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**Master of Science in
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**The evolution of brick-and-mortar store:
an empirical analysis of technological innovations and
multichannel models adopted by physical retailers.**

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SOMMARIO

Il mondo del retailing sta cambiando più velocemente che in passato. Questi cambiamenti sono legati soprattutto all'incremento della rivalità interna, a una minaccia maggiore da parte di nuovi concorrenti dovuta all'espansione dell'e-commerce e a un più elevato potere contrattuale dei clienti derivante da una maggiore possibilità di scelta. La crescente diffusione dei mobile devices nella vita quotidiana sta portando, inoltre, al continuo successo del mobile-commerce. Più recentemente anche la diffusione dei social networks, non solo in termini di social commerce, ma soprattutto come strumenti utili nelle fasi di prevendita e post-vendita, stanno alterando il contesto competitivo. Tutti questi elementi costringono i retailers a essere attenti e pronti al cambiamento.

Lo scopo di questo lavoro è offrire un quadro generale sulla situazione attuale in cui l'aumento della competitività del mercato sta influenzando le prestazioni dei negozi tradizionali (*brick-and-mortar store*) e come questi ultimi stanno tentando di reagire ai nuovi trend e ai cambiamenti dell'ambiente competitivo, proponendo un nuovo modo per attrarre, servire e mantenere i propri clienti.

L'evoluzione dello store fisico è stata studiata attraverso l'analisi delle nuove tecnologie in-store, la multicanalità e l'interazione fra questi due temi. Attraverso la lettura di paper scientifici, white paper e la visione di video sul Web sono state individuate e analizzate nel dettaglio le nuove tecnologie che i retailers hanno introdotto o stanno introducendo nei brick-and-mortar store e i modelli multicanali che implicano la presenza dello store fisico.

L'interazione fra nuove tecnologie e multicanalità è stata studiata attraverso l'individuazione delle sole tecnologie introdotte in-store capaci di supportare percorsi multicanali. Tra queste, maggior attenzione è stata posta nell'analisi di una tecnologia in particolare, il *geofencing*, con un'analisi approfondita del processo di funzionamento e la creazione di un modello per la valutazione dell'investimento in questa tecnologia.

ABSTRACT

The world of retailing is changing faster than in the past. These changes are mainly related to the increase of internal rivalry, to a greater threat from new competitors due to the expansion of e-commerce and to a higher bargaining power of customers due to a larger field to choose from. The growing popularity of mobile devices in everyday life is leading also to the continued success of the mobile-commerce. More recently, the spread of social networks, not only in terms of social commerce, but also as useful tools in the early stages of pre-sales and post-sales service, are altering the competitive environment. All these elements are forcing retailers to be alert and ready to change.

The purpose of this paper is to provide a general picture of the current situation in which the increase of the competitiveness of the market is affecting the performance of traditional shops (brick-and-mortar store) and how the latter try to react to new trends and changes in the competitive context, providing a new way to attract, serve and retain their customers.

The evolution of the physical store has been studied through the analysis of the new technologies in-store, multi-channel and the interaction between these two issues. Through the reading of scientific papers, white papers and watching videos on the Web it was possible to identify and analyze in detail the new technologies that retailers introduced or are introducing in the brick-and-mortar store and multichannel models that imply the presence of the physical store. The interaction between new technologies and multi-channel has been carried out through the identification of the only technologies introduced in store able to support multi-channel paths. Among these, most attention was paid to the analysis of a particular technology, the *geofencing*, with a thorough analysis of the operating process and the creation of a model for the evaluation of the investment in this technology.

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EXECUTIVE SUMMARY

A. Assumptions of analysis

Nowadays the world of retailing is facing an increase of the overall competitiveness of the external market due, in particular, to a higher degree of internal rivalry, a higher threat of new competitors and a higher bargaining power of final customers.

The retail industry is changing more than ever before. The changes in customers' behaviours, the spread of new technologies in daily life and the economic situation are three elements that are mutually reshaping the retail world. Focusing our attention on physical retailers, we can say that e-commerce has disrupted the traditional brick and mortar format. E-commerce allows for broader assortments at lower distribution costs than physical stores, indeed, consumers have more options than before and they will spend their money only on the very best option. With the e-commerce boom, many people thought that this was the end of brick and mortar retail. It is true that customers continue to move from physical stores to online and mobile channels to do their shopping but it is important to remark that actually e-commerce sales are just a small quantity of the overall. An Accenture's research of 2012 shown the percentage of sales made by physical stores in different countries: in UK, for example, is more than 85 %, 91 % in Germany, and a whopping 98 % in Italy, while in the US stores account for 95 % of all sales. (Accenture: Winning the retail war)

Speaking about e-commerce, we have to take into consideration not only the use of Internet but even new devices like tablets and smartphones that empowered consumers like never before. The diffusion of mobile devices modified deeply consumers' habits and their shopping behaviours. For example a customer, using his smartphone, can compare prices of a product directly in the retail and decide to buy it online. Customers with mobile devices have not only the power to buy anywhere and anytime but also to raise info about a product, to get special coupons and discounts, to manage personal account data and even to pay. To keep up, retailers need to be vigilant across channels and offer many options to customer to purchase products. They also need to engage with customers through social media.

The diffusion of social media like Facebook, Twitter and Pinterest is giving merchants new channels to communicate with their customers, sustaining in particular, the pre-sales and post-sales phases.

This increase of the external market's competitiveness is affecting the performances of physical retails, also called brick-and-mortar stores. To contrast this situation, companies should deeply understand opportunities and threats coming from the emerging trends and the changes in the competitive environment.

B. Research Objectives

This research evaluates how retailers are replying to the changing in customers' behaviors and needs, to the possible opportunities and to the current trends characterizing this world in evolution. Only business to consumer context, B2C, will be analysed.

The aim of this study is to analyse how brick-and-mortar stores are evolving, with a particular focus on technological innovations and on multichannel models adopted by merchants.

Furthermore, once analysed each phenomenon at a time, we focused on the interactions between technological innovation and multichannel; identifying in other words all the technological innovations that enable multichannel paths.

For this reason the study has been developed in relation to the following research questions:

- 1) Which is the state of the art of the implementation of different technological innovations in brick-and-mortar stores?
Identify all the possible technological innovations adopted in physical stores, found in different sectors and all over the world. List all the possible benefits and drawbacks for merchants and customers of each innovation. Classify all the innovations found and find common trends and clusters.
- 2) Which is the state of the art of the multichannel models, offered by merchants, which imply possible interactions with physical store?
Identify the main multichannel macro-models and specific paths that rely on physical store. List possible benefits and drawbacks for merchants and customers of each multichannel path.
- 3) How can these two perspectives (technological innovations and multichannel models) support each other?
Identify which are the technological innovations that enable and support a multichannel model.
- 4) Geofencing as an innovation able to support multichannel: what is its impact for merchants?
Among all the innovations found in the third research question, analyse in detail the working principles of geofencing and evaluate its impact.
- 5) How is it possible to evaluate geofencing performances?
Identify a model able to assess the value of the investment in geofencing. Make a sensitive analysis for single parameters of the model and for different possible scenarios.

C. Methodology of analysis

Our work is divided in two main parts. The first part is a literature review on two main topics of the retail evolution: technology innovations and multichannel. The second part, instead, is based on a general empirical analysis with related considerations about the multichannel models and the in-store innovations found. Once defined the state of the art of multichannel models and of technological innovation in-store, we performed a more detailed analysis of one of these innovations: geofencing.

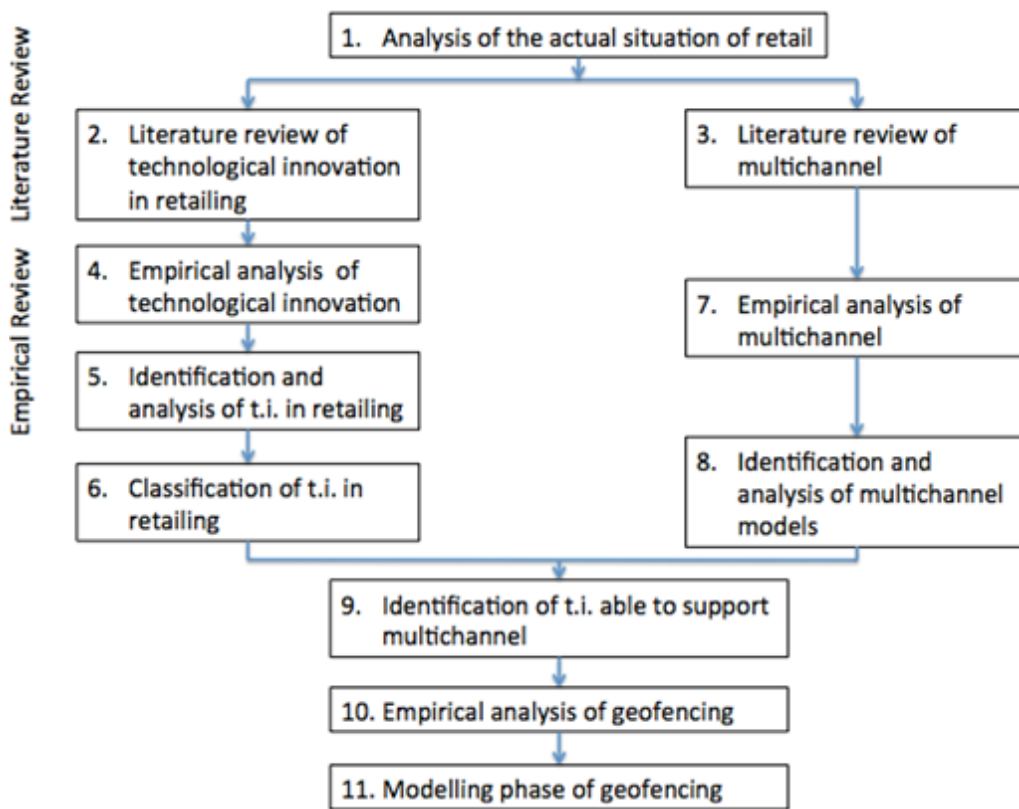


Figure E.1 – Phases of methodology [Personal elaboration]

The methodology of analysis in detail is divided in the following steps:

1. Analysis of the actual situation of retail

The starting point is the analysis of the actual context in which physical stores operate. This step aims at analysing the main forces and causes behind

the evolution of brick-and-mortar store through the analysis of white papers, conferences of experts, articles of newspapers, and few contributions from scientific papers.

2. Literature review of technological innovation in retail

The review analyses the theme of *innovations in retailing* in the existing literature. It aims at focusing on the innovations applied in physical stores, which are going to reshape the traditional model of brick and mortar stores. Our focus is limited to those papers, which deal with the theme of in-store innovation in a Business to Consumer context, B2C, that imply a front-end interaction with final customers. We analysed 11 different scientific papers and from this we identified: the possible classification of innovation in retailing, the factors that triggers the introduction of innovations and the impacts for customers and merchants.

3. Literature review of multichannel

The *multichannel* review aims at analysing how this theme has been discussed over the time. In particular our focus is on the theme of multichannel models in retailing, since the goal of our thesis is valuing the evolution of the store coming from the jointly integration of elements like the introduction of technological innovation and the adoption of a multichannel approach. Through the analysis of 25 scientific papers we identified some macro model of multichannel and case studies, which allow us to set the issue and benefits, criticalities and critical success factors coming from the adoption of a multichannel approach. To complete our analysis review and have a broader knowledge on the two main topics described above (technological innovation and multichannel), we analysed 19 white papers from several consulting companies as Accenture, Bain, BCG, Capgemini, McKinsey, PWC and Kantar Retail.

4. Empirical analysis of technological innovation

The empirical analysis of technological innovations started with the search of in-store innovations, through the reading of articles, white paper, scientific paper, the view of videos and specific website not only from Italy but from all over the world. Most sources that we found regard the American and English markets but it should not be underestimated the contribution from some other countries of the Far East (Korea) and Germany.

5. Identification and analysis (benefits and drawbacks) of technological innovation in retail

Second step was the identification and analysis of the innovations found with a description on the working principle and relative benefits and drawbacks for both customers and merchants.

6. Classification of technological innovation in retail

Once defined the state of the art of technological innovations, we classified them according to different axes like impact of innovation, diffusion degree, innovation degree, device used.

7. Empirical analysis of multichannel

The empirical analysis of multichannel was made considering only those approaches that imply the presence of the offline channels. We identified three multichannel paths (Offline + Online, Offline + Mobile, Offline + Social) but we focused our attention only on the first two, identifying different multichannel models.

8. Identification of multichannel models which imply the utilization of offline channel (physical store)

A more detailed analysis was carried out in order to define all multichannel models that rely on physical store.

9. Identification of the technological innovation able to support multichannel model

All technological innovations found were classified on their capabilities to enable multichannel paths.

10. Empirical analysis of geofencing: typologies, process description, main variables of implementation, KPIs

We choose to analyse “geofencing” as an example of innovation able to support multichannel paths.

11. Modelling phase of geofencing

A model was done in order to assess the value of geofencing, through the use of ROI, NPV and Payback time. A subsequent sensitive analysis on critical factors and different scenarios was performed.

D.Results

The last phase of our research is to provide the final results, which correspond to answer the research questions formulated above.

- 1) The state of the art of technological innovations introduced in physical store by merchant is characterised by a high degree of heterogeneity. In fact we identified 26 innovations that differ in many aspects. For each of the 26 innovations we identified all the possible benefits and drawbacks coming from their adoption both for merchants and customers.

INNOVATION	MERCHANT	
	BENEFITS	DRAWBACKS
Qr infoscan	-Higher customer satisfaction, -Higher service level, -Support pre-sales in store	/
Windows shopping wall	-Increase sales, -Higher service level	-Create efficient supply chain -Integration with physical store
Shadow QR code	-Increase sales -Word of mouth	-Create efficient supply chain -Integration with physical store
QR code windows' store	-Store profitable 24 h per day -Reduction variable costs -Higher service level	/
Mobile shopping assistant	-Reduction personnel costs -Higher service level -Gather info on cust. purchases -Increase quality perception	-Create friendly and powerfull app -Data mining on customers' data
Mobile augmented reality	-Gather info on cust. preferences -Stimulate customer curiosity	-Data mining on customers' data
Geofencing	-Increase sales -Increase brand awareness	-Privacy management -App developement (if app-based)
Mobile point of sales	-Avoid loss of sales due to stock out -Higher service level	-Personnel training
Kiosk	-Support pre-sales and post-sales -Higher service level -Higher customer satisfaction	/
Browse&order hub	-Avoid loss of sales due to stock out -Higher service level -Higher customer satisfaction	-Stock-out management -Medium implementation cost
Vending machine	-Reach high traffic location -Higher service level	/
Display	-Brand awareness -Capture customer attention -Modify contents in dynamic way (respect to posters)	/
Video label	-Brand awareness -Capture customer attention -Modify contents in dynamic way (respect to posters)	/
Interactive display	-Capture customer attention	-High costs
Interactive window	-Capture customer attention	-High costs (only in flagship store)

	-Brand awareness -Reduce shelf space -Reduce personnel	
Augmented reality window	-Reduce storage costs -Expose a limited number of products -Customer's attention and curiosity	-High costs (only in flagship store)
Magic mirror	-Reduce storage costs -Expose a limited number of products (clothes in store) -Customer's attention and curiosity	-High costs
NFC payment	-Higher productivity -Simple technology	-Low diffusion
Mobile remote payment	-Higher productivity -Simple technology	-Low diffusion
Fingerprint authentication	-increase productivity check-out points -Cost savings	-Privacy management -Not everyone can use it (physical problem) -Customer suspiciousness
Barcode card as product	-Reduce shelf space (showroom) -Reduce storage costs -Higher productivity -Simple and cheap technology	/
Self-checkout kiosk	-Reduce personnel costs	/
Personal shopping assistant	-Decrease personnel costs -Gather cust. info on preferences -Communicate to customer promotion and discount -Higher service level -Deliver high customized info -Increase quality perception -Shelf visibility	-High costs -Create a friendly and powerful solution
Self shopping pod	Decrease personnel costs -Gather cust. info on preferences -Communicate to customer promotion and discount -Higher service level -Deliver high customized info -Increase quality perception -Shelf visibility	-High costs -Create a friendly and powerful solution
Bodometric scanner	-Higher productivity -Useful role of shopping assistant -Higher value perceived by customer	-High costs -Personnel training
Free wifi	-Support pre-sales and post-sales	/

Figure E.2 – Technologies' pros and cons for merchant [Personal elaboration]

INNOVATION	CUSTOMER	
	BENEFITS	DRAWBACKS
Qr infoscanner	-Higher knowledge of products before buying -Consulting ratings and feedbacks -Interaction with products	/
Windows shopping wall	-Time saving -Gathering info -Home delivery	/

Shadow QR code	-Time saving -Discount -Home delivery -Enjoyable experience	-Usable in limited time window and location -It depends on weather condition
QR code windows' store	-Buy a product with the store closed -Time saving -Verify product availability -Home delivery -Gather info of products	/
Mobile shopping assistant	-Time saving -Stay on budget -Gather product info in store	/
Mobile augmented reality	-Get info on product -Feedback and ratings -Discount	/
Geofencing	-Discount -Personalised offerings -Proximity to store	-Privacy problems -Spam
Mobile point of sales	-Time saving -Free home delivery (if stock out)	/
Kiosk	-Browse of catalogue -Personalized offerings -Fidelity card management	/
Browse&order hub	-Check product availability -Compare different products -Time saving (not seek for products in store, no checkout) -Free home delivery (if stock out)	/
Vending machine	-Time saving -Location	/
Display	-See products on video	/
Video label	-See products on video	/
Interactive display	-See products on video -Get info on selected product	/
Interactive window	-See products on video -Get info on selected product -Interact with virtual product -Feedbacks and ratings -Share on social networks	/
Augmented reality window	-Try virtually products not in store -Try products immediately without enter the store	/
Magic mirror	-Try virtually products not in store -Time saving in trying clothes -Compare outfits -Share outfit (few cases) -Feedback (few cases)	-Not accurate
NFC payment	-Simple to use -Time saving -Higher payment security	-Threshold of payment with NFC
Mobile remote payment	-Simple to use -Time saving -Higher payment security	/
Fingerprint	-Simple to use	-Privacy problems

authentication	-Higher payment security -Easier and faster -Make payment without cash and credit card -Loyalty card no more necessary	-Not everyone can use it (physical problem)
Barcode card as product	-Time saving at checkout point	/
Self-checkou kiosk	-Possible time saving (less queue)	-Not always time saving -Not always easy to use
Personal shopping assistant	-Time saving -Stay on budget -Comparing different proposals -Get info on products -Know fidelity points -Examine shopping list -Discount -Products locator	/
Self shopping pod	-Time saving -Stay on budget -Comparing different proposals -Get info on products -Know fidelity points -Examine shopping list -Discount	/
Biometric scanner	-Time saving in selecting the right cloth size	/
Free wifi	-Get products info -Compare products and prices -Saty connected	

