s

Table 40: Increment of the buyers rate by emailing reactivity between the control group n°1 (email only) and the experimental group n°1 (email + SMS).

Group	Reactivity to email over past 6 months	Uplift of conversion rate at D+22 (100 index)	Significance
Experimental n°2	Non reactivities	102	n.s
D-2:email			
D: email			
D-D+22: display	<i>RTB</i> Reactives	109	p<1%

Table 41: Increment of the buyers rate by emailing reactivity between the control group n°2 (email only) and the experimental group n°2 (email + display).

2.4 A performance that depends on the situations of mobility and the geographical location

2.4.1 How the situation of mobility may impact conversion rate

The role of the device is a key element for a deeper understanding of consumer response to brand messages in an omni-channel environment. The effect of activating a channel in a situation of mobility can be analyzed by isolating a mobile non-users population to measure its effect on individuals who have never interacted with the brand on a mobile device. Activating a mobile channel generates a significant increment of the conversion rate (14%) only in mobile non-users (Table 42). In the absence of brand's proactive mobile activation, these 14% of incremental conversions would not have occurred. Our results support H14:

H14: The incremental impact of an alternative channel is stronger when it implies a switch (i.e. migration) of device for the customer.

Group	Mobile user	Uplift of conversion rate at D+4 (100 index)	Uplift of conversion rate at D+22 (100 index)	Significance
Experimental n°1	Non mobile users	114	113	p<1%
D-2:email D: SMS	Mobile users	103	107	n.s

Table 42: Increment of the buyers rate according to a mobile/non-mobile users vision between the control group n°1 (email only) and the experimental group n°1 (email+SMS).

2.4.2 How the individuals' geographical location may impact performance

Optimizing the performance of a communication campaign involves a geographical approach for a brand offering both an e-commerce website and a network of retail stores. The e-commerce website can be considered as a geographical extension of the physical distribution network. Therefore, in the context of omni-channel campaigns, the question of optimizing

channels mix according to the customer's location in regard to the nearest physical retail store appears to be key. The results show that the efficiency of the mobile channel decreases with distance to retail store (Table 43).

Indeed, the SMS no longer has an incremental impact beyond twelve kilometers of a store in Ile-de-France and twenty-two kilometers in the provincial areas, whether urban or rural. Therefore, our results support H13:

H13: The incremental impact of a mobile channel (SMS) decreases as the distance between the point of sale and the customer increases.

Group	Catchment area	Uplift of conversion rate	
		at D+22 (100 index)	Significance
Experimental n°1	1*	105	p<5%
D-2:email			
D: SMS	2*	96	n.s

* The catchment area n°2 gathers the quarter of individuals in the database most distant from a retail store. Zone n°1 therefore includes the 75% of individuals considered in catchment areas (under 12 km from a retail outlet in Ile-de-France and under 22 km in the provincial areas).

Table 43: Increment of the buyers rate according to a catchment area vision between the control group n°1 (email only) and the experimental group n°1 (email+SMS).

2.5 A vector of significant incremental reach and repeated exposure

Omni-channel communication increases the reach of a campaign - the quantitative coverage of the intended target - in a logic of extensive communication. While the SMS allows to reach in an almost exhaustively the intended target, the email is not opened by the whole target. The performance of the combination of email and SMS can therefore be explained by a higher volume of individuals exposed to the message, since the SMS has a reading rate close to 90%. The challenge is therefore to evaluate this same ability for display banners to address

individuals who would not have been exposed to the message in an email single-channel campaign. The data collected enable to identify the individuals who opened at least one email in the campaign and the individuals who were exposed to at least one banner during the analysis period. While email allows to reach 15% of the target, its combination with the display allows to increase the number of individuals exposed by a factor of 2.6. The activation of the display in addition to the email allows to increase from 15% to 39% the target coverage. A cross-analysis (Table 44) shows that 79% of the individuals exposed to display banners over the analysis period did not open the email while the remaining 21% were exposed on both channels.

Display exposed		Volume of contacted by email	Volume of email openers	Reach of email	Volume of email non openers	Reach of email + display	Incremental reach (100 index)
Non exposed	Volume	508 823	61 685		447 138		
	%	100%	12%		88%		
Exposed	Volume	220 265	45 579		174 686		
	%	100%	21%		79%		
Total	Volume	729 088	107 264		621 824		
	%	100%	15%	15%	85%	39%	263

Table 44: Illustration of the extensive capability of multiple channels targeting. The case of email and display.

These data highlight two performance explanatory phenomena: the ability to generate a significant incremental reach and to touch the same individual through different channels. The respective contribution of these two phenomena to performance is a decisive factor. The analysis conducted indicates that 64% of incremental conversions are related to an increased target coverage - the extensive dimension - while 36% are related to exposure via both channels - the intensive dimension. These two phenomena coexist and generate synergies.

Section 3: Discussion –When omni-channel communication invites to reinvent traditional targeting logics

3.1 Omni-channel impacts performance thanks to a complementarity of additional channels and a switch of devices

These experiments highlight the benefits of activating several channels rather than just one to enhance the performance of a communication campaign. In this sense, the results confirm the work of Godfrey, Seiders and Voss (2011) according to which the reciprocity generated by the multiplication of channels leads to an increase in the volume of transactions.

The interaction effects between channels must be explored by taking into account the specific characteristics of each channel and the different customer profiles: the performance of omni-channel communication is not necessarily linked to the number of channels activated simultaneously by the brand but to a more precise understanding of the heterogeneity of customer's responses to each channel. In addition, the complementarities highlighted between channels make it possible to identify and evaluate the intrinsic characteristics of each channel that generate synergies. Such characteristics include in particular their ability to cover the target audience (reach), their ability to re-expose the audience of an existing channel, their ability to reach a customer in a situation of mobility or their online nature likely to increase the impact of a campaign on a population that is sensitive to digital channels.

These results confirm our willingness to measure both the reactivity of communications on each channel and the synergies between channels.

In fact, the first experiment reveals the existence of a population who is not reactive to a message sent on a channel and who are nevertheless reactive to a message sent on an alternative channel: customers considered as non-reactive to a channel should not systematically be considered disengaged in their relationship with the brand. These results are convergent with a conceptual reflexion proposed by Vanheems in 2007. In the context of omni-channel and connected commerce, these results confirm the channel's role in the ability to take advantage of the purchase potential of specific individuals.

The second study reveals that the conversion increment generated by the display is mostly generated by individuals who were not exposed to the campaign emails. A complementarity of reactive audiences for each channel is highlighted.

While the interest of using multiple channels on commercial performance has been highlighted in retailing, this research also reveals the benefits of activating multiple channels for communication purposes. The importance of mobile phones as an ideal rendezvous is also highlighted, particularly in a drive-to-store objective by attracting individuals in catchment areas to the retail store. The mobile invites customers within the catchment area to take a trip to the physical store at an appropriate time. Thus, the advertiser is capturing flows of customers in mobility situations that it would not have been able to capture without this communication channel on the customer's life journey. Mobile device is a source of point-of-sale traffic, thus confirming its central role as a communication channel, its strength coming from the transactions it generates on the brand's other transaction channels. In spite of its importance, the mobile phone, an intimate object for the person who owns it, must be used with "tact" because it could more easily be perceived as intrusive and generate rejection, especially if the volume of SMS received is too high. Furthermore, misuse could be perceived as manipulation and lead to resistance (Roux, 2007).

3.2 Challenging traditional customer-value-based models to reinvent new approaches to omni-channel marketing resource allocation

This research reveals that the omni-channel approach is more effective on lower-value or inactive customers. Thus, discontinuing all communication towards low-profit or unprofitable customers (Haenlein, Kaplan and Schoder, 2006) is not always relevant, contrary to what is advocated by the CRM approach. Indeed, the incrementality-based methodology allows us to attribute to each channel its real contribution to the performance of a campaign and helps to rethink the allocation of marketing resources, particularly to lighter customers, and questions the supposed low effectiveness of contact strategies dedicated to these non-loyal or unprofitable customers (Volle, 2001). These experiments identify non-reactive customers on a historical channel, supposedly disengaged from the brand in a single-channel environment, who can be activated or reactivated through the additional channels. Kumar's (2010) approach, using the marginal impact of communications as a criterion for segmentation of databases, can then be questioned. Assessing the impact of an additional euro invested in communication on customer value without taking into account the predominant role of the channel on which the investment is made would be likely to bias the precise measurement of the effects of more expensive communication. Moreover, faced with a lack of reaction or an increase in the

consumer's response time, a potential signal of defection, omni-channel management is an appropriate strategy for retaining customers (Crié, 1996). The reactivation of probable "abandonists" identified by a drop in their activity could thus be achieved through the use of a channel likely to take advantage of their potential, as is observed in multi-channel distribution (Vanheems, 2007). On the other hand, the absence of an effect of the omni-channel device on larger customers may be due to the fact that their saturation threshold in the product category has been reached (Anderson et al, 2005). The already "very good customers" would have reached their maximum purchasing potential in the product category, their share of portfolio (share of wallet) with the brand under study is important. As a result, sending messages through several channels no longer allows the already very high level of purchase of these individuals to be developed. After an invitation to focus on customers with the most value (Roberts and Berger, 1999) (Thomas and Sullivan, 2005), and then on customers who react best to a growth in the volume of communication (Kumar, 2010), the era of the omni-channel is calling for new forms of action. In the first approach, channels are being selected based on their costs, with the least expensive channels being allocated to the least profitable customers. According to the second one, the decision to communicate depends on the ROI generated by an increased investment. The multiplication of channels reveals a third original way. Customers may actually be unresponsive to communication actions because the channels used for these actions do not align with their preferred channels (Godfrey, Seiders and Voss, 2011). This observation, as recently mentioned by Verhoef, Kannan and Inman (2015), calls for an assessment of the consumer's responsiveness, no longer to a communication campaign, but to each channel to which he or she has been exposed during the campaign. The low responsiveness of the most profitable customers to this promotional communication, which is by nature transactional and limited in time, should not, however, question the relational component of communication whose objective is to maintain the long-term relationship with a customer who is likely to be very attached to the brand. An integrated omni-channel communication, via digital or mobile channels, as part of a promotional operation is effective on customers who may not think about the brand naturally for this type of product when making their decision. On the other hand, during the promotional period, heavy customers do not generate incremental sales, which means that an increased investment in additional channels is not efficient. This essay suggests that when assessing a customer's value at a given point in time (especially if projected), this strong heterogeneity in terms of preference and therefore behavioral response to each channel should be taken into account.

Section 4: Conclusion, limitations and need for future research

This essay investigates a rather unexplored field: omni-channel from a communication perspective. Revealing the strategic dimension of omni-channel communication, it identifies the sources of synergies between the different communication channels and reveals the strategic role of using a channel in a situation of mobility. An initial analysis of the literature presents the benefits and risks of using multiple channels to communicate with customers. The empirical study identifies areas of complementarity between channels and sources of performance of the communication campaign. About two-thirds of the incremental impact comes from better target coverage and one-third from repeated exposure. The empirical section also highlights complementarities depending on the type of target audience. The study shows in particular the strategic nature of the omni-channel in order to take advantage of the purchase potential of lower value customers or customers who are not reactive to the historical channel (email). The overall results demonstrate the interest of leveraging a combination of digital channels to improve the performance of a communication campaign. These results also invite us to reconsider, in light of digital channels, the traditional models based on customer value and consequently to reconsider resource allocation approaches.

Further discussions on the strategic nature of specific customers that have been set aside until now must therefore be engaged. While the experimental design of the study is based on behavioral data and a large sample size, some limitations, which constitute research avenues, can be highlighted. Firstly, these two experiments were carried out with the same brand, which invites to reproduce them in order to reinforce their external validity. In addition, the over-representation of female in the samples suggests that control variables (gender, age, or income) should be taken into account to consolidate the validity of the results. These results also call for the study of interactions between independent variables, in particular between value and distance at a customer's point of sale, which would make it possible to test the validity of gravitational models in an omni-channel context. In this sense, the study of their moderating effects is also a relevant research avenue. Secondly, these studies were carried out within the context of relatively short-term promotional operations; from a more relational perspective, the question of the medium- and long-term impact and, in particular, the influence of the multiplication of channels on the customer's lifetime has yet to be explored. Measuring long-term effects would help to understand whether there is a loss over time of increments generated

in the short term. It should also be noted that an intensification of omni-channel communication actions by actors in the same industry could lead to a moderation of the impact of activating several channels on the targeted audience. In this respect, a particularly stimulating research path lies in measuring the influence of the activation of several channels on the development of the customer's share of wallet. Finally, a measure of this influence on each step of the decision-making process would allow us to understand how the multiplication of digital channels affects the psychological mechanisms leading to purchase.

GENERAL INTRODUCTION

**CHAPTER 1: THE MARGINAL IMPACT OF AN ADDITIONAL BRAND-INITIATED
COMMUNICATION CHANNEL: A PEOPLE-BASED AND INCREMENTAL
APPROACH**

**CHAPTER 2: BRAND CHANNELS' ORCHESTRATION: UNDERSTANDING THE
IMPACT OF DIGITAL, TRADITIONAL AND MOBILE CHANNELS ON CUSTOMER
JOURNEY**

**CHAPTER 3: HOW TO COORDINATE DIGITAL AND MOBILE CHANNELS TO
GENERATE INCREMENTAL VALUE ACROSS CUSTOMERS HETEROGENEITY?**

GENERAL CONCLUSION AND DISCUSSION

GENERAL CONCLUSION AND DISCUSSION

Section 1: Introduction

The question we examined in this doctoral research was to understand the impacts of brands' omni-channel communication strategies on customers' purchasing behavior. By "omni-channel communication", we mean a combination of multiple types of communication channels and touchpoints that requires an orchestration. To build orchestration strategies, we advance several contributions that relate to:

- i) Analyzing the phenomenon thanks to a multiple-level behavioral response of customers and the drivers of performance of additional channels
- ii) Understanding the contribution of firm-initiated channels to the guidance of customers in their path to purchase across multiple purchase channels
- iii) Exploring customers' heterogeneity in their responses to such strategies with key individual and actionable variables.

We primarily look at the omni-channel phenomenon from a communication perspective while most research still focus on retailing challenges. We advance a conceptual definition of omni-channel communication that makes it distinctive from Integrated Marketing Communication and Direct Marketing that are close concepts in the literature. The research enables to bridge gaps in the literature and contributes to the understanding of omni-channel communication. Specifically, we assess the impact of omni-channel communication on behavioral antecedents of transaction at the different steps of the purchase funnel. We then analyze the main contributors to an additional channel: Average Order Basket, purchase frequency and conversion rate. We also provide an incremental ROI perspective of an additional channel (study n°1). We then understand and measure to what extent a communication channel (email, print communication and SMS) may direct customers towards a specific purchase channel (with both own and cross-channel effects). We furthermore assess an additional channel Return On Investment taking into account both online and offline transaction in lights of cross-effects (study n°2). We then identify key variables that translate customers' response heterogeneity to an additional channel: customer value, customer responsiveness to a channel and customer

location to the nearest store (study n°3). Finally, we explore two dimensions of channels' interaction: the extensive one and the intensive one and split the overall impact by dimension.

The overall results demonstrate the interest of leveraging a combination of digital channels to improve the performance of a communication campaign (Table 45). The three complementary essays enable to draw conceptual, methodological and managerial contributions. Before we develop these contributions, we present a summary of the key findings of the three essays (Table 46). Moreover, for pedagogical concern, we highlight the most critical features that drive communication channels' selection and that seems to us symbolic of the switch from traditional customers' activation strategies to omni-channel orchestration.

Channels' selection in traditional customers' activation strategies is based on:	Channels' selection in omni-channel orchestration is based on:
Their cost	Their incremental impact in the loyalty loop
Their intrinsic ROI and profitability	Their incremental ROI
Their supposed fit with the campaign objective	Their interaction and complementarities on customer responsiveness
The customer consent that is needed to activate them	Their impact on customers' journey
Customer value (predicted of retrospective)	Customer value development

Table 45: the key dimensions of effective omni-channel orchestration in contrast with existing customers' activation strategies

	Study 1	Study 2	Study 3
Topic	The marginal impact of an additional brand-initiated communication channel: a people-based and incremental approach	Brand channels' orchestration: understanding the impact of digital, traditional and mobile channels on customer journey	How to coordinate digital and mobile channels to generate incremental value from connected customers?
Research question	To what extent is the marginal cost of additional channels covered by incremental revenue driven by customers' response (e.g., purchase frequency, average order basket and buyers rate)?	How do alternative brand-initiated channels impact customers' path to purchase through multiple transaction channels?	Who are the most responsive customers' profiles to the simultaneous activation of digital and mobile channels?
Data	<ul style="list-style-type: none"> - email and SMS targeting - programmatic display targeting across Appnexus and Facebook Exchange platforms - email + programmatic on Appnexus exposure (not accessible on SMS and not possible through Facebook walled garden) - individual visits, visits with add-to-cart, transaction on the website (online only) - Marginal costs of every additional channel 	<ul style="list-style-type: none"> - email, SMS and print targeting - online + offline transactions (thanks to loyalty program for offline conversions) - Marginal costs of additional channels 	<ul style="list-style-type: none"> - email and SMS targeting - programmatic display targeting across Appnexus and Facebook Exchange platforms - email + programmatic on Appnexus exposure (not accessible on SMS and not possible through Facebook walled garden) - online + offline transactions (thanks to loyalty program for offline conversions) - Customer value based segmentation, historical customer reactivity to email, customers distance to retail store and building of catchment areas according to INSEE data - Device-related qualification on email reactivity: mobile versus desktop

Key findings	<ul style="list-style-type: none"> - Upper, mid and lower funnel steps' responses are all positively impacted by an additional channel - Firm-initiated channels drive a volume effect to engage more customers into a loyalty loop - No effect of a new channel on purchase frequency and Average Order Value - Marginal costs of activation strongly influence incremental ROI - A strong overlap in channels' coverage: 92% of the effect of an additional channel come from multiple-channel exposure 	<ul style="list-style-type: none"> - strong incremental impact on offline+online transactions due to additional channels - The most efficient channel on revenue generated (print) is not the most effective: ROI is more than twice lower for print than for SMS - Strong cross-channel effects of mobile activation: 46% of its impact observed online vs 54% in store - Print generates a strong own-channel effect: 96% of its effect observed in store - Brand's communication channels impact customer's channel choice for transaction - A novelty effect in channel exposure does exist, with a decreasing channel impact due to previous frequency of contact on that channel 	<ul style="list-style-type: none"> - strong heterogeneity in customer's response depending on value segments: the greater impact of additional channels is generated on lower value customers - Stronger channels' impact on customers who do not react anymore to historical channel - the switch of device, from desktop to mobile, mostly drives the incremental impact - Mobile activation effects diminish with distance to retail store. No impact on customers out of catchment areas - Short-term effect of programmatic display on target coverage is strong: x2,6 versus email only - because of display cumulative reach
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Table 46: Summary of the key findings of the three essays.

Section 2: Contributions of the doctoral research and managerial implications

To present the contributions of this doctoral work, we favor to identify three main fields that we contribute to, rather presenting these contributions essay by essay. Our first main contribution relates to the understanding of channel's causal impact on customer's response. The second field of contribution is to give a new perspective on customers' journey analysis and design. The third contribution relates to the orchestration of omni-channel campaigns.

2.1 Understanding channel's causal impact on customer's response

2.1.1 Conceptual contributions

Brands and retailers that pursue the objective of building omni-channel strategies start to diversify the channels of communication to generate a value increase. A main concern that we arise is that the traditional indicators that measure communication response suffer from several limitations in an omni-channel world. Because, they do not account for consumer's sensitivity to the different channels and the complementarity between them and because, frequently, those indicators are channel-specific and heterogeneous (e.g. open rate or the reactivity rate for email, the cost per mile - CPM - or the cost per click - CPC - for display). A first contribution of this work is the focus on analyzing the impact of each channel on each customer segment with common mindset and on common metric: channel's causal incremental effect on behavioral responses of a target. This contrasts with existing research on marketing actions' efficiency mostly based on prediction instead of causation and based on attribution modeling (Li and Kannan, 2014). Incrementality-based methodology enables to control for well-know, but underexplored, common biases: customers' selectivity bias (such as selective targeting of customers by firms) and activity bias (such as customers' interactions due to triggers that demonstrate that a decision-making process has already started). Observational field data with no control – or holdout – groups usually underestimate such biases. We therefore control for endogeneity on our studies thanks to large-scale experimental designs.

A second contribution relates to the phenomenon of synergy (Naik and Raman, 2003) thanks to the analysis of interaction between email channel, mobile and programmatic channels.

Applied to such heterogeneous channels, we complement channels' interaction theory and study two phenomena leading to potential synergy. The first is the ability of an additional channel to increase the reach (i.e., the coverage of the defined target), that is to say to reach individuals who would not have been reached by the first channel; the second is the ability of that channel to re-expose individuals already reached by the first channel. While Edell and Keller (1989) studied the combined effect of advertising messages when they are sent across multiple channels, on television and radio, we respond to multiple calls for further research to extend to new channels such analysis. For a short-term promotional operation, the empirical study (n°3) shows that about two-thirds of the incremental impact comes from better target coverage and one-third from repeated exposure. We demonstrate that both extensive and intensive effects coexist when two channels are simultaneously activated and we quantify such effects in different settings.

A third contribution relates to the benefits of adopting a people-based vision instead of a more common channel-centric approach. We are among the first to embrace the “bottom-up approach” of Integrated Marketing Communication (Batra and Keller, 2016) by adopting an agnostic approach to assess channel's contribution. Because brands and retailers have to deal with a growing number of channels (Brynjolfsson, Hu, and Rahman, 2013), the fragmentation of audiences due to overlaps across channels becomes a key concern. Drawing on research on media consumption habits (Webster and Ksiazek, 2012; Taneja et al., 2012), the growing access to individual exposure and response data across heterogeneous channels enables to pursue the goal of a people-based approach of omni-channel communication. It seems obvious that marketing communication should focus on people, and address consumers instead of channels, devices or multiple consumers' online identifications. Our work puts forward the concept of people addressability in the context of fragmentation of audiences and technologies. Being able to recognize and address with consistency people in an omni-channel view is both critical and challenging for brands and retailers. Even if such issues are not new for most marketers, the development of programmatic media constitutes a major step that increases the interest to develop new investigation as suggested by Malthouse et al. (2018). As a very step, our research paves the way in the trend of convergence between mass media on one side and CRM on the other; and to get rid of non-relevant boundaries for customer activation and development.

A fourth contribution of this work is to better understand why an additional channel drives communication performance. We show that additional channels mainly contribute to a “*volume*

effect” by driving more customers to conversion with no significant effects on purchase frequency or average basket amount. Moreover, because omni-channel adoption implies to activate a growing number of communication channels, our work adopts a “marginal cost” versus “incremental revenue” approach. This enables to understand to what extent an additional channel drives not only ROI but also **incremental ROI**.

2.1.2 Managerial contributions

Managerially, our work gives to practitioners several inputs for the implementation of an effective omni-channel communication strategy. We suggest that assessing the consumer's responsiveness, no longer to a communication campaign, but to each channel to which he was exposed during the campaign, becomes fundamental (Verhoef, Kannan and Inman, 2015). The people-based marketing vision that helps firms build a non-siloed omni-channel contact strategy makes possible an improved *addressability*. While the industry of digital marketing faces a growing need for effectiveness and relevance, addressability becomes more realistic by linking PII data and non-PII data at the individual level (i.e. such as an email-cookie matching procedure). Firms may extend their CRM strategies to media channels such as display advertising, but also radio or TV that become accessible through programmatic buying. On the other hand, the heterogeneity of “opt-in channels” (email, mobile or print communication) has resulted in many different performance metrics that are difficult to compare. While we provide a research design that has been recognized as missing in the literature: randomized field experiment with holdout groups that truly identify causality effects, this approach is easily replicable in managerial settings by adapting the contact strategy to opt-in types. Valuing the *incremental* impact of each channel appears to be a relevant shared metrics in this context (Kannan, Reinartz & Verhoef, 2016). Furthermore, as channels are increasingly in competition for marketing investments, incrementality logics could challenge more traditional attribution modeling, by allowing with more reliability questions such as: “what would have been the response of these customers without this treatment?”