Figure E.3 – Technologies’ pros and cons for customer [Personal elaboration]

We classified all the innovations found according to the following dimensions:

1. Impact of innovation (operative, tactical, strategic)
2. Covered phases of the buying process
3. Innovation typology (hardware, software)
4. Device used (smartphone, tablet, kiosk, screen...)
5. Innovation degree
6. Diffusion degree
7. Sector of application
8. Intra-company diffusion (only in flagship store, in all point of sales)
9. Active of passive role of customer in using innovation

A table showing some of these classifications is presented below:

INNOVATION	Innovation typology	Device used	Supported phases	Active/Passive	Impact of innovation	Innovation degree	Diffusion degree	Intra-comp. diffusion degree
QR Infoscanner	software	smartphone, tablet	pre-sales	Active	operative	2,25	5	All
Windows shopping wall	software	smartphone, tablet	pre-sales, selection, payment, post-sales	Active	strategic	4	3	All
Shadow QR code	software	smartphone, tablet	pre-sales, selection, payment, post-sales	Active	tactical	4	1	Limited
QR Code window's store	software	smartphone, tablet	pre-sales, selection, payment	Active	tactical	3,5	4	All/ Limited
Mobile shopping assistant	software	smartphone, tablet	pre-sales, selection	Active	tactical	2,75	1	All
Mobile augmented reality	software	smartphone, tablet	pre-sales, selection, post-sales	Active	strategic	4	1	All
Geofencing	software	smartphone, tablet	pre-sales	Passive	tactical	3	4	All/ Limited
Mobile point of Sales (tablet)	hardware	tablet	pre-sales, selection, payment	Active	strategic	4	2	All/ Limited
Kiosk	hardware	kiosk	pre-sales, post-sales	Active	operative	2	5	All
Browse & Order hub	hardware	kiosk	pre-sales, selection, payment	Active	strategic	3,25	2	Limited
Display	hardware	display	pre-sales	Passive	operative	2	4	All
Video label	hardware	display	pre-sales	Passive	operative	2,25	1	Limited
Interactive display	hardware	display	pre-sales	Active	operative	2,75	1	Flagship store
Interactive window	hardware	display	pre-sales, selection	Active	tactical	3,5	1	Flagship store
Augmented reality window	hardware	touchscreen display	pre-sales	Active	operative	3,25	1	Flagship store
Magic mirror	hardware	touchscreen display	pre-sales, selection	Active	tactical	4	1	Limited/ Flagship store
NFC point	hardware	NFC reader	payment	Active	tactical	3,25	1	All
Barcode card as product	hardware	barcode reader	selection	Active	strategic	2,25	1	Flagship store
Self-service checkout kiosk	hardware	kiosk	payment	Active	strategic	1,5	5	All/ Limited
Personal shopping assistant	hardware	smart reader	pre-sales, selection, post-sales	Active	strategic	3	3	Limited
Self-shopping pod	hardware	smart reader	pre-sales, selection, post-sales	Active	tactical	2,75	4	Limited
Mobile remote payment	software	smartphone	payment	Active	tactical	2,75	1	All
Fingerprint authentication	hardware	Fingerprint reader	selection	Active	strategic	4,25	1	Limited
Bodymetrics scanner	hardware	Body scanner	pre-sales, selection	Active	strategic	4	1	Flagship store
Vending machine	hardware	Vending machine	pre-sales, selection, payment	Active	strategic	3	2	All
Free wi-fi	hardware	smartphone, tablet	pre-sales, selection, post-sales	Active	operative	2	4	All

Figure E.4 – Characteristics of technology innovations [Personal elaboration]

We decided to calculate the innovation degree through different dimensions, with a qualitative analysis. We assigned to each dimension a score from 1 (low) to 5 (high). The final innovation degree is the weighted average of the six dimensions, assigning to each dimension the same weight.

Technological Innovation	Usability	Flexibility	Impact	Tec. Maturity	Average
QR infoscan	5	1	1	2	2,25
Windows shopping wall	4	5	5	2	4
Shadow QR code	4	4	5	3	4
QR code window's store	4	5	3	2	3,5
Mobile shopping assistant (scan&go)	4	3	3	1	2,75
Mobile augmented reality	4	4	3	5	4
Geofencing	5	2	3	2	3
Mobile Point of sales	4	5	4	3	4
Kiosk	4	2	1	1	2
Browse&order hub	4	4	4	1	3,25
Display	5	1	1	1	2
Video label	5	1	1	2	2,25
Interactive display	5	2	2	2	2,75
Interactive window	4	3	3	4	3,5
Augmented reality window	4	2	2	5	3,25
Magic mirror	3	4	4	5	4
Barcode card as product	5	2	1	1	2,25
Personal shopping assistant	4	4	2	2	3
Self-shopping pod	4	3	2	2	2,75
Self-service checkout kiosk	3	1	1	1	1,5
Vending machine	4	3	3	2	3
Biometrics scanner	5	2	4	5	4
NFC payment	5	1	2	5	3,25
Mobile remote payment	4	1	2	4	2,75
Fingerprint authentication	5	3	4	5	4,25

Figure E.5 – Innovation degree of new technology [Personal elaboration]

All these technological innovations are explained, analysed and classified in details in the dedicated chapter of empirical analysis.

Further results have been gathered from the analysis of technological innovations coming from the combination of different classification's axes.

An example of graphic follows, as it can be seen, some common trends and cluster have been identified:

IMPACT OF INNOVATION

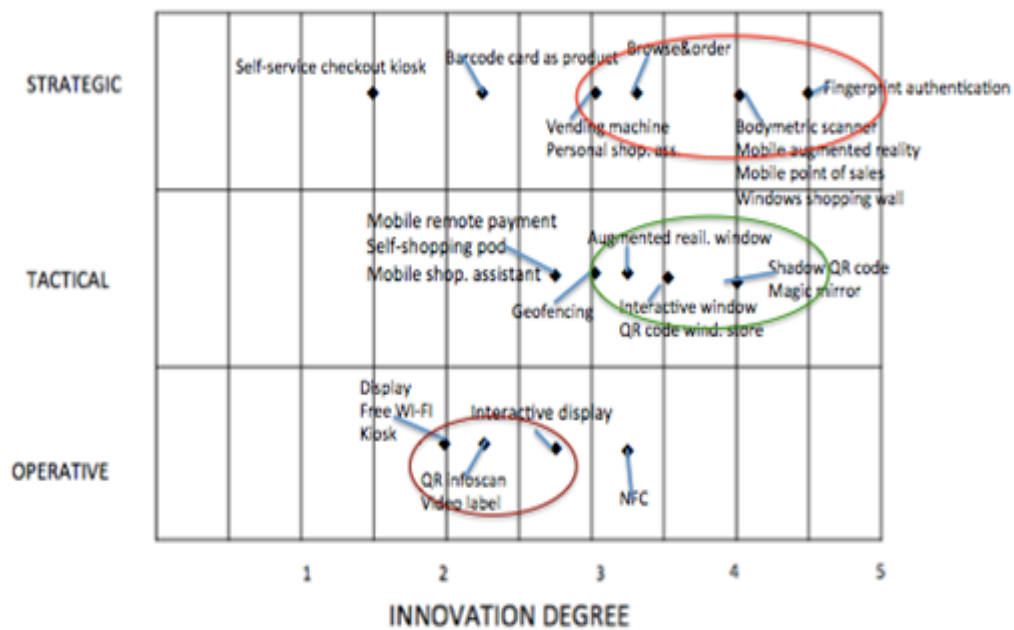


Figure E.6 – Classification of technology based on impact and innovation [Personal elaboration]

2) Concerning the state of the art of multichannel we identified three main macro- models:

- Offline channel (physical store) + Online channel
- Offline channel + mobile channel
- Offline channel + Social

We focused on the two first macro-models and we identified all the possible multichannel models.

Macro-model 1: Offline + Online

We started considering the first macro-model characterised by the interaction of physical store (offline channel) and online channel. We identified seven different models classified on the basis of the channel used to support one of the four phases of the buying process.

The seven models are:

- Info Commerce
- Info Store
- In-store support
- Online support
- Book and collect
- Pick and pay
- Info touch

An example of how we analysed each multichannel model is shown below:

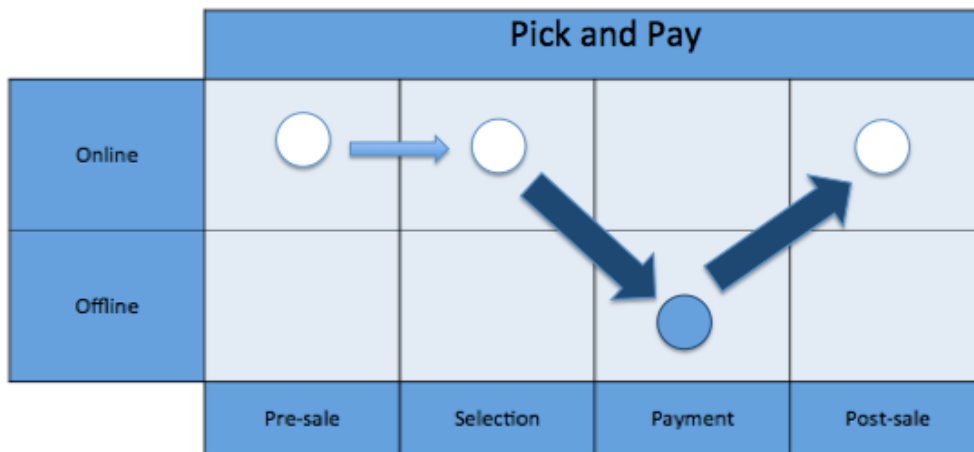


Figure E.7 – Pick and pay [adapted from Osservatorio eCommerce B2C]

Benefits and drawbacks per each channel are analysed below:

Multichannel model	MERCHANT	
	Benefits	Drawbacks
Infocommerce	-Higher efficiency force -Effectiveness and efficient communication -Higher customer satisfaction -Higher service level	-Sales force not sufficiently prepared -Need of integration between different catalogues
Infostore	-Possibility to avoid stock out -Higher sales force efficiency	/

	-Higher customer satisfaction -Higher service level	
Instore support	-Higher customer confidence -Higher service level	
Online support	-Possibility to outsource assistance and service	-Costly in some cases (Door to door service)
Book and collect	-Higher customer confidence -Higher service level -Higher customer service	-Integration of stocks management between different channels
Pick and pay	-Higher customer confidence -Higher service level -Customer management -High conversion rate	-Integration of stocks management between different channels
Info touch	-Possibility to show a high range of products -Reduce shelf space -Reduce storage costs -Support customer in store -Higher productivity	/

Figure E.8 – Offline + Online models’ pros and cons for merchant [Personal elaboration]

Multichannel model	CUSTOMER	
	Benefits	Drawbacks
Infocommerce	-Get info on products before buying them -Easy and fast comparison of products -Consulting ratings and feedbacks -Flexibility in gathering info	/
Infostore	-Get info on products before buying them -Direct contact with sales force -Interaction with products in store	/
Instore support	-Post-sales phase support	
Online support	-High flexibility (door to door support)	-Reduction in the security degree perceived by customer
Book and collect	-High control on process (time and modalities) -Possibility to see and touch products before buying them	/
Pick and pay	-High control on process (time and modalities)	/
Info touch	-Possibility to be supported in store	/

Figure E.9 — Offline + Online models’ pros and cons for customer [Personal elaboration]

Macro-model 2: Offline + Mobile

Concerning the second macro-model characterised by the interaction of the mobile channel and offline, the models found are:

- Store locator
- Info Mobile
- Mobile commerce
- Mobile support

	MERCHANT	
Multichannel model	Benefits	Drawbacks
Store locator	-Geolocalization of points of sales -Higher service level	/
Info mobile	-Attract customers -Increase purchase impulse (flash sales, limited offers in quantity and time) -Higher service level	/
Mobile commerce	-Increase purchase impulse (flash sales, limited offers in quantity and time) -Increase sales -Higher service level -Customer management	/
Mobile support	-Higher customer confidence -Higher service level -Customer management	/

Figure E.10 — Offline + Mobile models' pros and cons for merchant [Personal elaboration]

	CUSTOMER	
Multichannel model	Benefits	Drawbacks
Store locator	-Possibility to find the closest point of sales	/
Info mobile	-Info anywhere and anytime	/
Mobile commerce	-High flexibility -Possibility to strong discounts	/
Mobile support	-High control on the process	/

Figure E.11 — Offline + Mobile models' pros and cons for customer [Personal elaboration]

3) The results of the third research question concern how technological innovations and multichannel models in store integrate each other. In other words, we identified all the innovations able to support a multichannel approach. Each innovation has been defined as one of the following configuration:

- YES: the technological innovation implies multi-channel paths
- NO: the technological innovation doesn't imply multi-channel paths
- POSSIBLE: the technological innovation can imply multi-channel paths; but it is not mandatory and it could depend from the customer's choices or from the merchant's choice in implemented the technology.

Technological Innovations	Multichannel support
1. QR info-scan	YES
2. Windows shopping wall	POSSIBLE (if pick up in store)
3. Shadow QR code	POSSIBLE (if pick up in store)
4. Window's store QR code	YES
5. Mobile shopping assistant (Scan&go)	NO
6. Mobile augmented reality	YES
7. Geofencing	YES
8. Mobile Point of sales	YES
9. Kiosk	POSSIBLE
10. Browse& order hub	YES
11. Vending machine	NO
12. Display	NO
13. Video label	NO
14. Interactive display	NO
15. Interactive window	NO
16. Augmented reality window	NO
17. Magic mirror	POSSIBLE (if present social sharing)
18. NFC payment (mobile proximity payment)	NO
19. Mobile remote payment	NO
20. Fingerprint authentication	POSSIBLE (possible future integration between mobile, online)

	and offline authentication)
21. Barcode card as product	NO
22. Self-service checkout kiosk	NO
23. Personal shopping assistant	NO
24. Self-shopping pod	NO
25. Bodymetrics scanner	NO
26. Free Wi-Fi zone	YES

Figure E.12 – Technologies’ ability to support multichannel [Personal elaboration]

- 4) We decided to analyze in detail “*Geofencing*” as an example of innovation that enable multichannel paths. This innovation is based on the *Info Mobile model* where pre-sale phase is supported by the mobile channel while the other phases are performed by customer in the offline channel.

We decided to select geofencing for many reasons: first of all it can be applied to all kind of merchants regardless dimensions and sectors. This consideration, added to the fact that geofencing imply the use of mobile, which is becoming the personal shopping instrument of the near future, makes us think that geofencing has an high probability of diffusion. This could happen also because the innovation has a limited impact in term of cost and reversibility.

We defined a set of KPIs able to evaluate the operative performances of geofencing during time.

Moreover we provided a general model able to evaluate the investment in geofencing, independently from the type and sector in which merchant operates. In order to evaluate geofencing investment it is necessary shifting from the accrual to the financial logic, and for this reason we have to define all cash inflows and outflows generated by the investment.

Some previous considerations should be done before proceeding with the modeling of Cash Inflows and Outflows:

- Geofencing doesn’t require CAPEX. This because geofencing is a sort of marketing investment, thus, marketing funds aren’t 'tied' up in plants and inventories, but they are typically 'risky.' Marketing spending is typically expensed in the current period. The only expenses that are not in the current period are related to the implementation costs, which are totally allocated to year 0.
- Accrual events correspond to their related financial events. This is always true for Revenues and Cash Inflows because in a B2C market the

accrual event related to sales and the financial event related to cash payment by customers occur at the same time. We can make a reasonable hypothesis on considering the geofencing costs (recorded under the voice distribution/selling costs) correspondent to the related cash outflows. Under these hypothesis there isn't any variation on the operating working capital (OWC).

- Due to the fact that there aren't investments in fixed assets and in OWC, the Net cash flow (NCF) is equal with the Cash flow (CF).

We make two further hypotheses before starting with the model:

- No taxes
- No external financing: only shareholders are considered as financers ($K=K_e$)

Cash Inflows

$$\text{Cash Inflows} = \left(\text{Average expenditure per coupon} \left(\frac{\$}{\text{coupon}} \right) * \# \text{ coupon used (coupon)} \right) * (1 - \alpha)$$

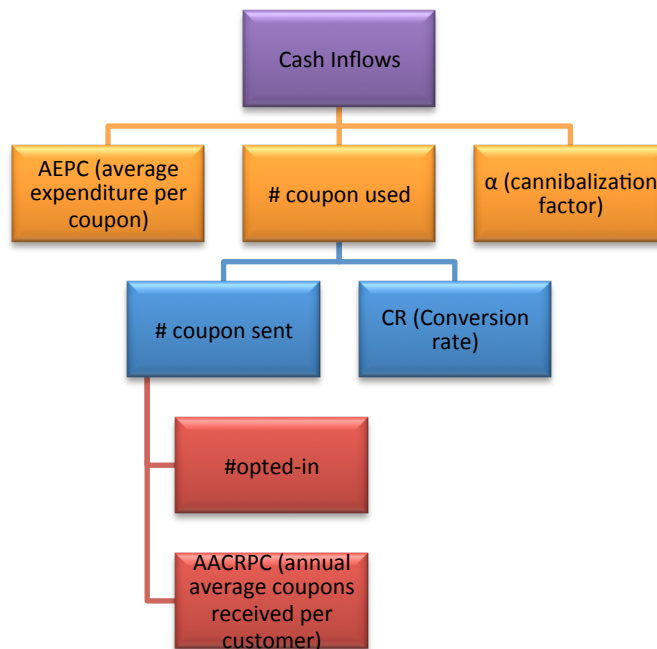


Figure E.13 – Layout of cash inflow factors [Personal elaboration]

Cash Outflows

Cash Outflows

$$= (\text{Revenues from geofencing}(\$) * \text{COGS}(\%)) + (\text{IC}(\$) + \text{Lifetime cost}(\$) + \text{Total costs messages}(\$))$$

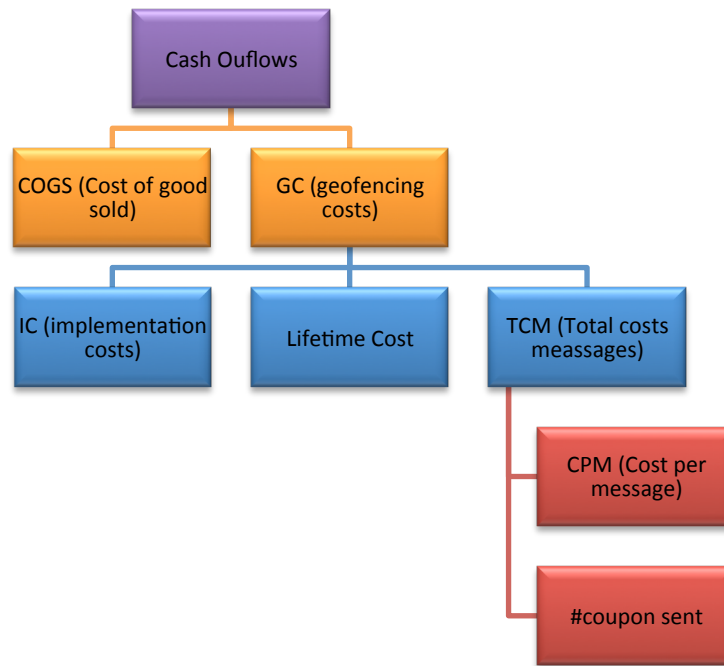


Figure E.14 – Layout of cash outflow factors [Personal elaboration]

Once defined the specific model able to assess all the cash inflows and outflows; we developed a basic case on the mass-market apparel sector to evaluate geofencing investment through three appraisal models: ROI, NPV and Payback time. We considered in our model the implementation of only one fence for a single store.