2.2 Investigating omni-channel communication effects on customer journeys

In digital contexts, most research on the effects of channels on customers' response has focused on customers who are already engaged in a path to purchase (i.e. mentioned above as the activity bias). In other word, customers who have already interacted with the brand through digital touchpoints such as search, social media or websites (Srinivasan et al. 2016) demonstrate an *a priori* intention to purchase. Therefore, a first contribution is to fill the gap regarding the understanding of such response for customers who are not engaged in a decision process as suggest by the works of Court et al. (2009) and Edelman & Singer (2015). Designing streamlined customer journeys that compress the consideration and evaluation steps to engage and lock-in customers in a "*loyalty loop*" has been highlighted as a key area for contribution. This loyalty loop is made possible when brands proactively activate their customer base through multiple channels: both programmatic and opt-in channels. In a context of increasing complexity implied by the combination of traditional, digital and mobile channels, we advance that omni-channel communication contributes to engage customers in this loyalty loop. Such omni-channel strategies require orchestration and integration as evidenced by Batra and Keller (2016). In particular, the "*contribution*" criterion reflects the main expected effects of a channel on customers' attitudinal and behavioral responses (e.g., build awareness, enhance image, induce sales...). As the concept of "*loyalty loop*" invites brands to activate channels that trigger conversion, we demonstrate which conversion channel most benefits from a given communication channel exposure. It reveals the incremental effects of additional channels at multiple steps of customers' online decision-making process. In particular, it demonstrates that additional channels impact both upper funnel and lower funnel steps of the journey. Impacts on upper funnel steps such a driving website traffic translate all along the journey until lower steps such conversions. Measuring incremental behavioral response provides a common and shared metric to better understand channels' contribution. We show that additional channels mainly contribute to a "*volume effect*" by driving more customers to conversion with no significant effects on purchase frequency or average basket amount. Loyalty effects happen when the additional channel activated maximize customers' reactivity. We, then, demonstrate that incremental volume effect positively impact the likelihood that customers continue their journey.

Then, as suggested by research agenda advanced by Lemon and Verhoef (2016) on customer journey analysis, understanding short-term behavioral consequences generated by firm-

activated channels need an integration of the ‘*purchase funnel*’ and the ‘*loyalty funnel*’. In particular, we contribute to identify the purchase channel in which the conversion may occur when customers continue their journey. We measure and understand how every communication channel drives its impact across the different distribution channels: the online versus offline share of conversion lift. We demonstrate that the type of firm-initiated channels has a significant influence on customer journey, in terms of channel-specific distribution of customers. We then extend the understanding of customers’ channel choice (Balasubramanian, Raghunathan, and Mahajan, 2005; Verhoef et al., 2007; Gensler et al., 2012). Channel choice was studied extensively from a customer standpoint in order to understand the drivers of channel use at each stage of the buying process. Brands’ proactive customers’ activation translates directly into behavioral changes in terms of channel choice (Batra and Keller, 2016).

Our results highlight the role of mobile channels as means to facilitate “on-the-go” shopping and trigger conversion when activated appropriately in the loyalty loop. Then, the strong interferences of mobile with other channels justify an omni-channel measurement impact. Mobile channels induce even more complex customer journeys as they often directly interfere with other channels during the customers’ decision-making process. We contribute to Shankar et al. (2016) call for research highlighting that “*measuring the effect of mobile and attributing results to mobile activities are still uncertain areas*”. Mobile appears as a facilitator of “*on-the-go*” or situational shopping rather than destination-based shopping. Therefore, if mobile can trigger conversions across channels, measuring its impact across online and offline channels constitutes a relevant research avenue for omni-channel customer journeys.

Our work then extends the research on “own and cross-channel effect” from Dinner et al. (2014) which pointed out that offline communication drives offline sales (*own-channel effect*) and that digital communication drives offline sales and reciprocally (*cross-channel effects*). We demonstrate that measuring the impact of a touchpoint on a single channel does not fully reflect its total impact. It is now crucial to consider such measurements in evaluating communication investments ROI. We specifically integrate mobile as a device and as a way to drive cross-channel behavior and to generate purchase on alternative channels. All in all, we provide a communication channels’ profitability analysis that can put in contrast with online versus offline transaction gross margin to build more profitable customer journeys.

2.3 Exploring the key dimensions of omni-channel orchestration: customers' heterogeneity factors

Our last of contribution relates to a better understanding of customers' response heterogeneity. We advance that designing an effective omni-channel contact strategy must take "channels' responsiveness" into account as our work gives evidence for the presence of segments that are sensitive to an alternative channel while other do not significantly react to it.

First, customer value-based marketing resources allocation models are broadly considered as efficient (Haenlein, Kaplan et Schoder, 2006; Volle, 2012). We show that, in omni-channel contexts, apart from its cost, the specificity of each channel is not taken into account in terms of its intrinsic ability to develop a customer's profitability or improve its reach. Taking into account the heterogeneity of customer responses to each channel seems critical. It seems more effective to maintain or even increase investments on such customers by allocating them to an alternative channel that could likely generate a more positive response than to stop investing on these customers. Activating a new communication channel - even if it is more expensive - can develop a customer's potential and generate increased performance. This work shows the strategic nature of the omni-channel in order to take advantage of the purchase potential of lower value customers. These results also invite us to reconsider, in light of digital channels, the traditional models based on customer value and consequently to reconsider resource allocation approaches from the CRM literature.

Our second contribution lies in the fact that customer's low value may be explained by a weak reactivity to the channel through which he is usually contacted on. We show that customers who are not reactive to the historical channel (email) positively react to an alternative channel. In particular, our work reveals the strategic role of device switch in driving customers' response. In this respect, mobile is proved to play a key role to explain customers' reactions (Wang, Malthouse et Krishnamurthi, 2015; Nysveen et alli, 2005). The ability of mobile to encourage a customer to make a deviation towards the physical locations of a retailer, especially as the distance to the point of sale is limited, encouraged us to better understand its effects especially when the customer has a choice between the retailer's store and the website to make a purchase. While traditionally the customer has integrated the commercial sphere, mobile has contributed to a paradigm shift as the brand now has the opportunity to integrate the private sphere.

Section 3: Limitations and future research

Our work has some limitations that constitute avenues for future research.

Our work focuses on the impact of channels on a relative short-term basis (a period of two months for the longest one). These studies were carried out within the context of relatively short-term promotional operations; from a more relational perspective, the question of the medium- and long-term impact and, in particular, the influence of the multiplication of channels on the customer's lifetime has yet to be explored. More research is needed to confirm on the long term the observed effects. In particular: does channel usage significantly change over time? If so, what are the consequences in terms of repurchase and customer value? Measuring long-term effects would help to understand whether there is a loss over time of increments generated in the short term.

Then, even if these field experiments were carried out with three different brands, all of them were limited in geography and done in France, which invites to reproduce them in order to reinforce their external validity. The study was carried out in one country during a promotional operation that may have a trigger effect on purchase. It would be useful to validate the effects of mobile, digital and traditional channels with different communication objectives (relational or service-oriented) and in different countries.

As a further extension of research on cross-channel effects, mobile could be isolated, not only as a communication but also as a conversion channel, to measure whether online sales are desktop or mobile driven. Moreover, considering the moderating effect of the retailer's geographical coverage (network size and store location) to measure cross-channel effects would be useful. While mobile is proved strategic in "before-purchase" steps of the journey, its role as a transaction channel deserves further investigation in a context where M-commerce is developing.

Then, while omni-channel implies an exhaustive view of customers' channels and touchpoints, the channels analyzed in this doctoral work are not exhaustive. In particular, the expansion of programmatic channels such as targeted radio or addressable TV is a fruitful research area. This is all the more important that recent research highlights that touchpoints are increasingly activated and often controlled by customers themselves (e.g., exposure to User Generated Content, Customer-to-Customer interactions...). Finally, within the scope of newly appearing touchpoints, the massive rise of conversational agents such as chatbots or voicebots opens an

important research direction to investigate the balance of push versus pull marketing strategies to interact with connected customers. What if the future goal of omni-channel orchestration was to find the fine line between customers' activation and the management of conversations?

While omni-channel necessarily demands a better knowledge of customers connected routines and use of devices, people-based marketing is more than ever a critical challenge as the number of digital identifications of a same consumer expands. The understanding of consumer's digital identifications across channels, platforms, touchpoints, and devices is key domain of investigation for researchers in marketing and mathematics.

Research exploring advertising expenditures optimization in cross-channel effect settings would be useful. In particular, any contribution regarding purchase channels profit margins could lead to new insights on customers' strategic guidance on their paths to purchase. Optimizing the combination of touchpoints that directs the most strategic customers to the highest-margin channel appears to be fruitful area for further research. As the number of transaction channels is also expanding, this seems essential.

Finally, these results also call for the study of interactions between independent variables, in particular between value and distance at a customer's point of sale, which would make it possible to test the validity of gravitational models in an omni-channel context. In this sense, the study of their moderating effects is also a relevant research avenue. It should also be noted that an intensification of omni-channel communication actions by actors in the same industry could lead to a moderation of the impact of activating several channels on the targeted audience. In this respect, a particularly stimulating research path lies in measuring the influence of the activation of several channels on the development of the customer's share of wallet.

RESUME EN FRANÇAIS

Introduction et cadre conceptuel

La multiplication des canaux de distribution puis des canaux de communication, couplée à une mobilité croissante des consommateurs transforme la manière dont les marques dialoguent avec leurs clients et prospects. Si l'intérêt d'une distribution multi-canal pour améliorer la performance commerciale d'une entreprise a fait l'objet de différents travaux (Rangaswamy et Van Bruggen, 2005; Vanheems, 2009), peu d'études ont permis de mesurer l'intérêt de l'activation de plusieurs canaux de communication notamment numériques pour accroître la performance d'une campagne de communication. Les dispositifs de communication deviennent ainsi de plus en plus souvent « omni-canal ». Dans cet environnement hyper-connecté où les multiples canaux de communication s'enchevêtrent, comprendre le rôle que joue chaque canal dans le déclenchement de la transaction devient crucial. Le nombre croissant de messages envoyés au consommateur lorsqu'il se trouve en situation de mobilité associé à une faible connaissance des effets d'une telle exposition sur son comportement d'achat nous a conduit à étudier le caractère mobile d'un canal de communication. En intervenant en amont de l'acte d'achat auprès d'un client en situation de mobilité, le mobile pourrait ainsi constituer un levier fondamental de communication des marques et des enseignes.

En outre, le passage de l'ère du multi-canal à celle de l'omni-canal s'accompagne d'une évolution conceptuelle qui contribue à élargir la définition du terme canal en y incluant l'ensemble des points de contact (*touchpoints*) entre la marque et le consommateur. A cet égard, Verhoef, Kannan, et Inman (2015) soulignent que, face à l'essor du digital et du mobile, la frontière entre canal de distribution et canal de communication devient poreuse. L'omni-canal, c'est-à-dire l'imbrication de multiples canaux lors d'une même expérience d'achat invite à mesurer l'impact de l'utilisation de *chaque* canal sur la performance de la marque. La gestion omni-canal est ainsi définie comme « *le management des nombreux canaux et points de contact avec les clients, l'objectif étant de bénéficier de synergie et d'optimiser l'expérience des clients au travers des canaux ainsi que la performance de l'ensemble des canaux* » (Verhoef, Kannan, et Inman, 2015).

L'objectif de ce travail doctoral est d'analyser les effets de la communication omni-canal que nous définissons comme "*une approche intégrée qui permet de suivre les interactions de chaque individu à travers différents canaux de communication afin d'identifier et d'exploiter*

les synergies qui génèrent de la valeur pour les annonceurs et les consommateurs, conduisant à une allocation efficace des investissements en communication" (Bothorel, Vanheems et Guérin, 2016).

De plus en plus d'entreprises, qu'il s'agisse de marques ou de distributeurs, adoptent des stratégies omni-canal. La nécessité de mettre en œuvre de telles stratégies peut s'expliquer par plusieurs facteurs principaux.

Premièrement, la multiplication des points de contact par lesquels les entreprises et les clients peuvent interagir, qui conduit au développement de stratégies de contact innovantes en raison de la nouvelle nature de certains points de contact.

Deuxièmement, des clients de plus en plus matures et exigeants veulent interagir avec les entreprises n'importe où, n'importe quand et par n'importe quel moyen. En effet, les entreprises doivent être capables de s'adapter aux attentes de ces clients et d'être ensuite disponibles par le biais de plusieurs points de contact. Dans la mesure où des concurrents pourraient interagir avec leur client dans cette logique omni-canal, il est nécessaire d'offrir le même niveau de service pour conserver un avantage concurrentiel.

Troisièmement, des avancées technologiques majeures ont permis le développement du data marketing pour collecter de plus en plus de réactions et de comportements des clients tout au long de la relation et ainsi reconstruire une vision exhaustive centrée sur le client. Par conséquent, la connaissance de ces clients permet de concevoir des stratégies de contact éclairées par le biais de tous les points de contact disponibles.

L'adoption rapide de l'omni-canal trouve ses racines dans la coexistence simultanée de ces facteurs. Une stratégie de communication omni-canal devient un moyen de différenciation ainsi qu'un moyen de se créer un avantage concurrentiel. Le nouvel écosystème omni-canal rend ainsi décisive l'évaluation de l'influence de l'ajout d'un canal supplémentaire sur la performance de la campagne de communication, c'est-à-dire la mesure de la contribution du canal additionnel dans l'atteinte des objectifs de communication qui ont été fixés par l'entreprise.

Une revue de littérature permet de comprendre l'intérêt stratégique que revêt pour un annonceur la mise en place d'un dispositif de communication omni-canal. La littérature sur les médias, notamment les modèles de *reach*/fréquence puis les modèles de ciblage basés sur la valeur client issus du *Customer Relationship Management* – CRM – sont mobilisés. L'analyse

de la préférence des canaux par les clients et des effets d'interactions entre les canaux fournit une autre clef d'entrée pour comprendre l'intérêt de mobiliser plusieurs canaux lors d'une même campagne de communication. En revanche, la revue de littérature met en lumière l'inadaptation des techniques et outils disponibles pour isoler, mesurer et comprendre l'effet spécifique d'un canal au sein d'un dispositif omni-canal. La spécificité de chaque canal n'est donc pas prise en compte ni par sa capacité intrinsèque à développer la rentabilité d'un client ni par sa capacité à mieux le toucher. Kumar et alli (2008) précisent l'importance de la mesure de l'influence de chaque canal sur la probabilité d'achat, ce qui implique la prise en compte de l'hétérogénéité des réponses des clients à chaque canal.

Nous notons que les modèles de "réponse publicitaire" du consommateur (*advertising response*) ont longtemps été considérés comme le moyen le plus puissant d'évaluer l'efficacité des actions marketing (Little, 1979 ; Tellis, 2004). Ces données sont devenues accessibles aux chercheurs à la fin des années 1980 grâce à des données de panel "single-source" qui étaient relativement coûteuses et qui ne couvraient pas tout le spectre des canaux activés par les entreprises car la plupart des recherches se concentraient sur un seul canal : la télévision (Pedrick et Zufryden, 1991) ou l'affichage (Manchanda et al., 2006). Plus récemment, Danaher et Dagger (2013) ont appliqué ces méthodes à des investissements sur des canaux de communication multiples, avec une approche d'enquête qui génère des données déclaratives individuelles sur la mémorisation par le consommateur des canaux de communication auxquels il a été exposé. Li et Kannan (2014) ont également adopté cette approche et ont analysé ces effets sur la probabilité des clients de visiter un site web et d'acheter.

De manière plus générale, la plupart des publications ont eu recours à des données agrégées sur les dépenses publicitaires et les ventes (Little, 1979 ; Dekimpe et Hanssens, 2000). De plus, ces données ont été pour la plupart analysées grâce à des modèles économétriques permettant de mesurer les effets de la publicité et de la communication. Les modèles de marketing mix (MMM) et la modélisation de la réponse marketing (Bowman et Gatignon, 2010) sont apparus comme les principaux outils de mesure de l'efficacité publicitaire. Des études sur les synergies et les interactions entre les canaux de communication (Naik et Raman 2003 ; Naik et Peters 2009) et les effets à long terme d'une communication à travers de multiples canaux (Ataman, Van Heerde et Mela, 2010) ont également été menées. Par conséquent, le domaine de la mesure et de la compréhension de la réponse du consommateur à la communication omni-canal avec des données agrégées a été prédominant.

Nous mettons particulièrement en avant l'approche méthodologique de mesure de l'impact causal de la communication omni-canal sur le comportement d'achat des clients. Le CRM digital, basé sur des données nominatives, est désormais enrichi par des canaux programmatiques, basés sur des données comportementales, qui permettent des actions publicitaires ciblées sur des clients spécifiques. De plus en plus de supports, de plateformes et de canaux dans le domaine de la gestion de la relation client programmatique permettent aux entreprises de collecter des données sur l'exposition des clients et de savoir exactement quels clients ont été réellement exposés à chaque moment. Le fait de lier ces données aux réactions comportementales des clients, qu'il s'agisse de clics, de visites de sites web ou d'achats, modifie radicalement la manière dont les investissements en marketing et en publicité peuvent être mesurés. Notre approche méthodologique vise à fournir une contribution significative à ce domaine de recherche en répondant aux principales limites de recherche évoquées par ces travaux.

Tout d'abord, une partie importante des recherches mentionnées ci-dessus s'est concentrée sur la mesure des attitudes en évaluant les effets de la publicité par le biais d'approches d'enquête qui capturent principalement les mesures attitudinales des clients. Les nouvelles possibilités de collecte de données individuelles issues du marketing direct sur base de données et de l'achat média programmatique (aux enchères en temps réel) permettent de mesurer à grande échelle l'impact des réponses comportementales à travers les multiples étapes du processus de décision du client.

Ensuite, l'étude des réponses publicitaires individuelles soulève plusieurs biais identifiés dans l'état de l'art, car la stratégie de ciblage des entreprises met en évidence de fortes corrélations qui pourraient conduire à une mauvaise compréhension des effets des canaux. Le premier biais courant, souvent qualifié de "biais de sélection", révèle des problématiques d'endogénéité induites par le ciblage intense des clients à forte valeur ajoutée ou à forte propension à l'achat (Manchanda, Rossi et Chintagunta, 2004). En effet, comme ces cibles s'avèrent les plus rentables, la plupart des investissements publicitaires se concentrent sur les clients qui ont une plus grande probabilité d'achat. L'analyse des données relatives à l'exposition publicitaire permet souvent d'observer les effets sur la réponse des clients les plus rentables mais ne permet pas de comprendre l'impact plus large des canaux de communication. Le deuxième biais courant, souvent qualifié de "biais d'activité", révèle que la plupart des expositions publicitaires sont déclenchées par l'intérêt des clients pour une marque, un produit ou un service spécifique. Cela est encore plus évident dans les environnements numériques riches en données qui

fournissent une connaissance sans précédent de la navigation des clients et de leurs intérêts ultérieurs. Alors que les clients déjà intéressés réagissent plus positivement aux expositions et augmentent considérablement le retour sur investissement (ROI), une question cruciale se pose : que se passerait-il si ces clients achetaient même sans être exposés ?

En résumé, nous nous trouvons dans un contexte où de fortes corrélations pourraient biaiser la compréhension du phénomène. Dans ce contexte, le Marketing Science Institute (MSI) a défini des priorités de recherche qui encouragent les chercheurs à identifier les facteurs de décision des clients avec des approches causales. Le terme de causalité est ici d'une importance capitale : dans quelle mesure un canal de communication influence-t-il de manière causale la réponse comportementale des clients ?

Nous proposons que l'orchestration omni-canal exige une compréhension fine de la contribution de chaque canal aux changements de comportement des clients. Comme il devient essentiel de pouvoir évaluer la contribution de chaque point de contact au comportement des clients, nous mettons en évidence le concept d'incrémentalité. Nous définissons l'incrémentalité comme le nombre de conversions, dans son ensemble, qui n'auraient pas eu lieu sans l'ajout d'un traitement marketing, c'est-à-dire le volume de conversions directement et exclusivement causé par un traitement spécifique. Deux conditions sont donc avancées pour qualifier une conversion d'incrémentale : la possibilité d'affecter la conversion au nouveau traitement exclusivement et l'exposition effective du client à ce traitement. S'inspirant des travaux pionniers sur les modèles "uplift" (Radcliffe, 2007), cette variable permet à la fois d'isoler et de mesurer avec précision l'effet du point de contact sur le volume de conversions généré et, surtout, d'aligner les indicateurs de performance spécifiques à chaque canal (par nature hétérogènes), ce qui permet de comparer la performance d'un canal à un autre. L'incrémentalité met également en lumière un sujet important : la différence entre l'efficacité et l'efficience des investissements en marketing. Alors que l'efficience implique de maximiser la performance, l'efficacité implique d'optimiser le rapport entre la maximisation du rendement et le coût pour y parvenir (Malthouse, Maslowska et Franks, 2018).

Les modèles de réponse traditionnels ne prédisent pas les conversions incrémentales. En effet, l'approche de ces modèles consiste à prédire la probabilité d'achat en fonction d'un traitement marketing. En ce sens, les modèles de réponse (*response modeling*) sont généralement efficaces pour accroître la rentabilité des campagnes, car ils identifient les individus ayant la plus forte probabilité de conversion, mais une partie de ces individus auraient converti de toute façon,

même en l'absence de traitement. L'incrémentalité est déterminante car elle permet d'évaluer le changement de comportements des clients qui résulte d'un traitement spécifique (par exemple, un canal supplémentaire). Notre principale question de recherche portant sur la compréhension de l'impact causal de la communication omni-canal, notre objectif n'est pas de prédire la réponse d'un client sur la base de données d'observations, mais plutôt de mesurer l'effet causal direct d'un canal supplémentaire ou alternatif sur la réponse comportementale subséquente.

Les différentes contributions que nous proposons ont été rendues possibles grâce à une méthodologie expérimentale permettant de mesurer une inférence causale de la contribution d'un canal. Une expérimentation randomisée "grandeur nature" (*field experiment*) a été mise en évidence comme une méthodologie puissante et pertinente pour comparer des groupes de test qui peuvent être traités avec de multiples combinaisons de canaux avec des groupes de contrôle qui permettent de mesurer un comportement d'achat de référence qualifié de *baseline* (Zantedeschi, Feit, et Bradlow, 2016). Dans le domaine de l'exposition aux canaux de communication, des expériences de terrain randomisées ont déjà été mises à profit pour évaluer les effets de causalité sur la réponse des clients. Lodish, Abraham, Livelsberger et autres (1995) ont étudié la manière dont la publicité télévisée affecte les achats grâce à un dispositif de câble séparé qui leur a permis de randomiser les traitements des ménages et de recueillir des données sur les achats à l'aide d'un panel de consommateurs. L'exposition aléatoire à la publicité display a permis de mesurer son effet sur l'intention d'achat (Goldfarb et Tucker 2011) et sur les visites de sites web (Hoban et Bucklin 2014). À un niveau agrégé, des expériences géographiques ont comparé les marchés traités et les marchés témoins (Eastlack et Rao, 1989 ; Blake, Nosko et Tadelis, 2015). En revanche, les expérimentations sur le terrain avec des données individuelles peuvent également susciter des difficultés. La principale difficulté a été la découverte d'un effet non significatif des efforts de communication sur les achats (Lodish, Abraham, Kalmenson, et al., 1995 ; Lewis et Rao, 2015). Les effets non significatifs proviennent généralement de la taille des échantillons utilisés dans les expériences rapportées qui sont trop petits et d'un effet potentiellement trop faible sur les achats. Ceci apporte deux motivations :

- i. Considérer une grande taille d'échantillon pour les expériences de terrain randomisées, à la fois pour favoriser la validité externe et pour envisager un niveau d'analyse plus granulaire avec des sous-populations
- ii. Quantifier la magnitude de l'effet canal par canal en mettant en évidence la causalité.