This basic case was built in part using values coming from successful cases of geofencing implementation in the apparel sector, and in part with hypothesis due to lack of data. For this reason even if data are reasonable it should be necessary to test the model basing it on real cases.

The results of the basis case are the following:

NPV=782.810\$

Payback time (PBT)=0,68 years

ROI= each year is highlighted in green in the following table:

Basic case	year 0	1st year	2nd year	3rd year	4th year	5th year
Inbound CF	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
Revenues from Geofencing (RAG)	\$ -	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00
gross profit	\$ -	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00
Gross profit with cannibalization	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
# opted-in	0	800	800	800	800	800
#annual coupon received per person	0	18	18	18	18	18
#coupon sent	0	14400	14400	14400	14400	14400
Conversion rate	0	25%	25%	25%	25%	25%
Annual coupon used	0	3600	3600	3600	3600	3600
Average expense per customer	\$ -	\$ 70,00	\$ 70,00	\$ 70,00	\$ 70,00	\$ 70,00
Contribution margin	0	30%	30%	30%	30%	30%
Cannibalization factor	0	20%	20%	20%	20%	20%
TOTAL COST	\$ 50.000,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00
Implementation cost	\$ 50.000,00	\$ -	\$ -	\$ -	\$ -	\$ -
Annual lifetime cost	\$ -	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00
Cost per total SMS	\$ -	\$ 504,00	\$ 504,00	\$ 504,00	\$ 504,00	\$ 504,00

Basic case	year 0	1st year	2nd year	3rd year	4th year	5th year
Cash Inflow	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
Cash Outflow	\$ 50.000,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00
Cumulative Cash Outflow	\$ 50.000,00	\$ 110.504,00	\$ 171.008,00	\$ 231.512,00	\$ 292.016,00	\$ 352.520,00
NCF	\$ -50.000,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00
Cumulative NCF	\$ -50.000,00	\$ 30.616,00	\$ 111.232,00	\$ 191.848,00	\$ 272.464,00	\$ 353.080,00
Simple ROI	-1,00	0,28	0,65	0,83	0,93	1,00

Figure E.15 – ROI in the first five year after implementation – Basic case [Personal elaboration]

After building up a basic case, we performed a two steps sensitivity analysis: the first analysis was based on critical factors and the second one was based on different scenarios.

In the first sensitivity analysis we identified the number of subscribers, the average messages received by each person and the conversion rate as critical factors able to influence in a greater manner NPV and PBT results. Other factors like cannibalization factor and average expenditure per coupon seem to impact less.

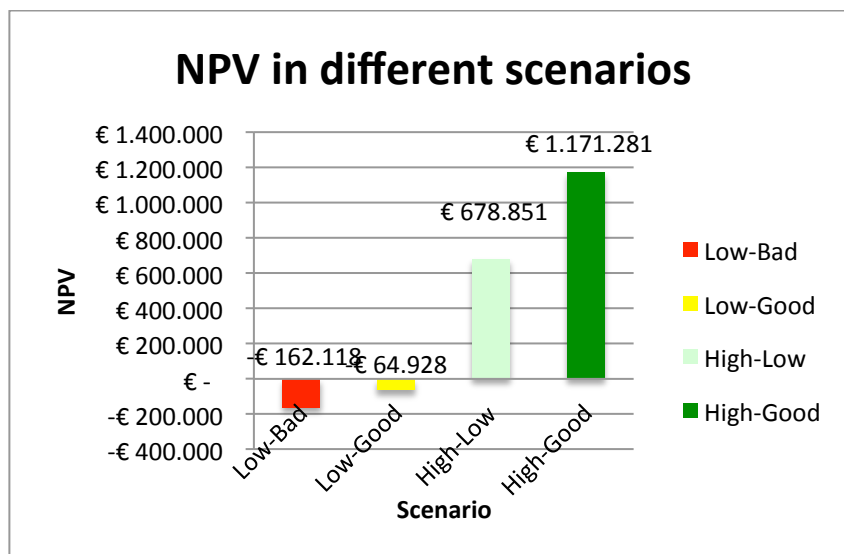
Varying one factor at a time we identified its impact on the change of NPV and Payback time. Results follow:

Summary of results	CR	#opted-in	AAEPC	Cannib. fact.	AEPC	NPV	Delta NPV	PBT (years)	Delta PBT
Basic case	25%	800	18	20%	€ 70,00	\$ 782.810		0,68	
Negative case CR - 5%	20%	800	18	20%	€ 70,00	\$ 491.240	-37,25%	1,05	54,54%
Positive case CR +5%	30%	800	18	20%	€ 70,00	\$ 1.074.380	37,25%	0,50	-25,93%
Negative case #opted-in -15%	25%	680	18	20%	€ 70,00	\$ 564.913	-27,84%	0,92	35,44%
Positive case #opted-in +15%	25%	920	18	20%	€ 70,00	\$ 1.000.707	27,84%	0,54	-20,74%
Negative case AACRPC -10%	25%	800	16,2	20%	€ 70,00	\$ 375.132	-52,08%	1,36	100,63%
Positive case AACRPC +10%	25%	800	19,8	20%	€ 70,00	\$ 1.248.802	59,53%	0,44	-35,88%
Negative case cannibalization factor +5%	25%	800	18	15%	€ 70,00	\$ 691.694	-11,64%	0,76	12,28%
Positive case cannibalization factor -5%	25%	800	18	25%	€ 70,00	\$ 873.926	11,64%	0,61	-9,86%
Average expenditure per coupon -10%	25%	800	18	20%	€ 63,00	\$ 637.025	-18,62%	0,82	21,22%
Average expenditure per coupon +10%	25%	800	18	20%	€ 77,00	\$ 928.595	18,62%	0,58	-14,90%

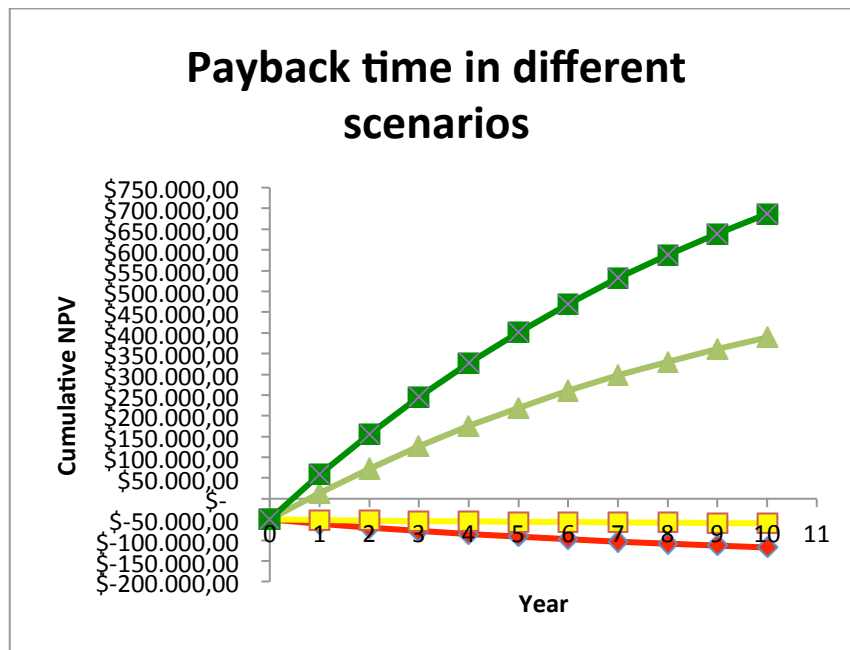
Figure E.16 – Framework of critical factors impact on geofencing performances [Personal elaboration]

The second sensitivity analysis was made considering four different scenarios, which differ in terms of economic condition (Bad or Good situation) and correctness in the implementation of geofencing (Low or High level of correctness in implementation).

These two drivers are able to influence some critical factors like conversion rate, average expenditure per coupon and others. From the results of this sensitivity analysis it seems that a correct implementation constitutes the prerequisite to have positive results in terms of NPV and payback time from the investment in geofencing; as a matter of fact, in the High-Bad scenario, where there is a negative economic condition, we have positive results.



Graph E.1 – Net Present Value of different scenarios [Personal elaboration]



Scenario	PBT (years)
High-Good	0,46
High-Bad	0,78
Low-Good	∞
Low-Bad	∞

Graph E.2 – Payback time in different scenarios [Personal elaboration]

It is important to underline the fact that is not possible to compare geofencing results coming from different merchants in terms of sector, dimension and strategy, only results coming from similar companies can be compared.

We built the assessing model of cash inflows and outflows from a deep analysis and study of the geofencing working principles. Anyway it is important to highlight some limitations of our model. The results of the basic case and of the sensitivity analysis are not based on a real case study, but they came in part from data raised by real cases and in part from estimated data. We were able to gather concordant values characterizing the geofencing costs of a network-based solution: implementation costs, lifetime costs and cost per message. These costs are independent from the sector in which the company operates.

We found other data coming from the apparel sectors for some factors like: conversion rate, number of opted-in, annual average coupon forwarded per

person. These data depend on the specific sector, geographical area and many other factors.

We estimated by scratch the cannibalization factors since we didn't find any document showing possible values of it.

1 Evolution of brick-and-mortar store

Before starting the literature review analysis, it is useful to present an introductory chapter able to give a picture of the actual situation of the retail world in general, and in particular of the traditional retail model based on physical store.

We are going to present the main forces that are reshaping and affecting the evolution of physical store, its advantages, its threats and opportunities emerging from the current trends to which it is subject.

This preliminary analysis is based essentially on the analysis of white papers of consulting companies like Accenture or McKinsey and on the opinions and results of researchers, experts and analysts of the sector.

We think that a general introduction to the evolution of brick-and-mortar store can be useful to trace the boundaries within which we could start the literature review based on two areas: multichannel and technological innovation.

1.1 Physical store: actual situation

“Every 50 years or so, retailing undergoes this kind of disruption. [...] Each wave of change doesn’t eliminate what came before it, but it reshapes the landscape and redefines consumer expectations, often beyond recognition. Retailers relying on earlier formats either adapt or die out as the new ones pull volume from their stores and make the remaining volume less profitable.”
Darrell Rigby

These words of Darrell Rigby, head of Bain & Company’s Global Innovation, Global Retail, and Winning in Turbulence practice, frame perfectly the situation of retailing in these days: this world is facing an increase of the overall competitiveness of the market due, in particular, to a higher degree of internal rivalry, a higher threat of new competitors and a higher bargaining power of final customers. To contrast this situation, companies should deeply understand opportunities and threats coming from the emerging trends in the competitive environment, in order to rethink ways to attract, serve and retain customers.

The changes in customers’ behaviors, the spread of new technologies in daily life and the economic situation are three elements that are mutually reshaping the retail world.

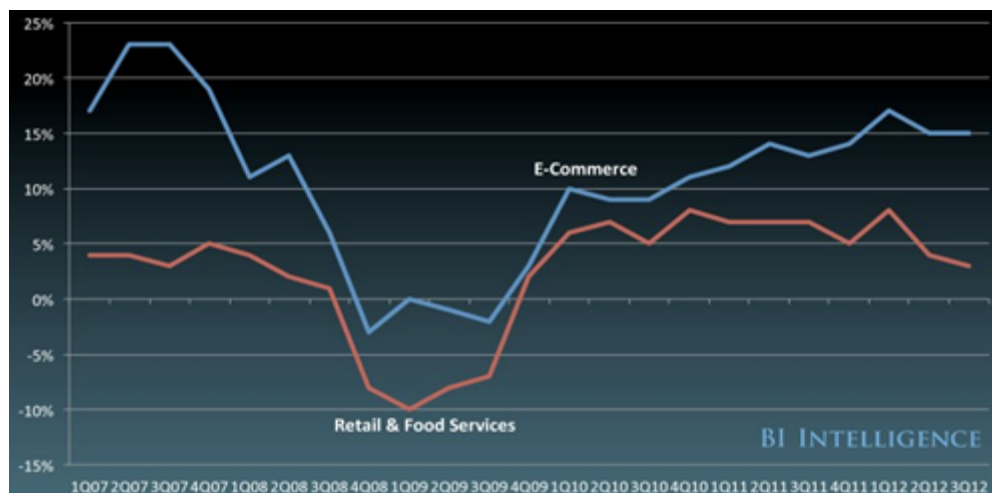
Focusing our attention on physical retailers, we can say that e-commerce has disrupted the traditional brick-and-mortar format. E-commerce allows for broader assortments at lower distribution costs, indeed, consumers have more options than ever before and will only spend their money on the very best option.

Since the late 1990s e-commerce boom, analysts, investors, and technology

1 Evolution of brick-and-mortar store

purists have been predicting the end of brick-and-mortar retail. While the prediction of the traditional shop format's end has been greatly exaggerated, the fact is customers continue migrating rapidly from physical stores to online and mobile channels to fulfill their shopping needs. (Accenture: How retailers can retain a profitable physical store network)

Another difference in terms of numbers between physical retail and e-commerce is that the latter is growing faster in the last years, as we can see in the following graph:



Graph 1.1 - Quarterly sales growth: e-commerce vs. retail and food services [comScore, US Department of Commerce]

This trend comes from the success of companies like Amazon, which it will become the world's sixth largest retailer by 2015. (Accenture: Winning the retail war)

Given that, it is important to remark that actually e-commerce is still a small part of total retail sales and brick-and-mortar stores still have a big importance both for customers and companies. In many countries, stores still account for the bulk of retail sales. In support of this last sentence it could be useful mention an Accenture's research of 2012 that presents the proportion of retail sales made up by stores in different countries: in UK, for instance, the proportion is more than 85 %, 91 % in Germany, and a whopping 98 % in Italy, while in the US stores account for 95 % of all sales. (Accenture: Winning the retail war)

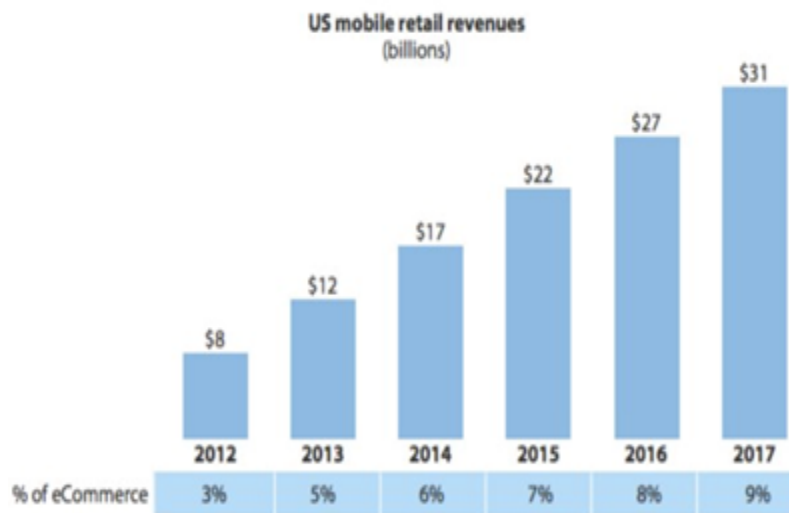


Figure 1.1 – Percentage of goods sold in physical stores [Accenture- Winning the retail war]

Speaking about e-Commerce, we have to take into consideration not only the use of Internet but even new devices like tablets and smartphones that empowered consumers like never before. The diffusion of mobile devices modified deeply consumers' habits and their shopping behaviors. For example a customer, using his smartphone, can compare prices of a product directly in the retail and decide to buy it online. Customers with mobile devices have the power to not only buy anywhere and anytime but also to raise info about a product, to get special coupons and discounts, to manage personal account data and even to pay.

Merchants know that far from killing off stores as a viable shopping channel, mobile technologies offer an opportunity to enhance the store experience exponentially, not only meeting consumer needs and expectations more efficiently, but also assisting in the delivery of the hyper-personalized and hyper-contextual experience. Mobile commerce is at the beginning of its life but the results obtained are encouraging and revenues will just keep increasing, as shown in the graph of Forrester Research.

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Graph 1.2 - US mobile retailer revenues [Forrester Research, Inc]

Another element that changes the competitive environment was the birth and the diffusion of social networks like Facebook, Twitter and Pinterest just to say some names. The situation is still far away from the beginning of a new social commerce age but social networks are giving merchants new channels to communicate with their customers sustaining, in particular, the pre-sales and post-sales phases.

For example Best Buy, the world's largest consumer electronics retailer, launched a new service called Twelpforce, which puts its 155,000-strong global workforce in direct contact with customers via Twitter. Customers who have questions about products or need help with technical problems, or who want service issues resolved, can "Tweet the Twelpforce," which is a single Twitter account for all Best Buy employees across all operations. Twelpforce replies to each specific user's query. But other Twitter users, both employees and customers can also listen in and contribute, so the new service provides a diversity of opinions and experiences from which anyone can benefit. (Accenture: Me-tail revolution)

This is just an example but it is necessary that brick-and-mortar retailers adapt immediately to the new needs, figuring out when, how and what give to customers.

We decided to sum up and to analyze the actual situation of the retail in general through a Porter's five forces analysis. Even if this model is generally applied to a specific sector to evaluate its attractiveness, we decided to apply it to the overall B2C commerce, with the focus on brick-and-mortar stores, in order to gather some qualitative feedbacks about the actual condition.

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<u>Internal Rivalry</u>	<u>Contribution to competition</u>	<u>Very High</u>
<i>Concentration and balance</i>	Very high	In every sector there are many different players. In the most of the cases merchants commercialize a wide range of products and services of different sectors. The internal market is very unbalanced because are coexisting very big player like Amazon or Walmart and smaller ones.
<i>Diversity of competitors</i>	Very high	Competitors are very different with very different strategies, different range of products and markets. For example there are companies with only physical chain, pure online players or mixed ones.
<i>Industry growth</i>	Very high	The overall demand has been affected by the economic downturns; but it impacted in different ways. Traditional retailers are recovering slowly while e-commerce is constantly increasing. The mobile commerce, in particular, has an annual double digits growth and it could affirm its fundamental part in the next future.
<i>Product differentiation</i>	High	Products sold cover every sector even if merchants that sell same products could have different strategies in terms of price, product delivery, additional services and so on.
<i>Switching cost</i>	High	In general low because the consumer has actually more power to switch from a merchant to another. Customer can choose to buy a product and a service how, when and where he wants according to the wide possibility of choice. A customer is not anymore pushed to go in a specific store to have a particular product.
<i>Storage cost</i>	Medium-High	Storage costs are very different according to the type of product commercialized, but we can affirm as a general rule that for physical store chains are higher than for pure online players.
<i>Exit barriers</i>	Medium	They are much higher for merchants that have physical stores (property or rented) than pure online players.

<u>Threat of new entrants</u>	<u>Contribution to competition</u>	<u>Medium</u>
<i>Economies of scale</i>	Medium	There is a high exploitation of economies of scale by the companies within the market in particular in some specific sectors like book, consumer electronic dominated by big players like Amazon. This lowers the threat of new entrants.
<i>Capital requirements</i>	Medium	The high capital required to set a new business in the industry make lower the threat of new entrants
<i>Brand identity</i>	/	The brand identity is very different from sector to sector and from product to product. We have also to distinguish between the mono-brand retailers and multi-brand retailers.
<i>Switching cost</i>	High	Considerations are equal to the ones explained in previously in the bargaining power of suppliers.

<u>Bargaining power of buyers</u>	<u>Contribution to Competition</u>	<u>High</u>
<i>Relative concentration</i>	Low	The concentration of buyers is lower compared to the one of suppliers, this reduce their bargaining power.
<i>Product features</i>	/	The product differences are very high to make considerations.
<i>Buyers' characteristics</i>	Very high	Buyers have the possibility to buy a specific product from an enormous number of merchants. They can select merchant according to their specific needs.

Figure 1.2 – Situation of retailers through Porter’ five force model [Personal elaboration]

The *bargaining power of supplier* impact has not been analyzed since our focus is too broad to find significant and common trends. The force called *threats of substitute product* is not relevant for our purpose since we are analyzing the condition of B2C commerce in general and not a specific product.

1.2 Physical store: faced problems

Even if physical store still takes the lion’s share respect to other channels, in the last half-decade many studies and researches showed a continuous decrease of its performances. In particular these researches indicated a decrease of productivity in brick-and-mortar and this trend is expected to continue in the next future. To confirm this, an Accenture’s research, “How retailers can retain

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a profitable physical store network”, analysed 29 top U.S. retailers and the results revealed that from 2005 to 2010, sales per square foot has actually declined by 5%. These less-productive stores are affecting financial performances of merchants, in fact, ROIC (Return on invested capital) of the same set of retailers declined by 25%, during the same time period.

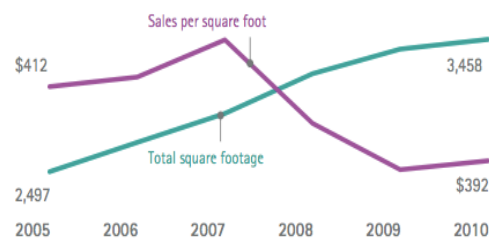
Rapidly declining foot traffic...

Retail Foot Traffic YOY % Decline
2008-2011



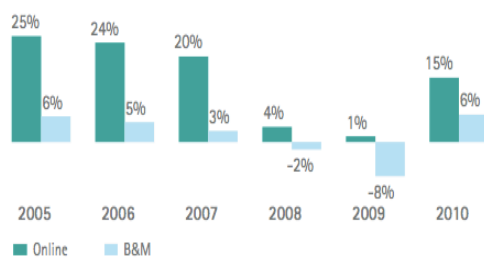
...is dramatically reducing store sales productivity...

Total Sq. Foot vs. Sales per Sq. Foot, US Retailer Index
2005-2010



...combined with continued online growth...

Online vs. B&M Retail Sales Growth Rate
2005-2010



...and in turn impacting financial performance.

Average ROIC—29 Top Retailers
2005 vs. 2010

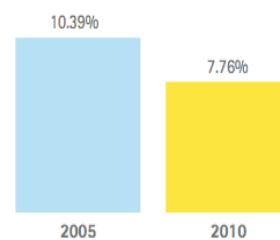


Figure 1.3 - Top 29 US retailers’ performances [Accenture - How retailers can retain a profitable physical store network]

The productivity’s decrease, assessed by the KPI “*Sales per square foot*” for example, is due to different reasons like the economic conditions and the disruptive force of e-commerce and mobile commerce. (The guardian: The changing face of e-commerce- survival of the fittest)

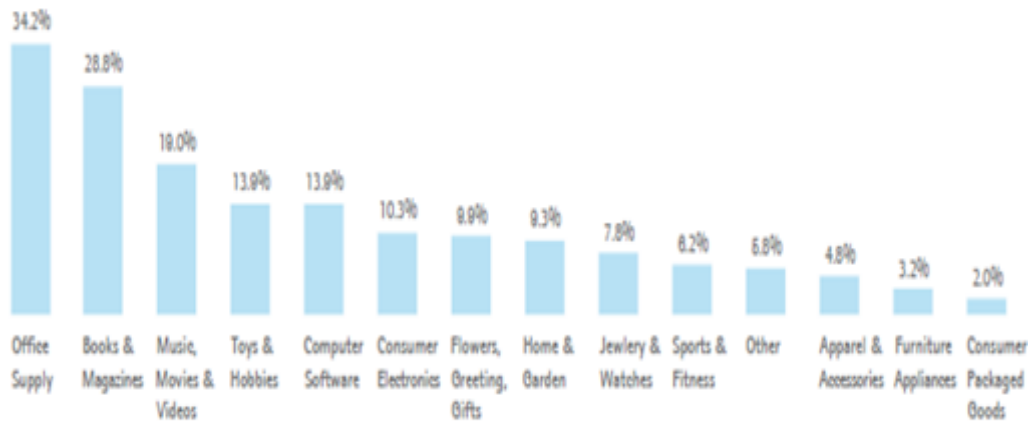
If one certainty about economic downturns is that they end, another is that traditional retailers recover slowly (McKinsey: The promise of multichannel retailing.). Last economic downturn has impacted in different ways according to the different channels. For example in Italy in 2012 the offline sales registered a -2%, while the online channel registered a +18% respect the previous year. (Osservatorio eCommerce B2c Politecnico Milano)

This means that a bad economic condition is just a minor part behind the bad

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performances of brick-and-mortar stores, while other trends are driving the decrease of their financial performance.

As we stated previously, e-commerce is one of the main reason; the figure below shows, for example, the penetration of online in different product categories in the American market. The most affected sectors are Office supply, books and magazines and music, movies and videos.



Graph 1.3 - Online penetration by retail category as of January 2012 [Accenture - Overstored. How retailers can retain a profitable physical store network in the face of growing migration to digital channels]

The causes of decrease in performances of brick-and-mortar store can be sum up as follow:

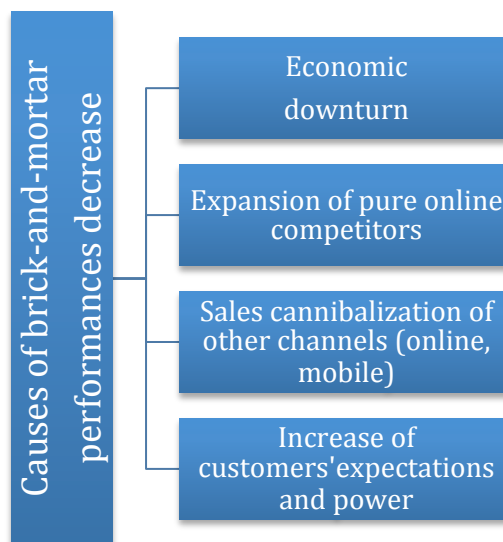
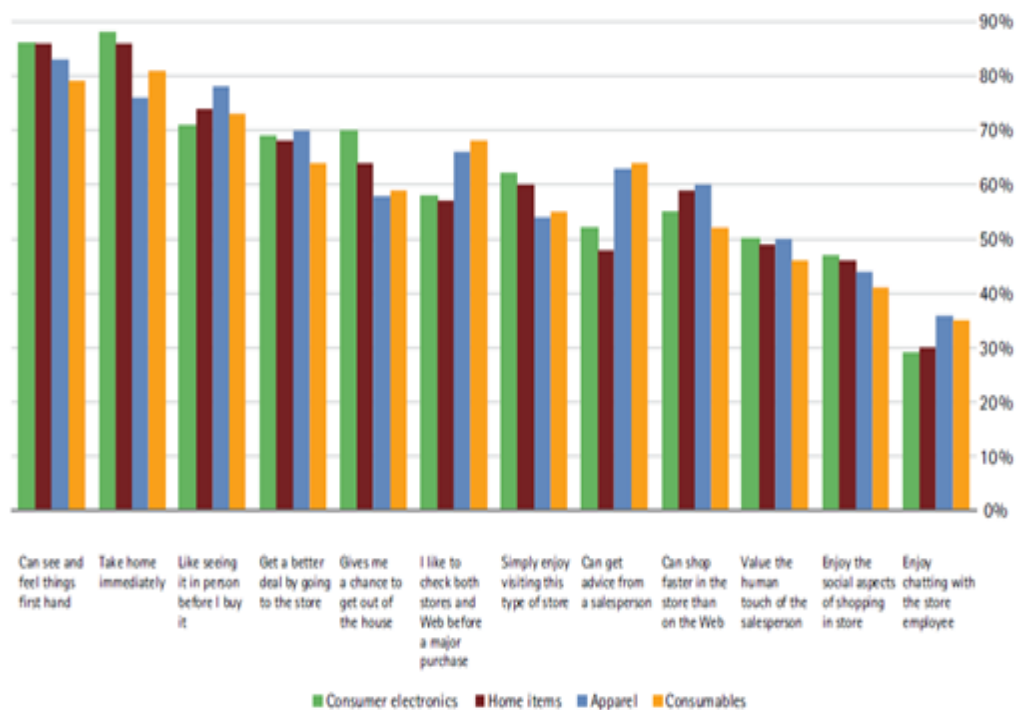


Figure 1.4 – Causes influencing physical retail’s performances [Personal elaboration]

Given these trends, the evidence is clear that the majority of traditional retailers have to rethink the role and the model of brick-and-mortar stores in order to invert the negative trend, and to improve the financial performances of the overall company.

1.3 Why physical retailer still resist?

The numbers showed in the chapter before indicate that physical stores still play an important role for shoppers and it does not seem that they will disappear any time soon. Some of the reason could be found in the following graph of one of Accenture’s research.



Graph 1.4 - Why consumers shop in store rather than online [Accenture – Creating an experience through mobility]

The main advantages and benefits that a physical store can offer are the followings: interacting or chatting with salesmen, seeing and trying out products first hand, convenience and instant gratification of taking a purchase home immediately and viewing items in person before buying. These elements are the most important reasons why a shopper prefers shopping in a store rather than online. It is possible to sum up brick-and-mortar store’s advantages trough the following visual model:

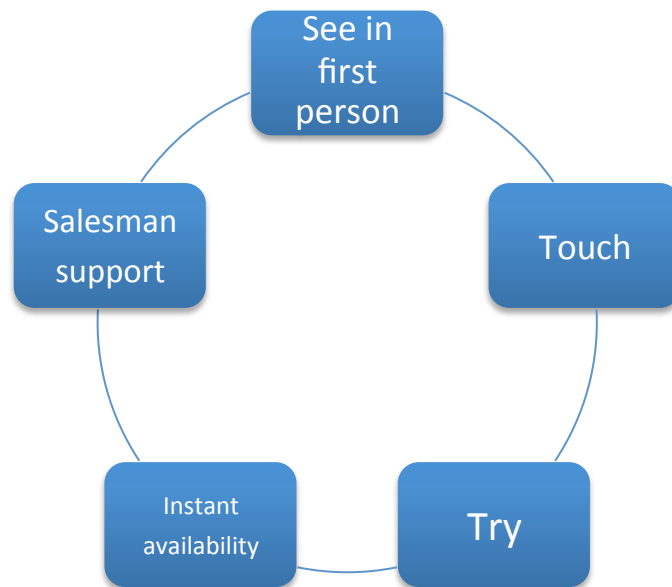


Figure 1.5 – Advantages of physical stores [Personal elaboration]

Companies are aware about the advantages of physical stores, as the chief executive of Kurt Geiger confirmed in an article of The Guardian: “People will always want to go to the high street because they want to discover things and they want to be with people in a bustling environment. You can't try a dress on over the Internet. You get the 'wow moment' when you pull it off the rack.” (The guardian: Don't abandon retail. People will always want the high street)

Companies need to exalt these benefits in the eyes of customers with the help of new technologies and new format. They should be able to engage their clients in a conversation useful for both parties and demonstrate the adding value that they can offer instead of pure online stores. It is not an easy task because different kinds of problems await retailers but as some successful example show, taking risks could bring favorable returns.

1.4 Physical store: redefine the shopping experience

Shopping is becoming a decentralized experience (because of multichannel) and a socially connected event (because of smartphone and web-enabled in-store kiosk) where customers discover new products, test them, share their thoughts and influencing perception among their peer group.

Retailers should facilitate this sharing of information and create experience that drive sales in-store, online and in the emerging channels like mobile and social.

An on-going study by IPG Media Lab, part of IPG Mediabrands reveals that

shopper satisfaction at retail stores is declining up to 15% per year. Small and large brands alike are searching for strategies to react to the change in customer expectation, where online retailers win on prices and convenience.

Retailers must adapt business models and integrate local, personalized services with online convenience.

Price is undoubtedly the primary leverage used by customers but it is not the only one and retailers can work on other drivers to restrain clients to not change store.

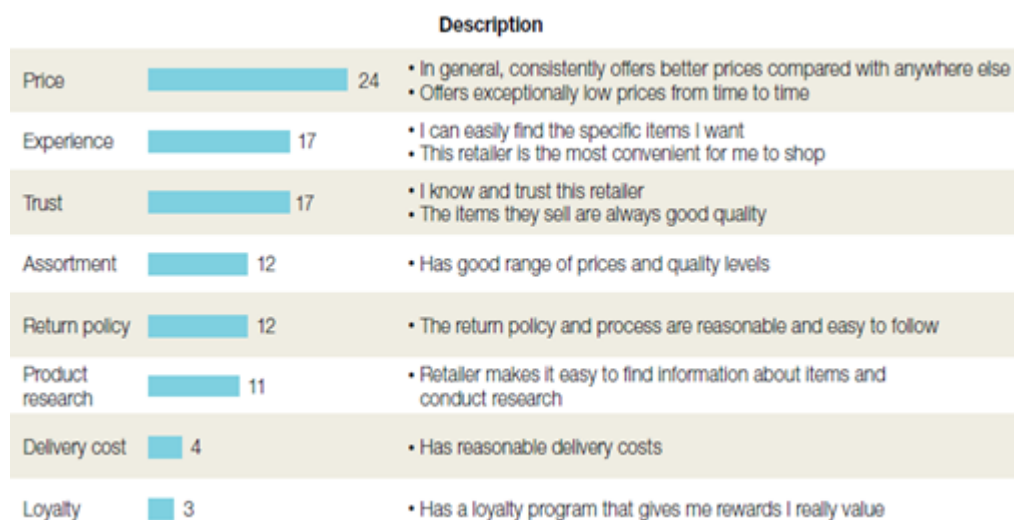


Figure 1.6 - Factors of relevance in deciding whether to purchase a product [McKinsey survey]

Today, brands must manage multiple revenue streams, where the retail space may not be primarily devoted to income. Designing these new shopping experiences is not just about immediate sales but about creating opportunities to facilitate impulse purchases, up-sell, and cross-sell. The challenge is in constructing a seamless shopping experience that integrates the in-store, transactional, and post-sale goals. The experiences must converge to promote discovery in-store and the continuation of the sales process at home or on-the-go. As products become commoditized, the perceived value must come from the user experience.

Stores will increasingly become places that we visit, not simply to pick up mass produced articles but also to design and co-create special things with the personal assistance of experts.

According to an article on StarTribune, a report forecasts that in the next five to eight years, consumers can look forward to disappearing checkouts, shrinking stores and hovering holograms with product information. As more people move to urban areas where quick trips to the store are the norm, consumers will shop more often and retailers will need to capitalize on impulse needs. *"People used*

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to make shopping lists," said Tina Wilcox, CEO and creative director at Black, a retail branding company in Minneapolis, in the article, "But now they buy something because they got an e-mail with a coupon attached, or because a retailer has faster checkout lines with handheld point-of-sale devices." Overall, shopping will become more frequent, with people picking up goods as needed on a daily basis at nearby stores, instead of weekly stock-up trips to a less convenient location, the article reported.

	Store 1.0	Store 2.0	Store 3.0™
	Early 20th Century	Late 20th Century	Early 21st Century
Point of Sale	Cash register	Handheld "line-busting" functionality and wireless support	Mobile points of service; the entire store floor is the point of sale
Connectivity	Pony Express	T1 backbone and wi-fi support for wireless in-store tools	Store is fully Web-enabled; wireless customer access; 4G connectivity; and cloud based services
Staffing Model	Shopkeeper and family	Staff to support workload	Staff to support customer experience
Talent Development	Who has time to develop talent?	Hire, hope to retain, hire again	Engage, train, develop, promote
Multiple Shopping Channels	What's a channel?	Multichannel	Omni-channel; in-store fulfillment of online orders; and seamless integration across selling platforms
Footprint	Size 10 ½	Bigger is better!	Smaller, strategic, dynamic, less inventory, specialized, agile, and personalized
Product Information	Read the label	Online research	Customized, aggregated data pushed to shopper in anticipation of — not in reaction to — customer's purchases
Retailer's Differentiator	Location	Product and service	Customer experience and multi-channel integration
Brick & Mortar Store's Role	The only option	Competitor to online channel	Critical to brand fulfillment; integrated with all sales and service channels

Figure 1.7 - The changing role of the store [Deloitte – Store 3.0 The store is not dead. Long live the store]

In recent years, the importance of an enjoyable experience during the shopping activity increased. In fact, several authors carried out that consumers who enjoy the shopping experience engage more purchases if compared to those who not. (Kim & Kim, 2008) The shopping experience, therefore, can be influenced by the fun provided in the store (Diep & Sweeney, 2008). In particular, this experience plays an important role in the consumers' satisfaction process. (Soderlund & Julander, 2009) Indeed, an entertainment context seems to have a stronger impact on consumers' satisfaction than a non-entertainment context. In fact, it can add value to the goods and services provided at the store.

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Moreover, the level of entertainment is a powerful tool to improve processes, by enhancing users' experience.

In this scenario, many studies are focusing on the best application of enjoyable elements in the points of sale in order to entertain more consumers, improve their shopping experience and communicate the brand in new and attractive ways (Burke, 2002) (Chang & Burke, 2007) (Michon, Chebat, & Turley, 2006). To achieve this task, several firms added in their stores entertainment technological innovations capable to enjoy existing consumers, as well as to attract new ones.

2 Literature Review

The literature review is based on the analysis of two main areas that characterize the evolution of physical store in general: technology innovation and multichannel.