Le cadrage conceptuel de ce travail doctoral se réfère à plusieurs courants de recherche. En effet, la nature intégrative de la recherche omni-canal conduit à une imbrication de plusieurs travaux de recherche. Le passage du multicanal à l'omni-canal, conceptualisé par Verhoef, Kannan & Inman (2015), implique d'élargir le champ d'étude à tous les points de contact entre les marques et leurs clients. Les canaux et les points de contact étant très divers dans leur nature et leurs caractéristiques, il en résulte deux implications essentielles :

- i. La combinaison des canaux transactionnels et des canaux de communication. Cela invite à une fusion entre la recherche en distribution et en gestion de la relation client. Cela est principalement dû à la prolifération des canaux et à la nature mixte des nouveaux canaux (à la fois transactionnels et relationnels).
- ii. L'inclusion des canaux bidirectionnels et des canaux unidirectionnels (principalement des marques vers leurs clients) dans le champ de la recherche. Cela justifie la compréhension des effets de canaux tels que la publicité télévisée, la radio et les SMS qui sont généralement des canaux à sens unique.

Par conséquent, notre recherche porte sur de multiples domaines de recherche qui comprennent le marketing relationnel (Grönroos, 1997 ; Meyer-Waarden, 2007 ; Aurier et N'Goala, 2010), la communication marketing intégrée (Edell et Keller, 1989 ; Belch et Belch, 1998 ; Keller 2001 ; Batra et Keller, 2016) et enfin la vente au détail multicanal et omni-canal (Verhoef, Neslin et Vroomen 2007 ; Vanheems 2009 ; Konus 2010 ; Verhoef 2012 ; Verhoef, Kannan et Inman 2015)

- i. Concernant le marketing relationnel, cette recherche doctorale prolonge les travaux qui ont été menés dans le domaine du marketing direct et de la publicité (Zantedeschi, Feit et Bradlow 2016 ; Stone et Jacobs 2008 ; Roberts et Berger 1999 ; Chang et Zhang 2016) ; Stone et Jacobs, 2008) et dans le domaine de la gestion de la clientèle digitale et omni-canal (Peelen et al. 2006 ; Fader 2012 ; Volle 2012).
- ii. Concernant la communication marketing intégrée, elle prolonge les recherches menées dans le domaine de la communication sur la synergie des points de contact activés dans un environnement online et offline (Naik et Raman 2003 ; Naik et Peters 2009 ; Kumar, Choi et Greene 2017 ; Havlena, Cardarelli et Montigny 2007 ; Danaher et Dagger 2013).
- iii. En ce qui concerne la distribution multi-canal et omni-canal, cette étude vise à enrichir la recherche sur le parcours clients (Dinner, Van Heerde et Neslin 2014 ; Srinivasan, Rutz et

Pauwels 2015 ; Lemon et Verhoef 2016), et la promotion des ventes en tenant compte de l'hétérogénéité de la réponse comportementale des clients aux sollicitations marketing (Belch et Belch 1998 ; Volle 2001 ; Andrews et al. 2016).

En répondant à plusieurs appels à la poursuite de la recherche dans les domaines mentionnés ci-dessus, notre contribution à la compréhension de l'omni-canal recoupe plusieurs domaines de recherche. Par nature, nous pouvons nous attendre à ce que de plus en plus de contributions futures dans le domaine de l'omni-canal adoptent une approche transversale similaire.

Questions de recherche

La mise en œuvre de stratégies de communication omni-canal soulève plusieurs questions pour les entreprises, en particulier pour les distributeurs. La compréhension de l'impact ou de l'influence des stratégies de communication omni-canal sur la réponse comportementale des clients fait émerger plusieurs pistes de recherche.

La première consiste à comprendre les différents impacts de canaux supplémentaires sur la réponse des clients. L'étude de la réponse comportementale des clients aux campagnes de communication ouvre deux grandes possibilités de recherche. Premièrement, elle implique de se concentrer non seulement sur la transaction (c'est-à-dire l'achat), mais aussi sur les étapes antérieures du parcours, comme les visites sur le site web ou l'ajout d'un article au panier. Ce suivi est rendu possible par la collecte de données en ligne à partir des interactions digitales des clients. Deuxièmement, il permet de comprendre si le coût marginal d'activation induit par un canal supplémentaire se traduit par un revenu supplémentaire. Par conséquent, nous explorons les dimensions "coût", "couverture" et "contribution" des canaux supplémentaires de la communication marketing intégrée (IMC).

Une première question de recherche émerge vers une compréhension plus approfondie de l'impact de la communication omni-canal :

QR1 : Dans quelle mesure le coût marginal d'un canal supplémentaire est-il couvert par le revenu supplémentaire qu'il génère (déterminé par la réponse des clients par exemple par la fréquence d'achat, le panier de commande moyen et le taux d'acheteurs) ?

Ensuite, les stratégies omni-canal nécessitent une meilleure compréhension des parcours de plus en plus complexes des clients. Une des questions majeures soulevées est la façon dont plusieurs canaux de communication peuvent guider les clients dans leur parcours d'achat à travers les multiples canaux de transaction disponibles (par exemple, un site web marchand par

rapport à des points de vente physiques). Un canal de communication spécifique pourrait affecter le canal choisi par les clients pour effectuer leurs achats, mais peu de recherches évaluent la causalité entre les multiples canaux de communication et la transaction ultérieure des clients, il s'agit donc d'une contribution à la compréhension du critère de "contribution" de l'IMC dans sa globalité.

Une deuxième question de recherche émerge pour comprendre et quantifier l'influence de la communication omni-canal sur le parcours des clients :

RQ2 : Comment les canaux alternatifs initiés par la marque influencent-ils le parcours d'achat des clients à travers de multiples canaux de transaction ?

Enfin, l'adoption de stratégies de communication omni-canal implique d'étudier les multiples réactions des clients (c'est-à-dire l'hétérogénéité fréquemment évoquée) qui sont motivées par un canal supplémentaire en soi ou par l'interaction entre les multiples canaux activés. Ceci est lié à la nécessité d'une orchestration des canaux. Le critère de "conformabilité" de l'IMC fait ressortir l'idée d'une multiplicité de réactions des cibles à chaque traitement.

Une troisième question de recherche émerge pour comprendre l'hétérogénéité des réponses des clients et la manière dont les caractéristiques des clients expliquent les effets observés :

RQ3 : Quels sont les profils des clients les plus réactifs à l'activation simultanée des canaux numériques et mobiles ?

Trois séries d'expérimentations complémentaires (Copie du tableau 3) ont ainsi été menées selon des plans en randomisation totale. Notons que la méthode expérimentale sur des échantillons de grande taille nous permet d'exploiter les données comportementales individuelles en rendant exogène la variation des variables dépendantes grâce à une distribution entièrement aléatoire des individus entre les groupes de contrôle et les groupes expérimentaux

Essai	1	2	3
Méthodologie	Expérimentation en randomisation totale		
Mesure	Mesure de l'incrémentalité pour une évaluation causale. Test d'homogénéité effectué pour chaque analyse entre groupe de contrôle et groupe de test. Test Chi-2 pour échantillons indépendants avec variable dépendante binaire. Les p-values sont indiquées pour chaque test. Une approche de modélisation au niveau individuel, par une régression logistique pour prédire la probabilité d'achat pendant la période expérimentale (Achat / Absence d'achat).		
Variables indépendantes	1/ Antécédents comportementaux à la transaction : - Volume de visiteurs uniques - Volume de visiteurs avec ajout d'article au panier - Volumes d'acheteurs uniques 2/ Facteurs de revenu incrémental : - Panier moyen - Fréquence d'achat - Taux d'acheteurs uniques	1/ Effets "own-channel" et "cross-channel" : - Part d'incrément issue des conversions online - Part d'incrément issue des conversions en point de vente 2/ Profitabilité des canaux : - Retour sur investissement du canal	1/ Hétérogénéité des réponses à travers la base de données clients : - par segment de valeur client - par réactivité au canal - par localisation géographique par rapport aux points de vente 2/ Interaction entre canaux : - Dimension extensive : Reach incrémental du canal / couverture - Dimension intensive: exposition répétée au canal
Question de recherche	Dans quelle mesure le coût marginal d'un canal supplémentaire est-il couvert par le revenu supplémentaire qu'il génère (déterminé par la réponse des clients par exemple par la fréquence d'achat, le panier de commande moyen et le taux d'acheteurs) ?	Comment les canaux alternatifs initiés par la marque influencent-ils le parcours d'achat des clients à travers de multiples canaux de transaction ?	Quels sont les profils des clients les plus réactifs à l'activation simultanée des canaux numériques et mobiles ?
Objectif	Antécédents et facteur d'influence d'un canal	Influence du canal sur le parcours d'achat	Influence du canal à travers les profils de clients
Canaux de communication	email, SMS et display programmatique	email, SMS et courrier	email, SMS et display programmatique
Canaux de transaction	Ventes online	Ventes online versus offline	Ventes online et offline

Tableau 3 (copie): vue d'ensemble du design de recherche

Synthèses des essais

Le premier essai a pour but d'examiner l'influence de la communication omni-canal à différentes étapes du parcours d'achat online : de la considération, à l'intention d'achat et à l'achat. Les avancées technologiques majeures apportées par l'achat média programmatique en temps réel permettent aux marques de passer d'une stratégie de contact centrée sur le canal à une stratégie basée sur les personnes et d'améliorer l'adressabilité des clients aux étapes amont d'un funnel. Un canal supplémentaire permet d'augmenter à la fois le volume de visiteurs du site web, de visiteurs qui ajoutent un article au panier et d'acheteurs. Trois expérimentations à grande échelle menées sur une période de deux mois dans le secteur de grande distribution en ligne, respectivement sur 329 151 individus opt-out, sur 1 125 087 individus opt-in email et sur 426 451 individus opt-in email et mobile, permettent de mesurer cet impact incrémental. Un nouveau canal influence principalement le taux d'acheteurs uniques et n'a pas d'impact significatif sur la fréquence d'achat et le panier moyen des acheteurs. Ces résultats permettent de lier le coût marginal d'activation d'un canal supplémentaire à son impact différentiel sur les revenus générés, dans une logique de ROI incrémental. Nous discutons de ces résultats pour comprendre comment les marques pourraient améliorer l'orchestration de plusieurs canaux qui servaient auparavant différents objectifs tout au long du processus décisionnel des clients.

Le deuxième essai fait état de deux expérimentations dont le but est d'évaluer, à nombre de sollicitation égal, l'impact de la communication par différents canaux plutôt que d'utiliser le même canal. Pour de nombreuses marques, la sélection et l'orchestration des canaux sont essentielles afin d'engager leurs clients dans des parcours d'achat rentables. Plus précisément, l'objectif est d'évaluer s'il est plus efficace de communiquer plusieurs fois en utilisant le même canal ou en utilisant différents canaux dans le parcours du client. Une expérimentation a été menée dans laquelle la stratégie de communication par e-mail d'un distributeur français "click & mortar" a été remplacée par i) une stratégie courrier et e-mail et ii) une stratégie SMS et e-mail. Tous les traitements contrôlent la fréquence de contact pour isoler l'effet du canal. Sur des échantillons de 128 000 et 37 000 individus, les deux expériences ont augmenté la conversion et les revenus mais ont eu un impact sur la distribution des clients par canal d'achat. La communication courrier a principalement stimulé les ventes incrémentales offline, tandis que le SMS a stimulé à part égale les ventes incrémentales offline et online. Le type de canal activé par l'enseigne (e-mail, SMS et courrier) a eu une influence significative sur le canal d'achat choisi par les clients. Enfin, au-delà des revenus supplémentaires générés par ces

canaux supplémentaires, une analyse du retour sur investissement a été menée pour évaluer la contribution des canaux à la conception de parcours d'achat rentables.

Le troisième essai étudie la communication omni-canal en analysant l'impact de l'activation d'un nouveau canal de communication sur plusieurs profils de clients (l'hétérogénéité des clients). Les résultats de deux expérimentations combinant email, display en RTB et SMS, menées sur plus de 300 000 et 700 000 personnes, confirment l'augmentation des conversions en ligne et hors ligne. L'étude permet d'identifier les segments de clients sur-réactifs et sous-réactifs en fonction de plusieurs critères tels que la valeur du client, la réactivité du client à un canal et la localisation du client par rapport à un point de vente. Elle contribue à la compréhension des sources d'hétérogénéité dans la réponse des clients à la communication omni-canal (par exemple, la valeur du client, les habitudes des clients concernant leurs devices, la réactivité des clients aux canaux précédents et la localisation). Elle identifie également les sources de synergie entre les canaux et démontre que l'omni-canal est essentiel pour développer le potentiel de valeur de certains segments de clientèle.

Discussion, conclusion et limites de la recherche

La question que nous avons étudiée dans cette recherche doctorale consistait à comprendre les impacts des stratégies de communication omni-canal des marques sur le comportement d'achat des consommateurs. Par "communication omni-canal", nous entendons une combinaison de plusieurs types de canaux de communication et de points de contact qui nécessite une orchestration. Pour construire des stratégies d'orchestration, nous avançons plusieurs contributions qui portent sur :

- i) L'analyse d'une réponse comportementale des clients à plusieurs étapes de leur parcours et des facteurs de performance des canaux supplémentaires
- ii) La compréhension de la contribution des canaux initiés par les marques à l'orientation des clients dans leur parcours d'achat à travers de multiples canaux transactionnels
- iii) L'exploration de l'hétérogénéité des réponses des clients à ces stratégies avec des variables spécifiques et actionnables.

Les résultats obtenus montrent l'intérêt d'exploiter une combinaison de canaux digitaux pour améliorer les performances d'une campagne de communication (tableau 44). Les trois essais complémentaires permettent de dégager des apports conceptuels, méthodologiques et managériaux. Nous présentons une synthèse des principales conclusions des trois essais avant

de développer ces contributions (Copie du tableau 46). Par ailleurs, dans un souci pédagogique, nous mettons en évidence les caractéristiques les plus déterminantes qui motivent la sélection des canaux de communication et qui nous semblent représentatives du passage des stratégies d'activation des clients traditionnelles à l'orchestration omni-canal (Copie du tableau 45).

Critères de sélection des canaux par les stratégies d'activation clients traditionnelles	Critères de sélection des canaux par l'orchestration omni-canal
Leur coût	Leur impact incrémental sur la réponse comportementale
Leur ROI et leur profitabilité intrinsèques	Leur ROI incrémental
Leur supposée adéquation avec l'objectif de la campagne	Leurs interactions et complémentarités dans la réactivité d'un client
Le consentement nécessaire à leur activation	Leur impact sur le parcours d'achat
La valeur client (prédite [CLV] ou rétrospective)	Le développement de la valeur client

Tableau 45 (copie) : Principaux critères de sélection d'un canal à l'ère de l'orchestration omni-canal

Une première contribution de ce travail est l'accent mis sur l'analyse de l'impact de chaque canal sur chaque segment de clientèle avec un objectif commun et une métrique commune : un impact causal incrémental du canal sur les réponses comportementales d'une cible. Cela contraste avec les recherches existantes sur l'efficacité des actions de marketing, qui reposent principalement sur la prédiction plutôt que sur la causalité et sur la modélisation de l'attribution (Li et Kannan, 2014). La méthodologie basée sur l'incrémentalité permet de contrôler des biais courants bien identifiés, mais sous-explorés : le biais de sélection des clients (tel que le ciblage sélectif des clients par les entreprises) et le biais d'activité (telles que les interactions des clients dues à des déclencheurs qui démontrent qu'un processus de décision a déjà commencé). Les données de terrain d'observation sans groupe de contrôle sous-estiment généralement ces biais. Nous contrôlons donc l'endogénéité de nos études grâce à des dispositifs expérimentaux randomisés à grande échelle.

Une deuxième contribution concerne le phénomène de synergie (Naik et Raman, 2003) grâce à l'analyse de l'interaction entre le canal email, le mobile et les canaux programmatiques. Appliqués à ces canaux hétérogènes, nous complétons la théorie de l'interaction des canaux et étudions deux phénomènes conduisant à une synergie potentielle. Le premier est la capacité d'un canal supplémentaire à augmenter le reach (c'est-à-dire la couverture de la cible définie), donc à toucher des individus qui n'auraient pas été touchés par le premier canal ; le second est la capacité de ce canal à réexposer des individus déjà touchés par le premier canal. Alors qu'Edell et Keller (1989) ont étudié l'effet combiné des messages publicitaires lorsqu'ils sont envoyés sur plusieurs canaux, à la télévision et à la radio, nous répondons à de multiples appels pour que des recherches supplémentaires soient menées afin d'étendre cette analyse à de nouveaux canaux. Pour une opération promotionnelle à court terme, l'étude empirique (n°3) montre qu'environ deux tiers de l'impact différentiel provient d'une meilleure couverture de la cible et un tiers d'une exposition répétée. Nous démontrons que des effets extensifs et intensifs coexistent lorsque deux canaux sont activés simultanément et nous quantifions ces effets dans des contextes différents.

Une troisième contribution concerne les intérêts de l'adoption d'une vision "people-based" plutôt qu'une approche plus commune centrée sur les canaux. Nous sommes parmi les premiers à adopter l'"approche ascendante" de la communication marketing intégrée (Batra et Keller, 2016) en adoptant une approche agnostique pour évaluer la contribution des canaux. Comme les marques et les distributeurs doivent traiter avec un nombre croissant de canaux (Brynjolfsson, Hu et Rahman, 2013), la fragmentation des publics due aux chevauchements entre les canaux devient une préoccupation majeure. En s'appuyant sur des recherches sur les habitudes de consommation des médias (Webster et Ksiazek, 2012 ; Taneja et al., 2012), l'accès croissant aux données sur l'exposition et les réponses individuelles à travers des canaux hétérogènes permet de poursuivre l'objectif d'une approche de la communication omni-canal basée sur les individus. Il semble naturel que la communication marketing soit centrée sur les personnes et s'adresse aux consommateurs plutôt qu'aux canaux, aux devices ou aux identifiants multiples des consommateurs en ligne. Notre travail met ainsi en avant le concept d'adressabilité des individus dans le contexte de la fragmentation des audiences et des technologies. Être capable de reconnaître et de s'adresser avec cohérence aux personnes dans une vision omni-canal est à la fois essentiel et difficile pour les marques et les distributeurs. Même si de telles questions ne sont pas nouvelles pour les spécialistes du marketing, le développement des médias programmatiques constitue une étape majeure qui accroît l'intérêt

de développer de nouvelles recherches, comme le suggèrent Malthouse et al. (2018). Notre recherche ouvre la voie à la convergence entre les médias de masse d'une part et la gestion de la relation client d'autre part et à l'élimination de frontières non pertinentes pour l'activation et le développement de la valeur des clients.

Une quatrième contribution de ce travail est de mieux comprendre pourquoi un canal supplémentaire est un facteur de performance de la communication. Nous montrons que les canaux supplémentaires contribuent principalement à un "effet de volume" en conduisant davantage de clients à la conversion sans effets significatifs sur la fréquence d'achat ou le montant moyen du panier. De plus, comme l'adoption de l'omnicanal implique l'activation d'un nombre croissant de canaux de communication, nos travaux adoptent une approche de "coût marginal" par rapport aux "revenus incrémentaux". Cela permet de comprendre dans quelle mesure un canal supplémentaire entraîne non seulement un retour sur investissement, mais également un retour sur investissement incrémental.

Sur le plan managérial, notre travail apporte aux praticiens plusieurs contributions pour la mise en œuvre d'une stratégie de communication omni-canal efficace. Nous proposons que l'évaluation de la réactivité du consommateur, non plus à une campagne de communication, mais à chaque canal auquel il a été exposé pendant la campagne, devienne fondamentale (Verhoef, Kannan et Inman, 2015). La vision "people-based" du marketing qui aide les entreprises à construire une stratégie de contact omni-canal non-silotée permet d'améliorer l'adressabilité. Alors que le secteur du marketing digital est confronté à un besoin croissant d'efficacité et de pertinence, l'adressabilité devient plus réaliste en reliant les données nominatives (PII) et les données comportementales (non PII) au niveau individuel (c'est-à-dire une procédure de matching email-cookie). Les entreprises peuvent étendre leurs stratégies de CRM aux médias tels que le display, mais aussi la radio ou la télévision qui deviennent accessibles par l'achat programmatique. D'autre part, l'hétérogénéité des "canaux opt-in" (email, mobile ou courrier) a donné lieu à de nombreuses mesures de performance différentes et difficiles à comparer. Bien que nous fournissions un modèle de recherche reconnu comme manquant dans la littérature : une expérimentation aléatoire sur le terrain avec des groupes témoins qui identifient réellement les effets de causalité, cette approche est facilement reproductible dans des contextes managériaux en adaptant la stratégie de contact aux types de canaux opt-in. L'évaluation de l'impact différentiel de chaque canal constitue une mesure commune pertinente dans ce contexte (Kannan, Reinartz & Verhoef, 2016). En outre, dans la mesure où les canaux sont de plus en plus en concurrence pour les investissements en

marketing, les logiques d'incrémentalité pourraient remettre en question les modèles d'attribution plus traditionnels, en introduisant des questions plus objectives telles que "quelle aurait été la réponse de ces clients sans ce traitement ?"

Notre travail présente des limites qui constituent autant de pistes de recherche pour l'avenir.

Il se concentre sur l'impact des canaux sur une période relativement courte (deux mois pour le plus long). Ces études ont été réalisées dans le cadre d'opérations promotionnelles ; dans une perspective plus relationnelle, la question de l'impact à moyen et long terme et, en particulier, l'influence de la multiplication des canaux sur la durée de vie du client reste à explorer. D'autres recherches sont nécessaires pour confirmer sur le long terme les effets observés. En particulier : les comportements à l'égard des canaux changent-ils de manière significative au fil du temps ? Si oui, quelles sont les conséquences en termes de réachat et de valeur pour le client ? La mesure des effets à long terme permettrait de comprendre s'il y a une perte dans le temps des incréments générés à court terme.

Dans le prolongement de la recherche sur les effets "cross-channel", le mobile pourrait être isolé, non seulement comme canal de communication mais aussi comme canal de conversion, afin de mesurer si les ventes en ligne sont effectuées via un ordinateur ou un smartphone. En outre, il serait utile de tenir compte de l'effet modérateur de la couverture géographique du distributeur (taille du réseau et implantation des points de vente) pour mesurer les effets "cross-channel". Si le mobile s'avère stratégique dans les étapes de pré-achat du parcours, son rôle en tant que canal de transaction mérite d'être étudié plus avant dans un contexte où le commerce mobile se développe.

Alors que l'omni-canal nécessite une meilleure connaissance des habitudes des clients connectés et de l'utilisation des devices, le marketing "people-based" est plus que jamais un enjeu majeur à mesure que le nombre d'identifiants digitaux d'un même consommateur augmente. La maîtrise des identifiants digitaux des consommateurs à travers les canaux, les plateformes, les points de contact et les devices est un domaine d'investigation essentiel pour les chercheurs en marketing et en mathématiques.

Enfin, ces résultats appellent également à l'étude des interactions entre des variables indépendantes, en particulier entre la valeur client et la distance au point de vente d'un client, ce qui permettrait de tester la validité des modèles gravitaires dans un contexte omni-canal. Il convient également de noter qu'une intensification des actions de communication omni-canal par les acteurs d'un même secteur pourrait conduire à une modération de l'impact de l'activation

de plusieurs canaux sur le public cible. A cet égard, une piste de recherche particulièrement stimulante consiste à mesurer l'influence de l'activation de plusieurs canaux sur l'évolution de la part du portefeuille du client dans une catégorie donnée.