A clarification must be made: we took into consideration materials that covered not all the broad fields of multichannel and technology innovations but studies regarding multichannel involving the offline channel and only in-store technology innovations for the front-office, the ones that come in direct contact with the customers.



Figure 2.1 - Factors influencing the evolution of physical stores [Personal elaboration]

From the analysis of scientific papers and white papers of consulting companies, some journal articles and conference videos, it results that the adoption of new technologies, multichannel strategy and the seamless integration of these two elements, constitutes the complementary gears that are shaping the retail of the future.

In this chapter we are going to illustrate how literature deals with these topics.

2.1 Technological Innovations

2.1.1 Introduction

“It is retailing distribution which in the next few years is going to be the area of the greatest innovations and greatest changes”. (Drucker, 1993)

This statement by Peter Drucker captures the spirit of the various changes that have taken, and continue to take in retailing. Perhaps the most significant of these changes is the widespread development and implementation of technology in retailing. It has become axiomatic that the application of technology in business organizations is essential in ensuring that each firm remains in the market and compete against its rivals. The underlying reason for the application

of technology has evolved from enabling firms to simply do things cheaper, faster, and easier, to helping firms create and maintain their competitive edge.

Peter Drucker's view is echoed and supported by many practitioners and researchers. It has been argued that retailing changes in the 1990s are driven by the threats and opportunities offered by technology. (Achabal & McIntyre, 1992) Technology enables retailers to gain competitive advantage in an increasingly difficult and volatile operating environment. It is clear that new information technologies are revolutionizing the way distribution is organized and coordinated as well as reducing the cost of performing marketing flows and generating service outputs. (Stern, El-Ansary, & Coughlan, 1996)

Retailers focused even on the market side trying to serve consumers better, creating superior value for consumers through innovations that go beyond satisfying basic needs. In this sense the development and the implementation of various technologies over the years aimed and are aiming to an increase both of the retailers' efficiency and the effectiveness.

Our focus is only on the technological innovation introduced by retailer in the physical store, which involves the front-end interaction between customer and retailer itself. One of the aims of the thesis is to identify and classify these technological innovations that are able to change the traditional role of brick-and-mortar store, its offers and its interactions with customers.

To be on top of the competition, one of the points that brick-and-mortar stores do not have to overlook is to provide an enjoyable shopping experience to customers. In order to do so, technology innovations like virtual and augmented reality, RFID, biometric technology and 3D scanning, just to name a few, come in help to stores. As it is said in the research studies of Kim & Kim (2008), Diep & Sweeney (2008) and Liljiander *et al.* (2006), these technologies improve consumers' shopping experience and in-store services, as well as provide useful information and feedback to retailers about consumers' behaviors.

Hence, in one hand these technologies can influence consumers' in-store behaviors and their satisfaction, on the other one; these technologies modify the retailer-consumer interaction, by introducing new interactive tools and allowing retailers to implement more efficient and customized marketing strategies.

Therefore, many researches are focusing on the best application of these technologies in traditional stores in order to identify the ones capable to best fit consumers' requests, to enhance existing consumers and to attract new ones.

To achieve this goal, it is necessary to deepen our understanding of the advanced technologies in retailing context and their impact on consumers' decision-making process, by focusing on the characteristics of the interaction between consumer and technology.

2.1.2 Methodology

2.1.2.1 Scope of analysis

This review analyses the theme of *innovations in retailing* in the existing literature. It aims at focusing on the innovations applied in physical stores, which are going to reshape the traditional model of brick-and-mortar stores.

Our focus is limited to those papers, which deal with the theme of innovation in store in a Business to Consumer, B2C, context that imply a front-end interaction with final customers.

For this reason this analysis will focus on the different kinds of innovations introduced, the different areas of application, their different classifications, their impacts both on merchants' and customers' side.

We started from the analysis of the most dated papers, which analyze innovations that nowadays became a standard, to more recent papers that are trying to capture the new interactive technologies in retailing.

2.1.2.2 Selection process

We conducted a research by keywords using library databases. We found different scientific papers of different journals like the Journal of Retailing and Consumer Services, Journal of Interactive Marketing, Technology in society, Long Range Planning, Journal of Retailing and Harvard business review.

From the first set of papers we discarded all those papers regarding the innovations in business models that have a different view respect to our goal.

Subsequently we rejected even those papers dealing with innovations that don't have a direct interaction with the final customers.

Finally we identified 11 different scientific papers; six of them belong to the Journal of Retailing and consumer services and two to the Journal of Retailing. These two Journals represent the reference journals for the theme of innovation in store.

In the following table we present the papers used under a chronological order.

Year	Journal	Title	Author
1997	Long Range Planning	Emerging Trends in US Retailing	David A. Griffith, Robert F. Krampf
1998	Technology in society	Technological innovations in grocery retailing: retrospect and prospect	H.T. Keh
2010	Journal of Retailing and Consumer Services	Biometric technology in retailing: Will consumers accept fingerprint authentication?	Richard Clodfelter
2010	Journal of Retailing and Consumer Services	Entertainment in retailing: The influences of advanced technologies	Eleonora Pantano, Giuseppe Naccarato
2010	Journal of Interactive Marketing	Interactive Technologies and Retailing Strategy: A Review, Conceptual Framework and Future Research Directions	Rajan Varadarajan, Raji Srinivasan, Gautham Gopal Vadakkepatt, Manjit S. Yadav, Paul A. Pavlou, Sandeep Krishnamurthy, Tom Krause
2010	Journal of Retailing and Consumer Services	The mediating effects of perception and emotion: digital signage in mall atmospherics	Dennis C., Newman A., Brakus J.J., Wright L.T.
2010	Journal of Retailing and Consumer Services	Imputing relevant information from multi-day GPS tracers for retail planning and management using data fusion and context-sensitive learning.	Moiseeva A., Timmermans H.
2010	Journal of Retailing and Consumer Services	The impact of new technologies on customer satisfaction and business to business customer relationships: evidence from the soft drinks industry. Journal of Retailing and Consumer Services	Ryding, D.
2011	Journal of Retailing	Retailing Innovations in a Globalizing Retail Market Environment	Werner Reinartz, Benedict Dellaert, Manfred Krafft, V. Kumar, Rajan Varadarajan
2011	Journal of Retailing	Innovations in Retail Pricing and Promotions	Dhruv Grewal, Kusum L. Ailawadi, Dinesh Gauri, Kevin Hall, Praveen Kopalle, Jane R. Robertson
2012	Harvard business review	The future of shopping	Darrell Rigby

Figure 2.2 – Scientific papers covering the technology innovations topic [Personal elaboration]

2.1.2.3 Review method

We decided to classify the scientific papers under two different axes. The first axis regards the point of view analyses in the papers: merchant, customer or both.

The second axis on which we reviewed the literature is the basis of contents perspective.

We started analyzing in detail the contents of each paper to find the major issues regarding the theme of innovations in store.

2.1.3 Summary of review

2.1.3.1 Point of views

We decided to classify the scientific papers under two different axes. The first axis regards the point of view analyses in the papers: merchant, customer or both.

The second axis on which we reviewed the literature is the basis of contents perspective.

We started analyzing in detail the contents of each paper to find the major issues regarding the theme of innovations in store.

Title	Author	POV Merchant	POV Customer
Emerging Trends in US Retailing	David A. Griffith, Robert F. Krampf	X	
Technological innovations in grocery retailing: retrospect and prospect	H.T. Keh	X	
Biometric technology in retailing: Will consumers accept fingerprint authentication?	Richard Clodfelter	X	X
Entertainment in retailing: The influences of advanced technologies	Eleonora Pantano, Giuseppe Naccarato	X	X
Interactive Technologies and Retailing Strategy: A Review, Conceptual Framework and Future Research Directions	Rajan Varadarajan, Raji Srinivasan, Gautham Gopal Vadakkepatt, Manjit S. Yadav, Paul A. Pavlou, Sandeep Krishnamurthy, Tom Krause	X	
The mediating effects of perception and emotion: digital signage in mall atmospherics	Dennis C., Newman A., Brakus J.J., Wright L.T.		X
Imputing relevant information from multi-day GPS tracers for retail planning and management using data fusion and context-sensitive learning.	Moiseeva A., Timmermans H.	X	
The impact of new technologies on customer satisfaction and business to business customer relationships: evidence from the soft drinks industry. Journal of Retailing and Consumer Services	Ryding, D.	X	X
Retailing Innovations in a Globalizing Retail Market Environment	Werner Reinartz, Benedict Dellaert, Manfred Krafft, V. Kumar, Rajan Varadarajan	X	
Innovations in Retail Pricing and Promotions	Dhruv Grewal, Kusum L. Ailawadi, Dinesh Gauri, Kevin Hall, Praveen Kopalle, Jane R. Robertson	X	
The future of shopping	Darrell Rigby	X	

Figure 2.3 – Point of view used in the scientific papers analyzed [Personal elaboration]

From the table it is possible to notice how the perspective on which the literature is actually more focused is the merchant's one.

2.1.3.2 Basic contents

More interesting seems to be the other perspective on which we reviewed the selected papers.

We clustered them into five different main topics:

- a) Classifications of innovations
- b) Influence factors
- c) Impacts on customers
- d) Impacts on retailers
- e) Applications of new technologies

In the following chapters we analyze in detail how the literature debates on each of the issue presented.

Paper	Classification	Influence factors	Application of new technologies	Impacts on customers	Impacts on retailers
Technological innovations in grocery retailing: retrospect and prospect	Core				
Retailing Innovations in a Globalizing Retail Market Environment		Core			
Biometric technology in retailing: Will consumers accept fingerprint authentication?	Marginal		Core	Marginal	Marginal
Emerging Trends in US Retailing	Core				
Entertainment in retailing: The influences of advanced technologies			Marginal	Core	Core
Innovations in Retail Pricing and Promotions				Marginal	Marginal
Interactive Technologies and Retailing Strategy: A Review, Conceptual Framework and Future Research Directions	Marginal			Marginal	Core
The future of shopping					Marginal
The mediating effects of perception and emotion: digital signage in mall atmospherics				Core	
Imputing relevant information from multi-day GPS tracers for retail planning and management using data fusion and context-sensitive learning			Core		Marginal
The impact of new technologies on customer satisfaction and business to business customer relationships: evidence from the soft drinks industry				Marginal	Core

Figure 2.4 - Main topic discussed in the scientific papers analyzed [Personal elaboration]

As the table shows, papers dwell most with the topic of impacts on customers and retailers while just two deal with the classification and the studies of the application of new technology. Only one paper analyses the factors that causes firms to research and implement technology innovations

2.1.3.2.1 Classification of innovations

It is possible to divide the papers that deal with the classification of innovations in retailing in two main clusters.

The first cluster is composed by two papers dated in the end of the '90 (Keh *et al.* (1998), Griffith & Krampf (1997)), many years before the incoming revolution caused by the increasing diffusion and consolidation of new forces (i.e. mobile, social networks...).

For this reason, these papers analyze and present a complete classification of innovations in retailing, considering not only the ones that imply an interaction with the customers. Nevertheless these papers are useful because it is possible to extract, from their analysis, a general framework where new technological innovations introduced in store can be positioned.

The second cluster of papers, dated from 2010 till nowadays, is composed by papers that are describing a world in evolution under the perspectives of *new interactive technologies* and *entrainment in retailing*. These most recent papers generally deal with one or few interactive technology at time, analyzing for example their impacts on customers or retailers. They lack, instead, to give general frameworks.

There is only one paper in this cluster, Varadarajan *et al.* (2010), which proposes a clear classification in order to analyses the impact of technological innovations on retailing.

Some examples of the reviewed papers are reported as follows. A brief description for each is provided.

Keh *et al.* (1998) reviewed the major forms of technological innovations (operating and information technologies) that have taken place in the grocery industry, with a particular emphasis on the period from the 1970s until today.

The classifications of the technological innovations proposed by the paper can be easily applied to the retail world in general and not only to the grocery sector. An example of various technological innovations adopted in grocery retailing world is shown in the next table:

1970s	1980s	1990s	2000s
<ul style="list-style-type: none"> ● product handling* ● information processing ● product display ● housekeeping ● climate control 	<ul style="list-style-type: none"> ● scanner systems ● bar codes ● electronic cash register ● database management ● electronic data interchange 	<ul style="list-style-type: none"> ● expert systems ● consumer scanning ● data warehousing ● continuous replenishment ● computer-assisted ordering ● category management ● direct store delivery ● cross-docking ● electronic shelf labels ● Peapod (computer shopping) 	<ul style="list-style-type: none"> ● virtual reality ● shopper ID ● personal shopping assistant ● supply chain reinvention ● decision transformation

*Although some of these technologies were technically available earlier, they have been placed here by order of mass implementation.

Figure 2.5 – Major technology innovations in the grocery industry [Keh *et al.*]

The paper proposes two different categorization of technological innovations in retail:

1. Retailer–customer interface; within retailer interface; Retailer–supplier interface. (Achabal & McIntyre, 1992)
2. Operating technologies; Information technologies; other potential technologies. (Keh , 1998)

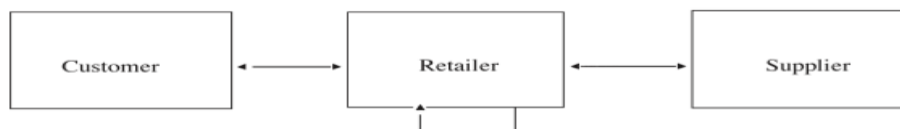


Figure 2.6 – Retailer’s interactions [Keh *et al.*]

The first classification starts from the focus on the supply chain position of retails. Since retailer is a sort of intermediary between the manufacturer/supplier and the consumer, it is possible to group the various forms of technology into the following framework:

1. The “*retailer–customer*” interface (e.g. electronic cash register, scanners, customer scanning, shopper ID, virtual reality, personal shopping assistant, product display);
2. The “*within retailer*” interface (e.g. housekeeping, climate control, product handling, information processing, database management, expert systems, decision transformation);
3. The “*retailer–supplier*” interface (e.g. electronic data interchange,

continuous replenishment, computer-assisted ordering, category management, direct store delivery, cross-docking, supply chain reinvention).

The second classification, instead, lies on the perspective of the retailer and this makes possible categorize the various forms of technology into: operating technology and information technology. Operating technology can be defined as technology that involves logistics (the physical movement of goods between manufacturer/warehouse to store), store algorithms (including shelf and floor use optimization) and routine store operations (including climate control, refrigeration, inventory management, and stocking). There is heavy reliance on operations management techniques in the implementation of operating technology. Information technology includes, instead, telecommunications linkages, electronic scanning, bar coding, database management, and multimedia offerings. For the next future we can envision other information technological innovations in retailing sector.

The same paper proposes a list compiled by AT&T Global Information Solutions containing some possible applications of innovations (Retail as entertainment, Shopper ID systems, Personal shopping assistant, Supply chain reinvention, Decision transformation), already applied at that time in other industries, and that would become solutions used in retailing nowadays, labeling them under the class of *other potential technologies*.

Griffith & Krampf (1997) examine the trends shaping the retail environment at the end of 20th century. In their studies, they used a modified Delphi approach to access managerial perceptions of the changing retail landscape. The result of their survey was the finding of four trends: changes in consumer markets, price and branding strategy, store formats, retail institutions and applications of technology.

The last trend, application of technology, proposed an interesting classification of innovations. It is based on three main areas: advancements in the logistics supply chain, sophistication in database marketing and the creation of electronic forms of retailing.

Varadarajan *et al.* (2010) developed a process model delineating the mechanism by which an interactive technology can alter the retailing landscape through their impact on retailing strategy and operations. In order to define these impacts the paper proposes the following classification of technological innovation:

- 1) Transportation infrastructure technologies
- 2) Broadcast technologies
- 3) Interactive technologies

2.1.3.2.2 Influence factors

As influence factors we considered all the elements that could be the trigger for the merchant to decide the implementation of an innovation; at the same time they are the environmental factors to be considered in order to succeed in the implementation.

We found only one scientific paper in the existing literature discussing the major environmental factors influencing the introduction and success of innovations in retailing.

Reinartz *et al.* (2011) focuses on retailing innovations in the context of a globalizing retailing environment. This paper examines the environmental conditions of markets in different development stages: mature, emerging and less developed. It explores consumer based, industry based, and legal/regulatory based challenges faced by globalizing retailers in these markets. The paper shows, moreover, how these challenges can be transformed into opportunities because retailing innovations are responsive to the characteristics of distinctive national markets.

According to the paper, there are three broad categories of environmental factors that drive the introduction and influence the success of innovations in retailing: consumer based, industry based, legal and regulatory-based factors.

- *Consumer based* challenges: in the same market there are customers that show different characteristic. The success of an innovation is dependent on its ability to address the current needs of customers better than existing offerings or to address the latent needs of customers. In order to do so, it is important that customers are involved in the developing process. *“Many companies have recognized that getting customers engaged in innovation processes is a crucial step.”* (Reinartz et al., 2011)
- *Industry based* challenges: the industry context is very complex. The intensity of competition in a market and supply chain management is a major driver of success. To survive in this environment a continuous updating and innovation is required. *“Technological developments are at the very heart of innovations, and have been identified as a major force behind innovations in retailing.”* (Reinartz et al., 2011)
- *Legal and regulatory-based* challenges: it refers to differences and changes in governance and regulations in the different markets. *“Regulatory constraints and the stability or volatility of political and legal systems strongly affect innovativeness and R&D performance.”* (Reinartz et al., 2011)

2.1.3.2.3 *Impact on customers*

This chapter could be divided in theory in two main areas: benefits and drawbacks.

There are few papers in general discussing the impacts on customers caused by the introduction of technologies in store. Anyway the current literature analyses better the field of customers' benefits (Pantano & Naccarato (2010), Dennis *et al.* (2010)) generated by the innovation respect to the customers' drawbacks. In fact, the customers' drawbacks are considered only for one specific technology and not in general, like the possible disadvantages coming from the introduction of the fingerprint authentication in store (Clodfelter (2010)).

Since there is lack of literature dealing with possible drawbacks, two articles are included in this second section. In the first one, Pantano & Naccarato (2010) investigate the extent to which the current advanced technologies are used in retailing, and their possible influences on consumers' behavior. This research has important insights for retailers, which can exploit them to appeal consumers in the new advanced environments, and enhance consumers shopping experience.

In fact, the introduction of advanced technologies offers new tools capable to support consumers in the creation of a more customized service. The main consequence is an increasing in their satisfaction.

Furthermore, the introduction of advanced technologies modifies also the store appeal. In fact, they are capable of influencing consumers' perception of the point of sale. Dennis *et al.* (2010) investigate how the introduction of Digital Signage (screens showing videos) has a positive effect on consumers' choice of the store. Retailers can exploit these insights in order to improve the perception of the layout of malls and influence consumers' decision-making process.

Clodfelter (2010) focuses on the consumers' acceptance of a new technology in the point of sale. In fact, he investigates the benefits of introduction of the biometric technology, with emphasis on the fingerprint authentication. Although the introduction of fingerprint authentication offers several advantages related to the improvement of speed and security in transactions, as well as a more efficient management of consumers and products information, consumers' response seems to be not so positive because they show little intention to use it. The main problem is a psychological one related to privacy issue, because for many people, having their fingerprints taken and stored in a database, is an experience similar to be filed by the police.

2.1.3.2.4 Impact on retailers

In the last sections, three studies identify and analyze the main implications of new technologies for retail services.

Pantano & Naccarato (2010) research shows the impact of the introduction of the new technologies toward retailers; in fact the paper outlines the possibility (for retailer) to achieve fast information on consumer behavior.

Nowadays, several researches show the increasing companies need to be constantly informed on consumers' preferences and requests in order to create strategies capable to succeed in the current changing market. In this perspective, the technologies presented are capable to collect, organize and manage information related to consumers' behavior, which can be accessed and updated constantly and rapidly by retailers. In this way, they can have an efficient feedback on consumer response about products, services and retailing strategies. In particular, the interaction between consumers and the technologies provides information about consumers' preferences (i.e. about their favorite color, etc.), useful for improving the quality of the products in the store, and shows their own opinion about the shopping experience (i.e. which kind of messages influenced more the buying behavior). In fact, most of these technologies are connected to databases with information related to the products, consumers and related purchases. In this way, an efficient match between databases allows to investigate consumers' preferences, as well as the effectiveness of the use of the technologies and their willing to use.

Another research of Varadarajan *et al.* (2010) defines a framework describing how interactive technologies are able to alter the retailing landscape through their impact on retailing strategy and operations.

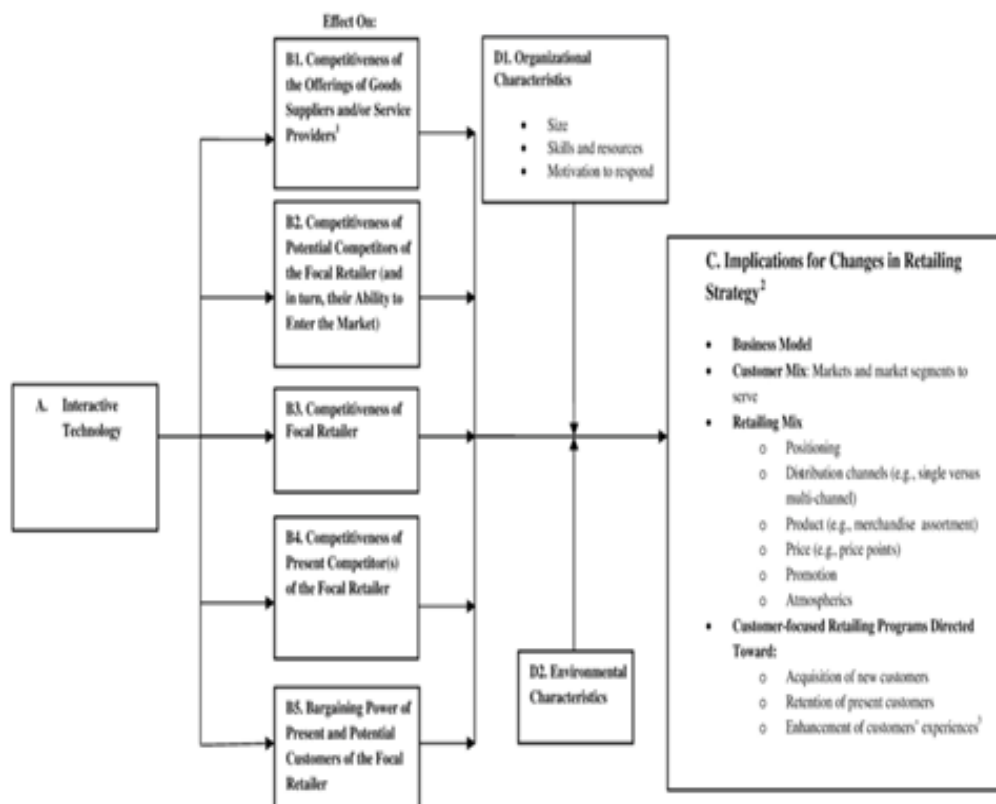


Figure 2.7 – Impact of interactive technology on retailing strategy: a competitive enhancement framework [Varadarajan *et al.*]

Ryding *et al.* (2010) focuses on the influence of the introduction of new technologies on the sales people effectiveness; she investigates how the increasing office technologies affects the relationship between sales force and clients, due to the improving of communication among the actors, by offering new efficient communication channels.

2.1.3.2.5 Application of new technologies

Innovation is the lifeblood of organizations in many industries, and retailing is no exception.

Although many of these technological developments neither originated in the retailing sector nor were developed primarily for transforming the retailing sector, retailers were often among the early adopters of new technologies. (Tamilia, 2007)

This chapter clusters all the scientific papers in the literature that analyze the application of new technologies in retailing.

There are few papers (Clodfelter (2010), Moiseeva & Timmermans (2010)) covering this issue, given the novelty of the argument.

These papers analyze only one per time technology and its applications. There is a lack of papers which give an integrated view and a general framework of new technologies in retailing.

Two main papers study the topic of applications of new technologies in retailing.

Clodfelter (2010) focuses on the consumers' acceptance of a new technology in the point of sale. In fact, he investigates the benefits in the introduction of biometric technology, with emphasis on the fingerprint authentication. Clodfelter continues in his paper with the explanation of possible application of several types of biometric technologies already applied in some store, especially for the payment phase: face recognition, hand geometry, iris scanning, voice recognition, and signature recognition. The technology is ready for the market but because of the privacy issue, it is still tested to determine how ready consumers are.

In addition, Moiseeva & Timmermans (2010) propose another technology innovation, which provides important data for retailers. They investigate the use of Geographical Position System Tracer to track consumers' behavior. The research carries out important information related to the consumers' favorites' routes, useful to identify the best location and the main factors influencing the shop choice.

2.2 Multichannel

2.2.1 Introduction

Multichannel is a reality, existing since more than ten years ago when first articles describing the potentialities offered by this approach appeared. Only in the recent years it became clear how introducing a multichannel strategy could bring important and big benefits. There is not a unique definition of multichannel strategy but many researcher and scholars gave different definition of what is it. We choose the one given by Rangaswamy and Van Bruggen that sums up all the others:

“Multichannel marketing enables firms to build last customer relationships by simultaneously offering their customers and prospects information, products,

services, and support (or any combination of these) through two or more synchronized channels.” (Bruggen, 2005)

Everybody agrees that this is the customer-centric era. Customers have several handy channels that can use in order to interact with firm: Web, Internet mobile, social media, telephone, catalogues, brick-and-mortar stores. Each customer moves in a different manner from other through all these channels.

Multichannel is the joint use of more channels supporting the whole interactive relationship between customer and firm. For example a customer can see a product on a catalogue, search for feedbacks and opinions on websites, order it online and paying when he will visit the store for picking it, obtain assistance through telephone if some problems show up. Doing this, a firm could be always in contact with its clientele giving them fewer arguments to switch to another competitor because of the lack of attention to their problem.

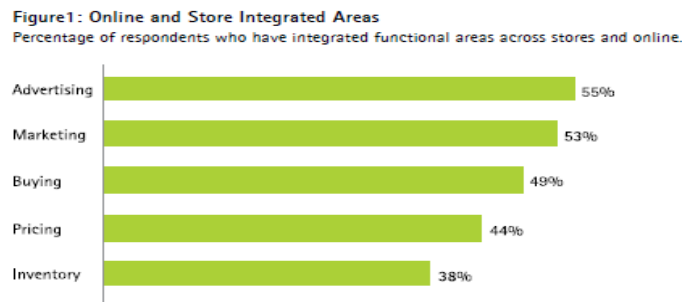
For the firms, multichannel strategy, gives the opportunity to broaden the horizons being well-knew by more people all around the world, understand better their customers' behaviors for developing new marketing strategies, cut down cost for reaching customers in new market and country that were previously inaccessible.

Multichannel approach gives merchants and customers several channels to interact between each other, channels that can be classified in four different categories:

- a) Offline: traditional brick-and-mortar stores
- b) Online: computers and tablets
- c) Mobile: smartphones
- d) Social: social network

In our project our focus is on the interactions between the offline channel with other ones. In a multichannel strategy, most of the time, the first two channels to be integrated are Offline and Online because the technology and experience needed is the oldest and best known. The reasons behind this approach are the growing competition in every sector. The fast-paced progress in the technology accelerates this trend.

Usually advertising and marketing are the first areas to be integrated. The pre-sales phase is very important to create product and brand awareness. On the other hand, inventory is the area that is the less integrated area even if recent studies had highlight the fact that integration of inventory cuts costs and makes the communication intra-firm more efficient.



Source: Accenture European E-commerce Survey, 2011

Graph 2.1 – Online and store integrated areas [Accenture – European e-commerce survey 2011]

Regarding the Offline + Mobile integration, only in the recent years we have witnessed a boom in the transaction made by smartphone, even this trend can be explained by the evolution and improved technology on the mobile sector: every month new models of smartphone are presented to the public, they look more and more like small computer and people likes to use them. Another factor benefits from the use of Mobile are that mobile phone is one of the three things that people has always with them, as well as keys and wallet.

The future looks even better for mobile commerce because the time necessary to become familiar with this technology and app is very short, accordingly, more and more persons will use their phones to buy products and services.

Last but not list Offline+ Social commerce is a new and very recent and new way of making business. It was born with the explosion of social platform in the daily life of customers: Facebook , Twitter, YouTube, Pinterest and many more. Social commerce allows customers to share information, experiences and opinions regarding a product or service, before and after buying it, with a “neutral” party of persons different from the merchant.

Companies already started to use social network in order to be present in these spaces, the upcoming challenge is to understand how possible is to link social networks with the buying process. Facebook is working to create an “I want” button. The only doubt that many people shares is that customers are not so confident in buying through social network, especially because of problems related to the privacy. Only time will tell if social commerce will be a success or not.

2.2.2 Methodology

2.2.2.1 Scope of analysis

This literature review aims at analyzing how the theme of multichannel has been discussed over the time.

In particular our focus is on the theme of multichannel in retailing, since the goal of our thesis is valuing the evolution of the store coming from the jointly integration of elements like the introduction of technological innovation and the adoption of a multichannel approach.

For this reason we tried to focalize only on the part of the literature that deal with the theme of multichannel in relation to the offline channel, simply called physical store or brick-and-mortar store.

The review of the literature brought to a wide analysis of the multichannel under several perspectives like for example the description of the different paths, the advantages and disadvantages both for customers and merchants, the criticalities and many other aspects.

2.2.2.2 Selection process

We conducted a research by keywords using library databases. We found several scientific papers of different journals like the Journal of interactive marketing, International Journal of Retail and distribution management, Internet Research, Marketing Intelligence and Planning, Journal of Retailing and Consumer services, Journal service management and many others.

We tried to select only those papers related to the scope of analysis, in particular those ones, which implied the offline channel in their analysis.

Finally we identified 25 different scientific papers. The Journal of reference for this issue is the Journal of Interactive marketing with five papers. The international Journal of Retail and distribution management and the other journals have one scientific paper for each.

The theme of multichannel has been widely discusses in the literature in the last decade, and this is shown by the high number of papers in many different Journals found respect to the issue of technological innovation in retailing.

In the following table we present the papers used under a chronological order:

Year	Journal	Title	Author
2002	Symphonya	Le politiche distributive multicanale B2C	Emanuela Tesser
2003	Journal of the Accademy of marketing science	Determinants of online channel use and overall satisfaction whit a relational, multichannel service provider	Mitzi M. Montoya-Weiss Glenn B. Voss
2004	Technovation	Benefits, impediments and critical success factors in B2C e-business adoption	Chris Dubelaar, Amrik Sohal, Vedrana Savic
2005	Journal of interactive marketing	Who are the multichannel shoppers and how do they perform?	V.Kumar and Rajkumar Venkatesan
2005	Journal of interactive marketing	Multichannel retailing: a case study of early experiences	Ruby Roy Dholakia, Miao Zhao, Nikhilesh Dholakia
2005	Journal of Interactive Marketing	Opportunities and challenges in multichannel marketing: an introduction to the special issue	Arvind Rangaswamy, Gerrit H. Van Bruggen
2005	Journal of Interactive Marketing	Consumers in a multichannel environment: product utility, process utility and channel choice	Sridhar Balasubramanian, Rajagopal raghunathan, Vijay Mahajan
2007	Journal of services marketing	An empirical analysis of e-service implementation	Adam Rapp, Tammy Rapp, Niels Schillewaert
2007	Direct Marketing International journal	Multichannel communication and consumer choice in the household furniture buying process	Torsten Lihra, Raoul Graf
2008	Business Process Management Journal	Examining product and process effects on consumer preferences for online and offline channels	Aimao Zhang
2008	Journal of Enterprise Information Management	Explaining the adoption of transactional B2C mobile commerce	Mohamed Khalifa, Kathy Ning Shen
2008	Internet research	Consumer behaviour in the multichannel contexts: the case of a theatre festival	Frances Slack, Jennifer Rowley, Sue Coles
2009	International Journal of Retail and Distribution Management	The effect of offline brand trust and perceived internet confidence on online shopping intention in the integrated multi-channel context	Kim Hongyoun Hahn, Jihyun Kim
2009	Industrial Management & Data Systems	Effects of daily and "woot-off" strategies on e-commerce	Bin Wang, Lai C.Liu, Kai S.Koong, Shuming Bai

2009	international Journal of Physical Distribution & Logistics Management	The marketing and logistics efficacy of online sales channels	Shashank Rao, Thomas J.Goldsby, Deepak Iyengar
2009	Management Research News	Online purchase determinants: is their effect moderated by direct experience?	Thijs Broekhuizen, Eelko K.R.E. Huizingh
2009	Journal of Service Management	A consumer-based view of multi-channel service	Harold Cassab, Douglas L. MacLachlan
2010	Marketing Intelligence & Planning	Multiple-channel and cross-channel shopping behavior: role of consumer shopping orientations	Patrali Chatterjee
2010	Decision Sciences Journal	The impact of the online channel on retailers' performances: an empirical evaluation	Yusen Xia, G. Peter Zhang
2010	International Journal of Consumer Studies	Conflicting attitudes and scepticism towards online shopping: the role of experience	Didier Soopramanien
2011	Internet research	Social commerce: looking back and forward	Renata Gonçalves Curty, Ping Zhang
2011	Journal of Consumer Marketing	Integrating social media with online retailing	Dennis A.Pitta
2012	Internet research	Exploring consumer value of multi-channel shopping: A perspective of means-end theory	Cheng-Chieh Hsiao, Hsiuju Rebecca Yen, Eldon Y. Li
2012	Marketing Intelligence & Planning	Positive and negative cross-channel shopping behaviour	Niall Piercy
2012	Journal of Retailing and Consumer Services	Cannibalization or synergy? Consumers' channel selection in online-offline multichannel systems	Tobias Kollmann, Andreas Kuckertz, Ina Kayser

Figure 2.8 – Table of scientific papers covering multichannel topic [Personal elaboration]

2.2.2.3 Review method

We decided to classify the scientific papers under three different perspectives. The first perspective regards the point of view of the analysis: customer or merchant. The second perspective is relative to the typology of channel considered by each paper (i.e. offline, mobile, online or social). In the third perspective, instead, we reviewed the scientific papers considering the issues covered by them.

In this second classification we clustered the issues under four different areas:

- a) Multichannel paths
- b) Criticalities
- c) Benefits
- d) CSFs

It is possible to cross the two perspectives (point of view and issue) in order to review the literature.

2.2.3 Summary of review

2.2.3.1 Point of view and channel typology

In this chapter we clustered the scientific papers selected under the point of view and the channel typology.

We found 12 articles that discuss the theme of multichannel under the perspective of the merchant. The following table lists all the articles:

Year	Journal	Title	Author	Point of view	Channel Typology
2002	Symphonya	Le politiche distributive multicanale B2C	Emanuela Tesser	Merchant	Online and Offline
2004	Technovation	Benefits, impediments and critical success factors in B2C e-business adoption	Chris Dubelaar, Amrik Sohal, Vedrana Savic	Merchant	Online and Offline
2005	Journal of interactive marketing	Who are the multichannel shoppers and how do they perform?	V.Kumar and Rajkumar Venkatesan	Merchant	Online and Offline
2005	Journal of interactive marketing	Multichannel retailing: a case study of early experiences	Ruby Roy Dholakia, Miao Zhao, Nikhilesh Dholakia	Merchant	Online and Offline
2005	Journal of Interactive Marketing	Opportunities and challenges in multichannel marketing: an introduction to the special issue	Arvind Rangaswamy, Gerrit H.Van Bruggen	Merchant	Online and Offline
2007	Journal of services marketing	An empirical analysis of e-service implementation	Adam Rapp, Tammy Rapp, Niels Schillewaert	Merchant	Online and Offline
2008	Journal of Enterprise Information Management	Explaining the adoption of transactional B2C mobile commerce	Mohamed Khalifa, Kathy Ning Shen	Merchant	Mobile
2009	Industrial Management & Data Systems	Effects of daily and "woot-off" strategies on e-commerce	Bin Wang, Lai C.Liu, Kai S.Koong, Shuming Bai	Merchant	Online and Offline
2009	international Journal of Physical Distribution & Logistics Management	The marketing and logistics efficacy of online sales channels	Shashank Rao, Thomas J.Goldsby, Deepak Iyengar	Merchant	Online and Offline
2010	Marketing Intelligence & Planning	Multiple-channel and cross-channel shopping behavior: role of consumer shopping orientations	Patrali Chatterjee	Merchant	Online and Offline
2010	Decision Sciences Journal	The impact of the online channel on retailers' performances: an empirical evaluation	Yusen Xia, G. Peter Zhang	Merchant	Online and Offline
2011	Internet research	Social commerce: looking back and forward	Renata Gonçalves Curty, Ping Zhang	Merchant	Social
2011	Journal of Consumer Marketing	Integrating social media with online retailing	Dennis A.Pitta	Merchant	Social

Figure 2.9 – Scientific papers analysis by channel typology and merchant's point of view [Personal elaboration]

The table outlines how the majority (10 out a total of 13) of the scientific papers with the merchant's point of view focus on the integration between the online and offline channels.

This is due by the fact that the integration between offline channel (physical store) and online channel represents the most diffused and consolidated form of multichannel for retailers since fifteen years ago, thus, it is widely analyzed in literature under many point of view. These papers are uniformly chronologically distributed from the beginning of the 21st century to now.

The adoption of multichannel paths that imply the integration between the offline channel and the mobile one is, instead, an evolving and underdeveloped phenomenon, because nowadays we are in the mean of a mobile revolution, which is impacting even the retailing world. For this reason we didn't find in literature any papers describing the integration between the offline and mobile channels. Only Khalifa & Shen (2008) describe the mobile commerce alone.