Essai	Essai 1	Essai 2	Essai 3
Objet de recherche	L'impact marginal d'un canal de communication supplémentaire initié par la marque : une approche « people-based » et incrémentale	L'orchestration des canaux de la marque : comprendre l'impact de canaux digitaux, traditionnels et mobiles sur le parcours clients	Comment coordonner canaux digitaux et mobiles pour générer de la valeur incrémentale auprès des clients connectés ?
Données	<ul style="list-style-type: none"> - Ciblage email et SMS issu de la base CRM - Ciblage display programmatique sur les DSP Appnexus et Facebook Exchange - Expositions email et display programmatique sur Appnexus (non accessible pour le SMS et le display Facebook [jardin clos]) - Tracking des visites individuelles sur le site, des mises au panier d'articles et des transactions online - Coût marginal de chaque canal additionnel 	<ul style="list-style-type: none"> - Historique de ciblage et transactions omni-canal - Ciblage email, SMS et courrier issu de la base CRM - Transactions online + offline (grâce aux programme relationnel pour les conversions offline) - Coût marginal de chaque canal additionnel 	<ul style="list-style-type: none"> - Ciblage email, SMS issu de la base CRM - Ciblage display programmatique sur les DSP Appnexus et Facebook Exchange - Expositions email et display programmatique sur Appnexus (non accessible pour le SMS et le display Facebook [jardin clos]) - Transactions online + offline (grâce aux programme relationnel pour les conversions offline) - segmentation de valeur clients, réactivité individuelle à l'email, distance au point de vente et construction de zones de chalandises par quartile selon les données INSEE, qualification sur le device de réactivité à l'email : mobile ou desktop
Résultats clés	<ul style="list-style-type: none"> - Toutes les étapes du parcours d'achat sont impactées positivement par l'ajout d'un canal supplémentaire - Les canaux initiés par l'enseigne génèrent un "effet volume" et davantage de clients donc une boucle de réachat - Pas d'effet d'un nouveau canal sur la fréquence d'achat et le panier moyen - Le coût marginal d'activation du canal influence fortement son ROI incrémental - Un effet de chevauchement important dans la couverture des canaux : 92% de l'effet d'un canal additionnel est lié à l'exposition à travers plusieurs canaux 	<ul style="list-style-type: none"> - Fort impact incrémental sur les transactions offline+online transactions attribuable au changement de canal - Le canal le plus efficace en revenue généré (courrier) n'est pas le plus efficace : le ROI est deux fois inférieur pour le courrier que pour le SMS - Fort effet « cross-channel » du mobile : 46% de son impact est observé online vs 54% in-store - Le courrier génère un fort effet « own-channel » : 96% de son effet est observé in-store - Les canaux de communication activés par la marque influence le choix des canaux de transaction par les clients - Un effet d'accoutumance au canal existe 	<ul style="list-style-type: none"> - Forte hétérogénéité dans la réponse client selon la valeur client : l'impact le plus important d'un nouveau canal est observé sur les clients à plus faible valeur - Impact plus forts d'un nouveau canal auprès des clients non-réactifs au canal historique - La migration de device, du desktop vers le mobile, génère l'essentiel de la valeur incrémentale - Les effets de l'activation sur mobile activation diminuent avec la distance au point de vente. Pas d'impact sur les clients hors zone de chalandise. - Un effet de court terme du display programmatique sur la couverture de la cible : x2,6 versus email seulement – grâce au reach cumulatif du display dans le temps

Tableau 46 (copie et traduction): Résumé des résultats clés des trois essais.

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APPENDIX

Appendix 1: Business valuations of the research

Mieux communiquer en utilisant sa data

INTERVIEW #3

Bâtir un CRM global dans une logique de fidélisation

➔ 1000mercis, vue par Renaud Montin, directeur marketing et digital d'Eram.

COMMENT AVEZ-VOUS RENCONTRÉ 1000MERCIS ?

Sur une recommandation via un réseau commun, j'ai rencontré Yseulys Costes. Notre partenariat s'est affermi grâce à la compétence, à la philosophie et aux valeurs de l'entreprise, qui rejoignent les nôtres : la proximité, l'audace, l'orientation client. Nous collaborons depuis quatre ans.

À QUEL BESOIN A-T-ELLE RÉPONDU ?

Avec une fréquence d'achat assez faible (cinq achats/an), la fidélisation est capitale pour nous. D'une vision en silo et avec une exploitation réduite de la donnée client, nous avons construit un CRM global performant avec 1000mercis.

POURQUOI AVOIR CHOISI CET ACTEUR ?

Notre CRM a été créé et fonctionnel en quelques mois, avec des programmes automatiques, des segments, ainsi que des protocoles de ciblage. L'expertise de l'équipe sur la data, la création de contenu, le rédactionnel et le ciblage constitue un atout clé pour l'efficacité de notre collaboration et favorise un usage complet de cette plateforme.

Y A-T-IL EU DES FREINS ?

Pas vraiment : notre philosophie multicanale est ancrée en interne. Le digital est au service du magasin physique. Cette volonté était intégrée dans notre brief et a tout de suite été assimilée par 1000mercis.

Nous avons donc pu piloter un ROI multicanal. L'ensemble des ciblage (SMS, display...) est mesuré dans un parcours global. En caisse des magasins physiques, les noms et e-mails des clients sont demandés afin de pouvoir mesurer les campagnes dans une dynamique crosscanal.

QUELS RÉSULTATS AVEZ-VOUS CONSTATÉS ?

Sur notre dernière opération, Les Folies d'Eram, nous avons observé 42 % de conversions incrémentales sur les non-réactifs aux e-mails, grâce

à l'envoi d'un SMS. Sur cette même opération, l'activation en programmation a permis de multiplier le reach par 2,6. Un échantillon de contrôle permet de mesurer la valeur incrémentale de chaque canal supplémentaire.

QUELLE ORIENTATION PREND LE CRM AINSI BÂTI ?

Après la construction des segments en RFM (récence, fréquence, montant), nous avons travaillé sur une promesse relationnelle au travers de la création du programme "Eram et moi". Ce programme n'est pas une carte de fidélité avec des points. Nos promotions ne se résument pas à des réductions mais prennent un sens plus large, par l'intermédiaire d'un contenu personnalisé pour chaque segment, afin d'apporter de la valeur à nos clients.

Nous avons graduellement couvert l'ensemble de la customer lifetime value, avec une approche micromarketing judicieuse.

COMMENT 1000MERCIS VOUS ACCOMPAGNE-ELLE DANS VOTRE DÉMARCHE D'INNOVATION ?

1000mercis est un acteur engagé dans l'accompagnement de nos évolutions et la construction de notre vision à court et plus long terme. Son pragmatisme et sa vision se révèlent également dans son développement propre. L'innovation est au cœur de l'entreprise 1000mercis, sa R & D est puissante et ambitieuse. Son développement dans la Silicon Valley en témoigne.

UN NOUVEAU SUJET QUE VOUS AIMERIEZ ABORDER AVEC L'ÉQUIPE ?

L'instore, c'est-à-dire la compréhension et la qualification des visiteurs qui sortent des magasins physiques sans avoir acheté, donc sans donner leur adresse e-mail. La data instore est riche en volume, nous aimerions explorer cette thématique avec 1000mercis. ■

[SOLUTION]

LE GROUPE 1000MERCIS, pionnier du data marketing et expert reconnu en CRM digital et marketing programmatique, de la collecte de données (base CRM, DMP) à l'activation multicanale (e-mail, mobile, RTB, réseaux sociaux, instore), a pour mission de concevoir des dispositifs à fort ROI incrémental pour les annonceurs souhaitant optimiser leurs actions de conquête et de fidélisation.

[ENTREPRISE]

ERAM appartient au groupe éponyme, qui comporte une dizaine de marques. Le groupe familial, issu de l'artisanat, fête ses 90 ans cette année. Fidèle à ses racines mais toujours en mouvement, chaque génération relève les défis de son époque, avec brio et innovation. Leader de la chaussure en centre-ville et centres commerciaux en France, l'enseigne Eram compte 375 points de vente en France et à l'étranger.



“L'innovation est au cœur de l'entreprise 1000mercis.”

Appendix 2: Marketing Award at Trophées du e-commerce in the category “Online strategies for customer acquisition and retention”



Appendix 3: Complement to modeling methodology (Chapter n°3 – Resampling methods)

To deal with the low share of buyers during experiments (i.e. a typical challenge in CRM modeling where a lot of “zeros” are observed), we are testing different resampling methods to study the possibility of improving the performance of logistics regression on our learning sample. A detailed view of the resampling methods tested is available here:

- under-sampling: randomly sub-sampling the majority class (the non-buyers in our case) in order to have a balance of classes,
- over-sampling: randomly over-sampling the minority class (the buyers in our case) in order to have a balance of classes,
- both-sampling: randomly sub-sampling the majority class (non-buyers in our case) and at the same time randomly over-sampling the minority class (buyers in our case) in order to have a balance of classes,
- SMOTE and ROSE: hybrid methods that reduce the majority class sample and artificially synthesize new data points in the minority class.
- Weights: this is not a resampling technique but allows a greater weight to be applied to minority class observations when estimating the parameters of logistic regression.

These different methods are applied to the learning samples of the 2 experiments.

The performances are analyzed with the ROC curve and the AUC criterion.

The results of these methods are as follows:

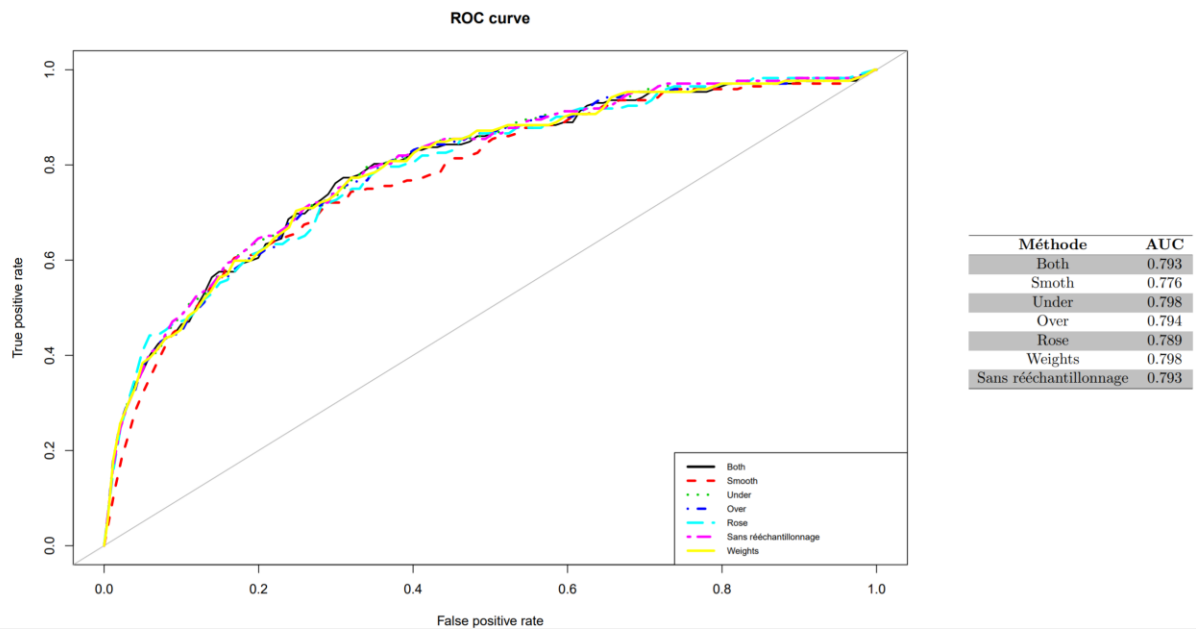


Chart 10: ROC and AUC curve with different resampling methods for SMS/Email (n°1) experiment data

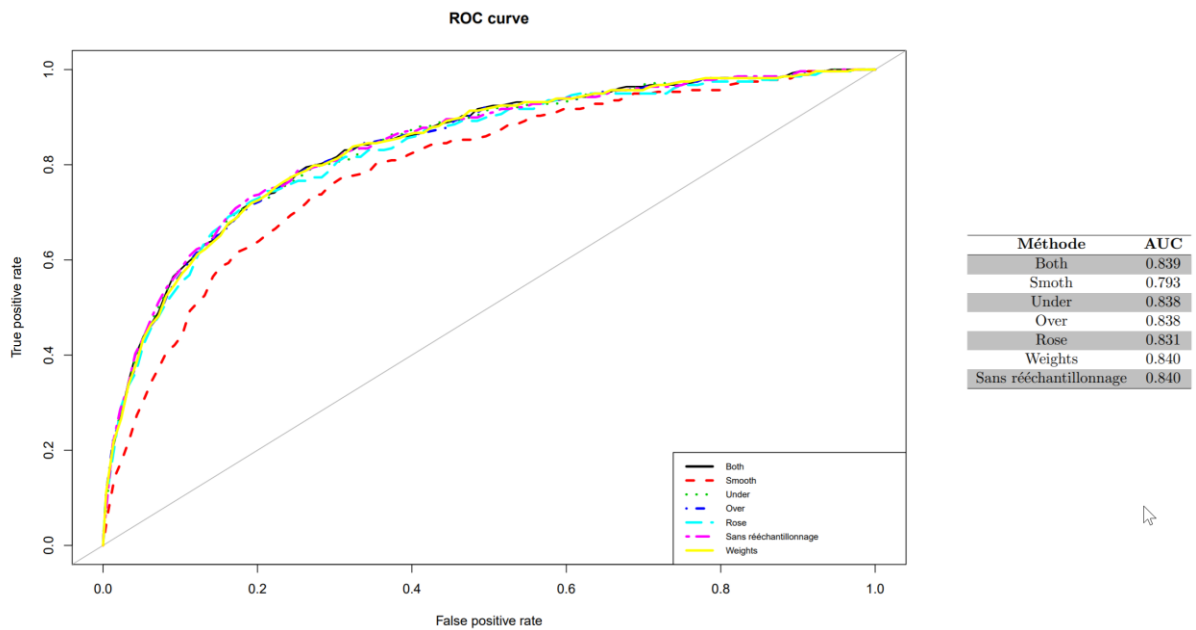


Chart 11: ROC and AUC curve with different resampling methods for Print/Email (n°2) experiment data

First, we obtain AUC values of more than 0.70 which shows good initial performance without selecting variables.