Newer multichannel approaches and paths come from the rising and diffusion of the social network in the daily life. The integration of offline and social channels is even more a recent aspect respect to the integration with the mobile channel, thus, nowadays there aren't paper describing this kind of integration. Curty & Zhang (2011) and Pitta (2011) focus on the theme of social commerce, but they don't give any perspective or any kind of analysis of how merchants could integrate the social network in a common multichannel approach.

There are, instead, 12 papers composing the other cluster of articles that analyze the perspective of customer.

Year	Journal	Title	Author	Multichannel Path	Channel Typology
2003	Journal of the Academy of marketing science	Determinants of online channel use and overall satisfaction with a relational, multichannel service provider	Mitzi M. Montoya-Weiss Glenn B. Voss	Customer	Online and Offline
2005	Journal of Interactive Marketing	Consumers in a multichannel environment: product utility, process utility and channel choice	Sridhar Balasubramanian, Rajagopal raghunathan, Vijay Mahajan	Customer	Online and Offline
2007	Direct Marketing International journal	Multichannel communication and consumer choice in the household furniture buying process	Torsten Lihra, Raoul Graf	Customer	Online and Offline
2008	Business Process Management Journal	Examining product and process effects on consumer preferences for online and offline channels	Aimao Zhang	Customer	Online and Offline
2008	Internet research	Consumer behaviour in the multichannel contexts: the case of a theatre festival	Frances Slack, Jennifer Rowley, Sue Coles	Customer	Online and Offline
2009	International Journal of Retail and Distribution Management	The effect of offline brand trust and perceived internet confidence on online shopping intention in the integrated multi-channel context	Kim Hongyoun Hahn, Jihyun Kim	Customer	Online and Offline
2009	Management Research News	Online purchase determinants: is their effect moderated by direct experience?	Thijs Broekhuizen, Eelko K.R.E. Huizingh	Customer	Online and Offline
2009	Journal of Service Management	A consumer-based view of multi-channel service	Harold Cassab, Douglas L. MacLachlan	Customer	Online and Offline
2010	International Journal of Consumer Studies	Conflicting attitudes and scepticism towards online shopping: the role of experience	Didier Soopramanien	Customer	Online and Offline
2012	Internet research	Exploring consumer value of multi-channel shopping: A perspective of means-end theory	Cheng-Chieh Hsiao, Hsiuju Rebecca Yen, Eldon Y. Li	Customer	Online and Offline
2012	Marketing Intelligence & Planning	Positive and negative cross-channel shopping behaviour	Niall Piercy	Customer	Online and Offline
2012	Journal of Retailing and Consumer Services	Cannibalization or synergy? Consumers' channel selection in online-offline multichannel systems	Tobias Kollmann, Andreas Kuckertz, Ina Kayser	Customer	Online and Offline

Figure 2.10 – Scientific paper analysis by channel typology and customer's point of view [Personal elaboration]

We can apply the same consideration made on the papers with merchant's perspective, since the totality of the papers focus on the multichannel form given by the integration of physical store and online channel.

By this review it is possible to underline how multichannel is widely discussed and analyzed in literature under both the perspective, thus, we can have solid and complete base of knowledge in order to start our research.

2.2.3.2 Classification of the covered topics

The papers selected can be reviewed according to five major areas or issues of analysis. The following table sums up which issue each paper covers.

Title	PathType	Benefits	CSFs	Criticalities
Le politiche distributive multicanale B2C		OK		OK
Determinants of online channel use and overall satisfaction whit a relational, multichannel service provider	OK	OK	OK	
Benefits, impediments and critical success factors in B2C e-business adoption		OK	OK	OK
Who are the multichannel shoppers and how do they perform?				
Multichannel retailing: a case study of early experiences				OK
Opportunities and challenges in multichannel marketing: an introduction to the special issue	OK	OK		
Consumers in a multichannel environment: product utility, process utility and channel choice	OK		OK	
An empirical analysis of e-service implementation		OK		
Multichannel communication and consumer choice in the household furniture buying process	OK		OK	
Examining product and process effects on consumer preferences for online and offline channels	OK			
Explaining the adoption of transactional B2C mobile commerce		OK		
Consumer behaviour in the multichannel contexts: the case of a theatre festival	OK		OK	
The effect of offline brand trust and perceived internet confidence on online shopping intention in the integrated			OK	
Effects of daily and "woot-off" strategies on e-commerce		OK		
The marketing and logistics efficacy of online sales channels				OK
Online purchase determinants: is their effect moderated by direct experience?		OK		OK
A consumer-based view of multi-channel service			OK	
Multiple-channel and cross-channel shopping behavior: role of consumer shopping orientations		OK	OK	OK
The impact of the online channel on retailers' performances: an empirical evaluation		OK		OK
Conflicting attitudes and scepticism towards online shopping: the role of experience		OK	OK	OK
Social commerce: looking back and forward		OK		OK
Integrating social media with online retailing		OK		
Exploring consumer value of multi-channel shopping: A perspective of means-end theory		OK		OK
Positive and negative cross-channel shopping behaviour	OK	OK		OK
Cannibalization or synergy? Consumers' channel selection in online-offline multichannel systems				OK

Figure 2.11 - Topics covered by each scientific paper analyzed [Personal elaboration]

2.2.3.2.1 Multichannel paths

This chapter analyses how the literature covered the issue concerning the description of different multichannel paths. A total of 9 papers out of 25 have as primary or secondary objective the description of channel paths. All these papers describe the different multichannel path in the form of offline and online. It is very difficult to track and describe customers' multichannel paths giving general rules and frameworks of them, since they depend from multitude factors (i.e. typology of customer, product, channel efficiency, particular customers' exigencies and many others). In fact in the literature there are some papers that try to describe consumers' multichannel paths in specific context like a UK concert (Slack *et al.* (2008)) or in specific sectors an geographical areas like the American furniture market (Lihra & Graf (2007)).

There in any case some paper which try to define general framework and rules that are able to describe the paths of the customers at each stage of the buying process (Balasubramanian *et al.* (2005)).

Some examples of the reviewed papers are reported as follows. A brief description for each is provided.

Slack *et al.* (2008) focus on the use of channels at different stages in the consumer decision making process associated with the purchase of theatre tickets for a regional theatre festival in Manchester, UK. In order to explore consumer behavior across channels in the consumer-decision making process, it has been used a questionnaire focuses on the relative use of different channels and specifically the importance of the Internet in the stages leading up to attendance at the festival: awareness, information gathering, decision making and purchase transaction.

Channel	Awareness	%	Information	%	Choice	%	Purchase	%
Internet	101	12	209	24	143	16	97	11
Flyer/poster	137	16	99	11	100	11		
Metrolink poster	12	1						
Local radio/TV	11	1						
Press	60	7	35	4				
Word-of-mouth	559	64	435	49	465	53	100	11
Brochure			161	18	204	23		
Phone							106	12
Box office							108	12
Door							374	43

Figure 2.12 – Use of channels at different stages to purchase theatre tickets [Slack *et al.*]

The paper outlines that the extent of use of different channels at different stages in the decision-making process varies, although the Internet is the only channel

that can be and is used to support all stages of the process. Throughout the process, with the exception of purchase transaction, the use of word-of-mouth is significant. Customers who started using the Internet at the awareness stage often continued to use it. Neither gender nor age has a significant effect on patterns of channel use.

Lihra & Graf (2007) evaluated how US consumers navigate through different communication channels at different steps of the buying process and how they would like to use communication channels in the future. This paper aims at evaluating the US consumers' channel use at different steps of the residential furniture-buying process, made by five different steps: activation, information research, product evaluation, product selection and transaction.

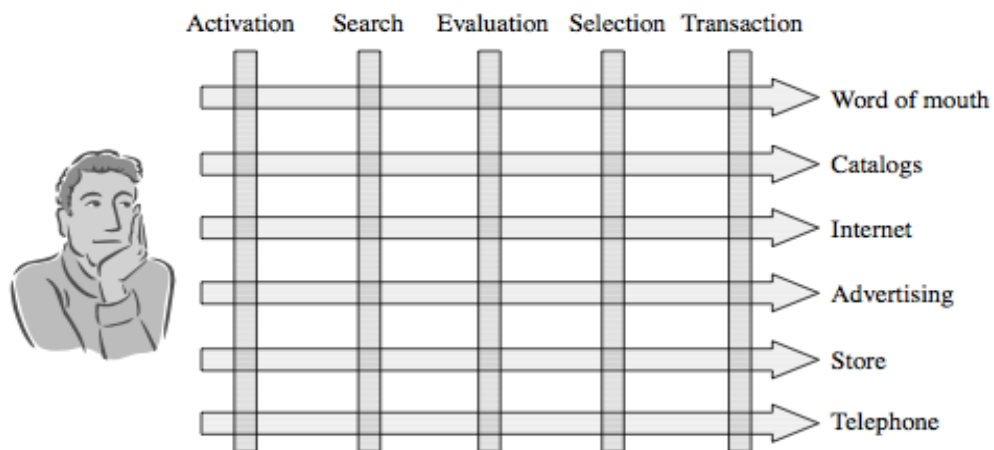


Figure 2.13 – Framework of communication channels at different steps of the buying process [Lihra & Graf]

About 11 hypotheses were developed to address the research problem. To test the hypotheses, an Internet survey was conducted in the USA. Results showed that the furniture retail store is the most important communication channel at each of the five considered buying process stages. Overall score of that channel was higher for females than males, indicating that women care more about communication when buying furniture. The Internet was not of significant importance when buying furniture. Advertising was perceived as a significant means to gather information.

Stage	Stage initiators	Channel attributes
Activation	Change in lifestyle Furniture is worn out or broken	Channel must be proactive
Search	Change in consumer tastes Need for a market overview	Opportunity to see the product Opportunity to touch the product Channel response time Ease of use Efficiency Consumer habits
Evaluation	Need to compare options	Abundance of information Opportunity to see the product Opportunity to touch the product Channel response time Ease of use Efficiency Channel trust
Selection	Evaluation of options has ended	Opportunity to see product Opportunity to touch the product Channel response time Ease of use Efficiency
Transaction	Need to pay for the product	Payment security Price Available information Website design

Figure 2.14 – Channel attributes for the furniture retail [Lihra & Graf]

Balasubramanian *et al.* (2005) developed a conceptual framework that outline which are the factors that influence the channel choice and how these factors influence this choice at any stages of the purchase process: forming a consideration set, choosing a product, and buying the product.

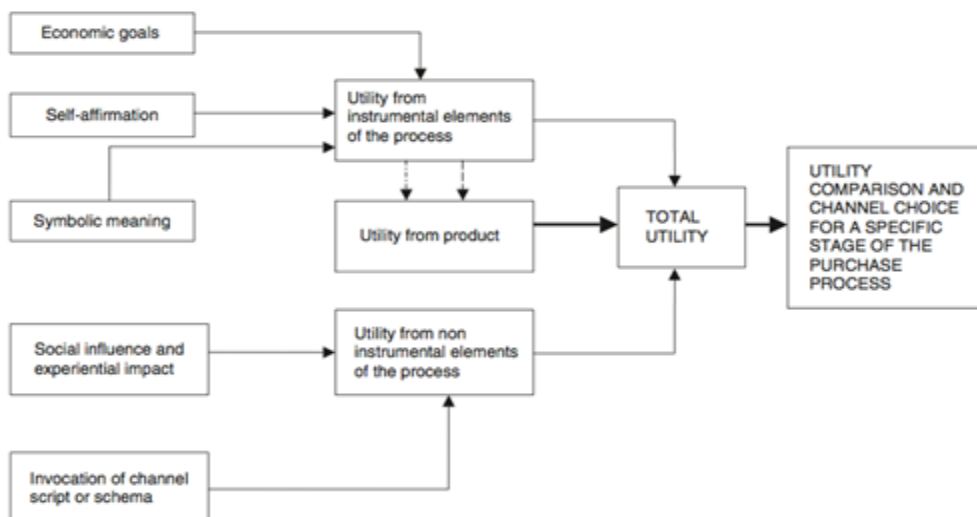


Figure 2.15 – Determinants of channel choice at a given stage of the purchase process [Balasubramanian *et al.*]

Zhang (2008) asserts that paths used by customers depend not only on the type of product but even on the type of transaction. This work shows that independent of the type of product, nowadays customers before ending a transaction want to have the major possible knowledge on a products/service so they use Internet and online channel to search for information and compare prices and products. There are some variations because of the different products but usually, when the execution of transaction and after-sales services phases are involved, offline retailers have the advantages because they can offer more customized offers to customers. This is valid for some products like cars or bank loan but it is not valid for commodities products like books, music, movie and office supplies.

2.2.3.2.2 Benefits

The issue of the benefits coming from a multichannel approach is well analyzed in literature both from the customers' perspective and the merchant's one. There are totally 15 scientific papers that have the objective to describe the benefits coming from the multichannel.

Hsiao *et al.* (2012) investigate consumer's benefits and values in a multichannel context. This study aims to develop a consumer value hierarchy that represents how consumers think and pursue when performing MCS. The research framework was developed from a perspective of means-end theory; two studies were designed to elicit and evaluate a consumer value hierarchy of MCS. First, a qualitative study was conducted to explore means-end elements of MCS. Then, a hierarchical value map of MCS was constructed with 314 usable responses from an empirical survey in Taiwan.

The findings elicited a total of 23 elements. Of the multichannel shopping attributes, ten refer to the shopping characteristics which consumers perceive while making their purchasing decisions in a MCS setting, including expanding geographical accessibility (A1), flexible service time (A2), immediate need fulfillment (A3), optimizing purchase decision (A4), ample product information (A5), diverse product selections (A6), various service interactions (A7), expanding contacts with consumers (A8), ease of transaction checks (A9), and location-based channel selection (A10). Nine MCS consequences refer to the expected outcomes and benefits that consumers receive when performing MCS, such as knowledge growth (C1), facilitating decisions (C2), money saving (C3), location convenience (C4), time saving (C5), transaction confidence (C6), personalized services (C7), increasing personal control (C8), and fast problem-solving (C9). Four MCS values refer to the goals that consumers achieved through their MCS, including pragmatism (V1), enjoyment (V2), safety (V3), and freedom (V4). Appendix 1 exhibits the contents and definitions of all

elements.

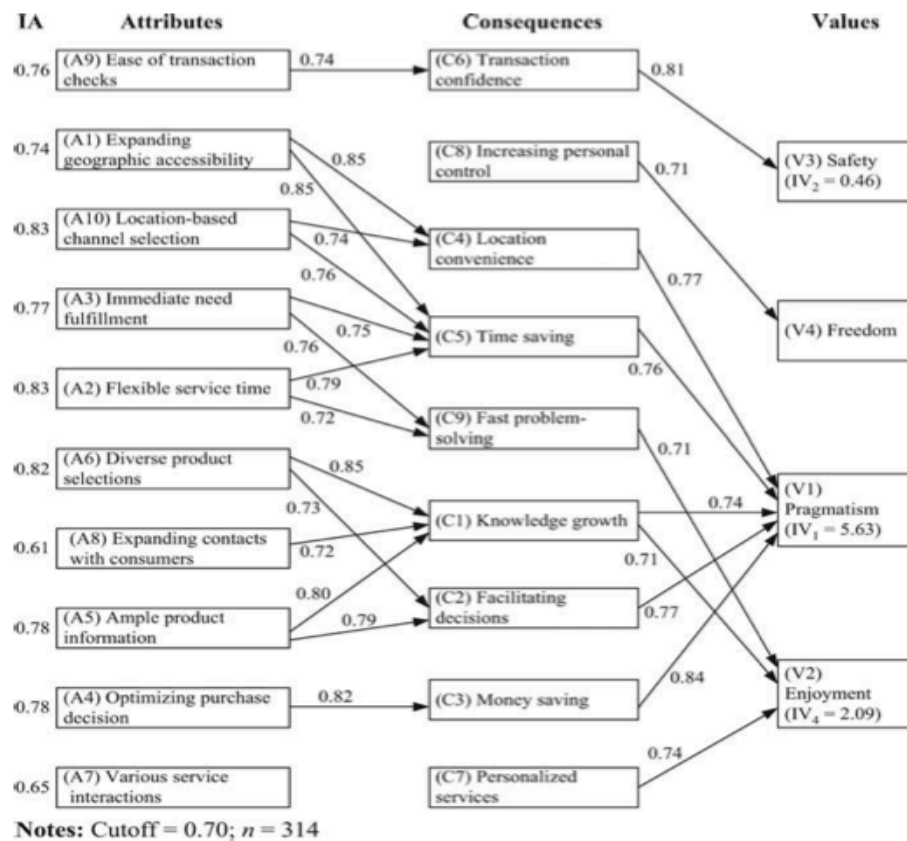


Figure 2.16 – Consumer’s benefits and values in a multichannel context [Hsiao *et al.*]

Many researches have been addressed in order to find merchants’ benefits when a multichannel strategy is implemented. Works of Xia and Zhang (2010), Chatterjee (2010) and Rapp *et al.* (2007), just to mention some, define some benefits of having an online channel flanking the physical store.

Rapp *et al.* (2007) distinguish four major benefits. The first benefit is efficiency: multichannel strategy allows improving the flow of information intra-company, reducing the sales transaction times and the possibility to improve knowledge about customers and react accordingly. The second benefit is novelty. Novelty is defined as new way of doing business, it could be done by increasing firm agility and increasing the richness-rich curve of a firm. Agility refers to the ability of the firm to react promptly to environmental changes. Increasing the richness-rich curve of a firm means to be able to know better a larger number of customers than it is normally possible. The third benefit is lock-in. It means securing customers with repeat transactions. It is possible to obtain this goal by increasing customer satisfaction, give the possibility to customer to customize

the interaction and let him perceive the switching cost to go to another competitor. The fourth benefit is the complementariness: the opportunity for synergies will raise the overall responsiveness of the firm and it is proved that firm with both offline and online channel are more successful than single-channel companies.

Kumar and Venkatesan (2005) found that there is a positive synergy towards multichannel shopping when customers are contacted through various channels. Customers who buy across multiple channels have more contacts with the firm, have past experience with the supplier through the online channel, purchase more frequently, receive communication from the supplier through multiple communication channels, especially through highly interpersonal channels. Customers who shop across multiple transaction channels provide higher revenues, higher share of wallet, have higher past customer value, and have a higher likelihood of being active than other customers.

Tesser (2002) highlights how the tough competition in the market forces firms to introduce new technology to move from the marketplace to the market-space. On one hand the use of these technology allows firms to reach markets overlooked before because not interesting or unprofitable, on the other hand, it allows supporting existing markets with new channels. Benefits of the integration of offline and online channels are the possibility to reach, and consequently to sell, more customers than single-channel firms. Others benefits are: brand awareness, usually firms operating in traditional markets already well-know and do not need advertisement on the Web. Traditional firms have already a base clientele to address communication and promotions and they know what customers demand and their habits. Their logistic is already tested and reliable.