Secondly, the results do not show any significant difference between methods and without resampling.

Thus, given these results and in order to stay as close as possible to the starting data, we will choose the weights technique.

Appendix 4: Complement to modeling methodology (Chapter n°3 – Variable selection)

In the context of variables selection, our objective is to find the best compromise between three elements:

1. the complexity of the model in order to avoid under-learning and to estimate the model coefficients with sufficient precision by obtaining sufficiently small confidence intervals,
2. the model performance, i.e. the ability of the model to make predictions on new data, which comes back to the previous point to the bias / variance compromise,
3. the interpretability of the model by ensuring that there is multicollinearity in the variables so that each explanatory variable can be interpreted reliably.

To make this compromise, we rely on three procedures that are available here:

- Procedure "forward" with the AIC criterion, to ensure a compromise between the first two points. We detail the AIC criterion in the below:

The Akaike information criterion (AIC) is a measure of the quality of a statistical model. When estimating a statistical model, it is possible to increase the likelihood of the model by adding a parameter. Akaike's information criterion, like the Bayesian information criterion, allows models to be penalized according to the number of parameters in order to satisfy the criterion of parsimony. The model with the weakest Akaike information criterion is then selected. The AIC criterion applies to models estimated by a maximum likelihood method: analyses of variance, multiple linear regressions, Poisson & logistic regressions and can be included in this framework.

The AIC criterion is defined by:

$$AIC = -2 \log \tilde{L} + 2k$$

where L is the maximum likelihood and k is the number of parameters in the model. With this criterion, the deviation of the model is $-2 \log \tilde{L}$ penalized by twice the number of parameters. The AIC therefore represents a compromise between bias, decreasing with the number of parameters, and parsimony, willingness to describe the data with as few parameters as possible.

- A study of the variance inflation factors (VIF) of the selected variables for to test multicollinearity. The trade-off between colinear variables ($VIF > 5$) is based on the one with the greatest marketing relevance for the study of effects. We detail below the inflation factor of the variance. In a regression, multicollinearity is a problem that occurs when some of the model's prediction variables measure the same phenomenon. Severe multicollinearity is problematic because it can increase the variance of regression coefficients and make it unreliable and difficult to interpret.

There are different measures of multicollinearity. The most traditional approach is to examine the variance inflation factors (VIFs). The variance inflation factor is the ratio of the variance of a multiple-term model by the variance of a single-term model. It estimates how much the variance of a coefficient is increased due to a linear relationship with other predictors.

The VIF factor is defined by:

$$VIF_j = \frac{1}{1 - R_j^2}$$

Where R_j^2 is the coefficient of determination of the regression of the explanatory variable X_j on the other explanatory variables. Sheather (2009) suggests to seek for variables whose VIF is greater than 5.

Appendix 5: Complement to methodology (Chapter n°3)

Textbox 1: Methodology of the experiments conducted (Chapter n°4)

Focus retailer: A specialized retailer of personal equipment that markets its products through both a network of physical stores and a merchant website.

Data collection: Experiments were conducted on 304,410 individuals and 729,088 individuals respectively. The samples are composed of 88% women and 12% men. The age structure is as follows: 14% of 18-24 years old, 24% of 25-34 years old, 37% of 35-49 years old, 21% of 50-65 years old and 4% of 65 and over. Behavioral purchasing data (online and offline) from the company's customer database were collected. These data are then reconciled with each individual's qualification variables (textbox 2 in the essay's appendix):

- Past customer value
- Customer reactivity to historical channel (email)
- The client's mobile appetite
- Distance of the customer to the nearest point of sale

Data processing: A homogeneity test is performed for each performance comparative analysis between control and experimental groups. The test is based on the Chi-2 law for independent samples and dummy dependent variable. The significance thresholds (p-values) for each test are indicated.

Text box 2: Additions to the methodology (Chapter n°4)

Campaign content:

Both experiments were carried out six months apart as part of a communication campaign that aimed at relaying a biannual promotional event. The brand intends to relay this offer to its existing customers in the database. The communications, regardless of the channel, aim at promoting the offer to maximize the number of purchases over the period.

Operationalizing of variables:

The identification of targets and relevant situations for the combination of several channels was achieved through four variables. They are derived from the literature mobilized (customer value, reactivity to communication, the effect of a message exposure in a situation of mobility) and correspond to the practices of advertisers for the performance analysis of communication campaigns. Past customer value: each individual is assigned to a segment (small, medium, heavy or inactive) based on their purchase history over the previous 12 months.

- Reactivity to the historical channel (email): an individual is considered inactive to the email in the absence of any reaction (opening or clicking) to the brand's emails over the previous six months.
- Mobile user profile: an individual is considered to be a mobile user if he/she has already opened an email of the brand on a mobile device.
- The distance to the nearest retail store: computed in kilometers.

Methodological justifications:

Compared to traditional media buying, the use of RTB - i. e. audience buying - is essential in an experimental design, as it allows both mastering the barrier between control groups and experimental groups and the tracking of individuals actually exposed to this channel. The compared sequences are equivalent in terms of message content. The number of transactions is calculated by the conversion rate of each group, i. e. the number of recorded transactions compared to the number of individuals contacted.

The impact of the SMS, which allows an exhaustive coverage of the target (reach) over a very short period of time - in the range of a few hours - is calculated both on D+4 to isolate more precisely its effect and for comparison with the experiment on D+22, i. e. over the whole duration of the operation in which the channel effect is more diluted. On the contrary, the impact of the display is calculated over the entire duration of the operation at D+22, since the effect of this channel is cumulative - the target coverage is achieved over time with each new ad impression.

Appendix 6: Overview of message creatives for the experiments

Chapter 1



FAITES LE PLEIN D'ÉCONOMIES À
[PERSONNE VILLE]



▶ **JE FONCE**



CETTE SEMAINE

	
Vendu seul 1,02 €	Vendu seul 3,15 €
Les 2 pour 1,53 €	Les 2 pour 4,09 €

▶ **A MOI LES PROMOS !**



CETTE SEMAINE

- 3+2 GRATUIT**
- 50% REMISE IMMÉDIATE**
- 50% SUR LE 2^{ème}**

▶ **J'ARRIVE**



NE FAITES PLUS LA COURSE
POUR VOS COURSES !



▶ **JE COMMANDE**



NE VOUS CASSEZ PLUS LE DOS
AVEC VOS PACKS D'EAU !



▶ **JE COMMANDE**

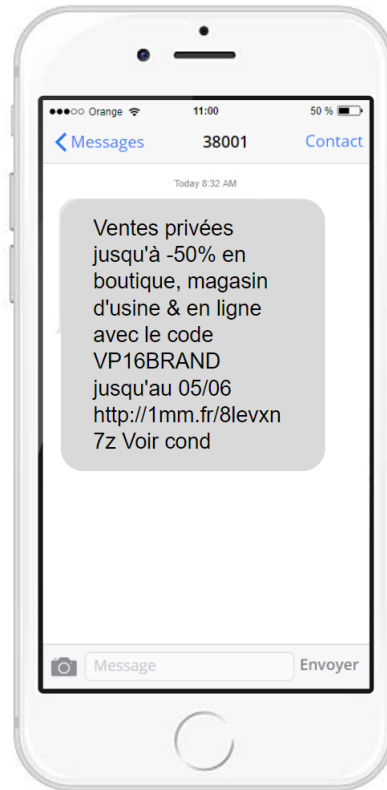


SIMPLIFIEZ-VOUS LES COURSES AVEC
CARREFOUR DRIVE
[PERSONNE MAGASIN]

▶ **1 CLIC, C'EST DANS LE COFFRE !**

▶ **JE COMMANDE**

Chapter 2



Chapter 3

Jusqu'au 11 novembre, profitez de -20% à -50% en boutique et sur le-shop
Si ce lien ne s'ouvre pas correctement, vous pouvez le visiter sur bit.ly/2G1E08G

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-40%	Boots haut bout homme jusqu'à 29,99 €	Boots court bout F jusqu'à 39,99 €	Bouton chaud garçon jusqu'à 29,99 €
-30%	Boots pied rock jusqu'à 27,99 €	Boots rock haut bout jusqu'à 39,99 €	Botte pied chat noir jusqu'à 19,99 €
-20%	Chelsea boots jusqu'à 11,99 €	Boots court femme jusqu'à 49,99 €	Boots crâne de cuir jusqu'à 11,99 €

Encore PLUS de FOLIES ici

FOLIE FEMME FOLIE HOMME FOLIE ACCESSOIRES
FOLIE GARÇON FOLIE FILLE

RETELE-CONTACTER

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RESUME

L'influence de la stratégie omni-canal des marques sur le comportement du consommateur

Cette thèse étudie la communication omni-canal et vise à comprendre les effets de l'activation d'un canal de communication supplémentaire auprès d'un client connecté. Trois essais complémentaires étudient respectivement (i) l'impact marginal d'un canal de communication supplémentaire, (ii) l'orchestration des canaux de communication dans un parcours client connecté et (iii) l'hétérogénéité des réponses d'un portefeuille de clients. Ces essais sont construits sur des designs expérimentaux à grande échelle qui combinent des canaux traditionnels, numériques et mobiles (email, SMS, courrier et bannières en RTB). L'influence d'un canal de communication sur le comportement d'achat du consommateur est mesurée de manière causale grâce à l'incrémentalité. L'incrémentalité permet de mesurer et d'isoler la contribution réelle de chaque canal à la réponse comportementale du consommateur dans son processus décisionnel. Ce travail doctoral montre que l'activation d'un canal supplémentaire génère un incrément significatif de conversions *online* et *offline* et permet par ailleurs de comprendre l'origine de cet incrément de conversions. Au-delà d'enrichir la compréhension des modèles de communication à l'ère des canaux numériques, mobiles et programmatiques, cette thèse met en lumière les impacts d'un canal sur les parcours clients et la forte hétérogénéité des réponses comportementales d'un portefeuille de clients. Elle identifie également les sources de synergie entre les canaux et démontre le rôle clé de l'orchestration omni-canal pour tirer profit du potentiel de certains clients.

Mots clés : omni-canal, incrémentalité, communication, orchestration, stratégie client

The influence of brands' omni-channel strategy on consumer's behavior

This thesis studies omni-channel communication and aims at understanding the effects of activating an additional communication channel towards a connected customer. Three complementary essays respectively study (i) the marginal impact of an additional communication channel, (ii) the orchestration of communication channels in a connected customer journey and (iii) the heterogeneity of responses across a customer portfolio. These essays are based on large-scale field experiments combining traditional, digital and mobile channels (email, SMS, mail and RTB display). The influence of a communication channel on consumer purchasing behavior is measured causally through incrementality. Incrementality makes it possible to measure and isolate the effective contribution of each channel to the consumer's behavioral response in his decision-making process. This doctoral work demonstrates that the activation of an additional channel generates a significant uplift of online and offline conversions and provides an understanding of the source of this uplift of conversions. Beyond deepening the comprehension of communication models in the era of digital, mobile and programmatic channels, this thesis highlights the impacts of a channel on customers' journeys and the strong heterogeneity of the behavioral responses of a customer portfolio. It also identifies the sources of synergy between channels and demonstrates the key role of omni-channel orchestration in leveraging the value potential of specific customers.

Key words: omni-channel, incrementality, communication, orchestration, customer strategy