Wang *et al.* (2008) search the benefits of “one deal a day” market strategy in the online channel. This strategy is good for firms that want to get rid of excess of inventory of overproduced products. This can be an important strategy to implement in the online channel because customers do not know what kind of promotion will be the next day so it can raise curiosity. Firm can use this as an excuse to gather more customers on its website and raise the number of visits per day. In order to be a successful strategy and to retain customers, firm should be sure that its price is the lowest on the market.

It is possible to sum up the benefits found divided by customers and merchants:
Benefits for customers:

- a) Synergies from the use of more channels could help the conclusion of a transaction
- b) Flexibility in making an order
- c) Opportunities to obtain more information about products
- d) Benefits for merchants:

- e) Synergies from the use of multichannel could help merchants to expand the range of goods presented to customers
- f) Be able to gain the trust of clientele will bring repeat sales from the same customer
- g) Increase of profitability because of the increase in goods sold
- h) Have more information about customers' behaviors in order to implement specific marketing strategies
- i) Increase of brand awareness, especially with the use of social network
- j) Possibility to achieve new markets
- k) Possibility to do advantageous promotions, like daily discounts, or to offer free after sales services like free delivery

2.2.3.2.3 Drawbacks

This chapter reviews the literature on how it deals with drawbacks and criticalities coming from a multichannel adoption. These eventual negative aspects have not been completely examined in literature, and they currently less analyzed respect to the benefits.

In the 9 papers criticalities are analyzed from the merchant's perspective since they are related to the possible problems, which could rise from the implementation of a multichannel strategy.

Possible drawbacks and negative consequences coming from the adoption of a multichannel approach could be the risk of losing customers due to the poor service of one channel (Piercy(2012)), risk of cannibalization between channels (Tesser (2002)) or infrastructural cost and others.

For example Tesser (2002) found that implementing a new channels bring some criticalities: more distribution cost for multiple channels, different returns on different channels, the difficulty of a fluid communication between two different channels and lack of coordination. Firms that want to begin a multichannel strategy should be aware of other possible criticalities like internal conflicts: cannibalization of the channels and underutilization of physical building, price difference in different channels and the not synchronization of channels.

Possible external conflicts are: possibility to create a direct selling channel for the manufacturer, loss of control on the selling channels, shift of power between retailer, supplier and customers.

Dubelaar *et al.* (2004) report the results of a study carried out to assess the benefits, impediments and major critical success factors in adopting business to consumer e-business solutions. This paper identifies as major impediments and criticalities to a multichannel adoption the following: leadership issues, operational issues, technology, and ineffective solution design.

Strategic factors

- Creation of web activities without major interruptions to the core business
- Duplication of traditional business assumptions online
- Comparison of performance with traditional industry competitors in the physical world and dismissal of online competitors
- Perception that Internet is an opportunity for company to communicate with customers, not for customers to communicate with them

Structural factors

- Internet is adopted and related activities are sprinkled throughout the company with no direct connection to the core business
- E-business division is kept separate and disconnected from the core business

Management-oriented Factors

- Under-commitment of resources and assignment of e-business responsibility to executives with no subject expertise
 - Lack of in-house technical and web skills results in choosing inappropriate vendors for development of e-business solutions
 - Insist that an Internet venture meet every corporate standard, without committing sufficient resources, both staff and economic
 - Celebrate conversion to e-business by requiring changes from people they are confused about making.
-

Figure 2.17 – Common e-business impediment identified from the literature
[Dubelaar *et al.*]

Piercy (2012) developed a questionnaire survey of the online customers of four companies to investigate influences of demographic and behavioral variables (purchase involvement, loyalty, experience with the internet, company and product-type) on positive and negative cross-channel behavior. The results display that customers have a far higher propensity to engage in negative cross-channel behavior (punishing offline channels for poor service online), than positive cross-channel behavior (preferring companies online who have an offline presence). For the traditional retailer this provides a worrying finding, their expensive offline divisions provide minimal reassurance to lure customers into the online world while online divisions can have a potentially significant negative impact on offline purchasing. For the online pure-play these findings are very encouraging, they lose little by not having a retail channel and while customer dissatisfaction may reduce purchase rates from the company, they do not have to consider the effects across multiple channels and divisions.

To sum up all contributes of the literature we identified the following possible drawbacks of implementing a multichannel strategy:

- a) Cannibalization of sales between different channels
- b) Lack of coordination and synergies between channels (silos approach)
- c) Infrastructural cost: cost deriving from the replication of existing activities or from the investment in new ones
- d) Free-riding of customers: customers could use the resources of the most convenient channel but purchasing with another company
- e) Poor service in a channel may impact the all company (loosing of customers)
- f) Price conflict between channels
- g) Different channel margins: merchant should monitor price and cost on each channel, because they could have a different cost-structure
- h) Transactional cost: it refers to all the cost generated by different transactions of information and products across the existing channels. For example the possibility of buying a product online and returning the product in a store generates transactional cost.
- i) Risk of losing control of the channel (increasing of cost due to a poor management)

2.2.3.2.4 Critical success factors (CSFs)

In the literature analyzed, 9 papers discuss the CSF of implementing a multichannel strategy.

A survey made by Hahn and Kim (2008) shows that brand trust of traditional firms with physical stores reduce the risk perceived by customers who are going to buy products of these firms online. In order to retain consumers' trust, retailers need to maintain smooth transactions from offline to online and vice versa. Therefore, it is vital for retailers to implement multichannel retailing strategies seamlessly in order to offer customers the ability to purchase and return merchandise using any channel with a minimum amount of hassle, which will eventually cause consumers to retain their trust in the firm's business and retail channels. Another critical success factor for multichannel firm regards information. In order to encourage offline customers to adopt the online channel for purchases, the multichannel retailers should provide consistent customer service and a large amount of information about the product.

Montoya *et al.* (2003) studies point out another critical success factor for online channel, it is the risk perceived by customers for online transaction security, especially for those people who are not so experienced with the use of Internet.

Customers are aware of security issues, and they are wary of providing too much personal information. There should be a clear connection between the information collected, how it's used and what value the customer receives from

it. Privacy, especially for the new generations might not be as important as for whom is suspicious about technology, but everyone wants to receive a benefit from giving his information.

Dubelaar *et al.* (2004) identified the CSFs in the adoption of e-business as: combining e-business knowledge, value proposition and delivery measurement, customer satisfaction and retention, monitoring internal processes and competitor activity, and finally building trust. Other possible CSFs are experience and commitment: the experience of merchants is important because while every type of channel has its own characteristics, there are some strategies that work across all engagement points. Experience and knowledge in the advertisement area is important to have a unique message to present to the customers. They should always know exactly what brand they are interacting with. This does not mean that the message has to be identical, but it needs to be clearly related. Commitment is also fundamental because multichannel retailing requires an investment in time and money. There is the need to have a clear strategy across all teams. Cooperation from everyone is critical to success. It is possible to sum up the CSF found using Dubelaar *et al.* (2004) framework:

Strategic factors

- Internet and related technologies used as a complement to the existing strategies
- Basis of competition not shifted from traditional competitive advantages such as cost, profit, quality, service, and features
- New competitors and market shares tracked
- Web centric marketing strategy
- Company's strategic position in the market strengthened
- Distribution and supply chain model frequently reviewed to maximize company's gain
- Buyer behavior and customer personalization
- First-mover advantage and quick time to market
- Good products and services offered by e-business
- Innovation allowed when risks are low
- Customer's and partner's expectations from the web well-managed

Structural factors

- Right digital infrastructure
- Good e-business education and training to employees, management, and customers
- Current systems expanded to cover entire supply chain
- Good cost control

Management-oriented factors

- Organization-wide commitment to e-business leadership (in terms of roles, responsibilities, budget matters, cross-functional interdependencies)
- Support for e-business from top management
- Awareness and understanding of capabilities of technology by executives
- Communication of the e-business value throughout the organization by top management

Figure 2.18 – Major success factors for e-business identified from the literature [Dubelaar *et al.*]

2.3 White Papers review

2.3.1 Introduction

To complete our analysis review and have a more broad general knowledge on the two main topics described above, we analyzed 19 white papers from several consulting companies as Accenture, Bain, BCG, Capgemini, McKinsey, PWC and Kantar Retail. Two other white papers from Motorola and Distretto calzaturiero Veneto were analyzed.

2.3.2 Methodology

In the following tables, we present the white papers used catalogued by topics covered and under a chronological order. We selected only those white papers that provide information about technology innovations in store and how multichannel strategy can help physical store.

Year	Consulting company	Title	Author	Technology innovations	Multichannel
2008	Distretto calzaturiero veneto	L'innovazione dei processi di comunicazione e gestione dei punti vendita nel settore calzaturiero	/	X	
2009	McKinsey	The promise of multichannel retailing	Steve Noble, Amy Guggenheim Shenkan, Christiana Shi	X	X
2010	Accenture	The "me-tail" revolution	Janet L. Hoffman, Renee V. Sang		X
2011	Accenture	Thriving through the great promotion	/	X	X
2011	Accenture	Retail pricing is about get personal	Jeanne G. Harris, Milton Merl	X	
2011	Avanade	The retail management game has changed: 6 trends you must embrace and understand	/		X
2012	Accenture	Connected store: deliver a shopping experience	/		X
2012	Accenture	European cross-border e-commerce: the challenge of achieving profitable growth	European Retail round table		X
2012	Accenture	Making mobile POS happen: five ways stores can better compete and grow	/	X	
2012	Accenture	Shopping senza frontier	Nathaniel Fry, Mathew J. Prebble, Christoph R. Loeffler		X
2012	Accenture	Creating an experience through mobility	/	X	X
2012	Accenture	Winning the retail war	/		X
2012	Bain	Omnichannel retailing: digital disruption and retailer opportunities	Darrell Rigby, Kris Miller, Josh Chernoff and Suzanne Tager		X
2012	Bain	Are consumers waiting for better deals?	Darrell Rigby, Kris Miller, Josh Chernoff and Suzanne Tager	X	
2012	BCG	Retail 2020: competing in a changing industry	Pierre Mercier, Rune Jacobsen and Andy Veitch		X
2012	Capgemini	Digital shopper relevancy	/		X
2012	Motorola	What's driving tomorrow's retail experience?	/	X	
2013	Accenture	Seamless retail: customize, connect, converge, collaborate	/	X	X
2013	Kantar Retail	The Future Shopper: How changing shopper attitudes and technology are reshaping retail	Lloyd Burdett, J. Walker Smith, Andrew Curry, Bryan Gildenberg and Steve Mader	X	

Figure 2.19 – Classification of white paper by topic [Personal elaboration]

As it is possible to see from this table, 10 out of 19 white papers are from the Accenture consulting group and 13 papers were published this year or the previous one.

2.3.3 Summary of review

Consulting groups usually research future possible trends and suggest how to keep up with the times but they also deal with the analysis of customers' behaviors and problems that can emerge from the utilization of new technology. The papers analyzed helped us to understand better the themes of technology innovation and multichannel in the evolving world of retailing with specific researches on the future of retailing.

3 Empirical analysis

3.1 Objective of the analysis

Our research is focused on the retail sector and its changes, in particular on the analysis of the new technological innovations and multichannel models adopted by merchants to revolutionize their physical stores.

Our focus is the analysis and classification of technological innovations that imply front-end interaction with customers in store. Front-end technologies are defined as those innovations able to offer an entertaining and improved shopping experience while communicating the brand in new and attractive ways.

In an era where e-Commerce is eroding brick-and-mortar store' s earnings, it is essential to find new ways to attract customers to the physical store.

Once defined the state of the art of technological innovations in physical store we identified all the benefits and drawbacks for each one both for customers and merchants. After this step we classified all the innovations according to different axes.

The analysis of the multichannel models is, instead, less detailed because the Osservatorio of E-commerce of Politecnico di Milano has already discussed this topic in exhausted way.

The next step was the analysis of the modalities of integration between technological innovations and multichannel, trough the identification of all innovations able to support multichannel.

In the chapter 4 we will focus on a detailed analysis of geofencing, taken as example of the integration between technological innovation and multichannel.

3.2 Logical process

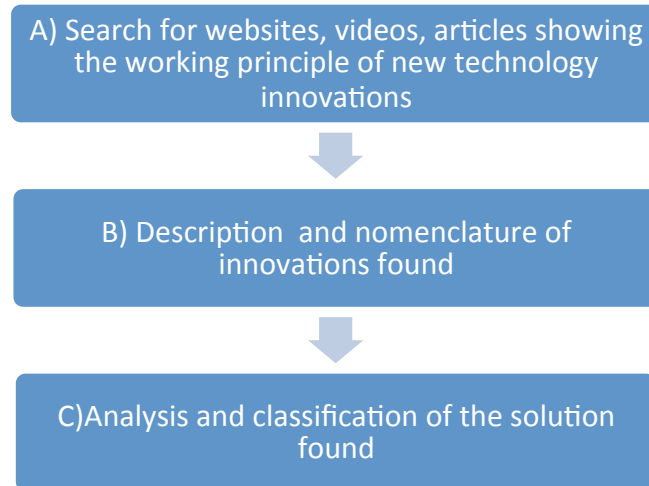


Figure 3.1 – Logical process phases [Personal elaboration]

The first step taken was the search of in-store innovations, through reading articles, white paper, scientific paper, the view of videos and specific website not only from Italy but from all over the world. The most sources that we found regard the American and English markets but should not be underestimated the contribution from some countries of the Far East (Korea) and Germany. Second step was the analysis of the innovations found with a description on the working principle and relative benefits and drawbacks for both customer and merchant. This analysis is developed in the next chapter.

3.3 Technological Innovations in physical store: State of the art

This chapter is dedicated to the nomenclature and the explanation of the technological innovations, used to make shopping easier, interactive and enjoyable for the customer. Only those innovations used in B2C context were considered.

Other two aspects are analyzed: the advantages and drawbacks both for customer and retail coming from the introduction of the specific technological innovation.

- **QR info-scan**

With QR info-scan customers could have more information, some feedbacks, ratings or videos about a specific product or service. To obtain this a customer has to scan a QR (Quick response) code with a mobile devices typically a smartphone, or also a tablet. This innovation actually is very diffused and it is becoming a status quo in more or less every sector.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Support pre-sales phase in store • Higher customer satisfaction • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Have a higher knowledge of products before buying them • Consult ratings and feedbacks of other customers • Interaction with product available in store 	/

- **Windows shopping wall**

Customer scans QR code or bar code from posters or screens placed in transit area like metro or buses stops, or airport’s gates. The customer could also paying with his mobile device and choosing the home delivery or the pick-up in store option. This solution is adopted in the grocery sector for a daily life shopping activity by merchant like Tesco. The borders of this technological innovation are fuzzy and not so clear; in fact it is in between the physical channel and the mobile one. We decided to consider this innovation as in-store innovation because windows shopping wall is in a certain way a physical store to all effects while mobile devices are only the means to shop. It differs from the traditional mobile commerce based on optimized websites or dedicated applications.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase sales meeting the needs of a segment of busy, metropolitan customers • Higher service level 	<ul style="list-style-type: none"> • Merchant has to create an efficient service in order to deliver the right order at the right time • Create an efficient supply chain for the service • Integration with physical store
Customer	<ul style="list-style-type: none"> • Time saving (no queue, home delivery) • Possibility to exploit moment of daily life otherwise lost for shopping activities • Get info on product • Possibility to find offers • Home delivery in a specific time window selected by the customer 	/

- **Shadow QR code**

Customer is able to scan QR code just in particular daily time window because of the shadows created by the sunlight. To increase sales during the lunch period, E-MART (largest retail chain in Korea) decided to launch a unique experience to its customers; that lasted only during the lunch hour. Thus, they launched a QR Code, only readable from 12:00 to 13:00, due to the position of the sun. Consumers who scanned the QR Code were directed to the E-MART online store and received \$12 coupons for products to be delivered in their homes. This action expanded to 36 locations in Seoul, offered more than 12,000 vouchers, the number of members increased by 58% and, moreover, there was a 25% increase in sales during the lunch hour. (<http://www.qrcartist.com>)

Shadow QR code is, actually, adopted only by E-Mart according to our researches.

The considerations of why we decided to classify this innovation as in-store innovations are the same ones of windows shopping wall.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Support pre-sales phase in store • Higher customer satisfaction • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Have a higher knowledge of products before buying them • Consult ratings and feedbacks of other customers • Interaction with product available in store 	/

- **QR code windows' store**

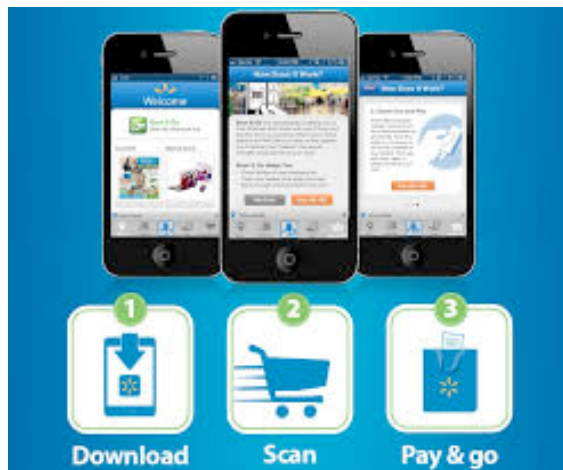
QR code window's store works in the same way of windows shopping wall with the difference that QR code are placed directly on store's windows. It offers to customer the possibility to order and pay a product even if the physical store is closed or if it's too much crowded to enter in.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase sales meeting the needs of a segment of busy, metropolitan customers • Higher service level 	<ul style="list-style-type: none"> • Merchant has to create an efficient service in order to deliver the right order at the right time • Create an efficient supply chain for the service • Integration with physical store
Customer	<ul style="list-style-type: none"> • Time saving (no queue, home delivery) • Possibility to exploit moment of daily life otherwise lost for shopping activities • Get info on product • Possibility to find offers • Home delivery in a specific time window selected by the customer 	/

- **MSA (Mobile Shopping Assistant)**

Customer scans products' barcode through an app installed on his mobile device. Once finished the shopping activity, the app will generate a new QR code through which customer can pay immediately all the products in the cart at a self-service kiosk using credit card or mobile payments. Big merchants like Metro or Wal-Mart have introduced this innovation; in Wal-Mart it is called SCAN&GO.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase sales meeting the needs of a segment of busy, metropolitan customers • Higher service level 	<ul style="list-style-type: none"> • Merchant has to create an efficient service in order to deliver the right order at the right time • Create an efficient supply chain for the service • Integration with physical store
Customer	<ul style="list-style-type: none"> • Time saving (no queue, home delivery) • Possibility to exploit moment of daily life otherwise lost for shopping activities • Get info on product • Possibility to find offers • Home delivery in a specific time window selected by the customer 	/

- **Mobile augmented reality**

A new app from IBM Research will provide shoppers with a personalized shopping experience with immediate product comparisons and special offers as they move throughout the store. It captures images via the built-in video camera on a user's smartphone or tablet and uses advanced image processing technologies to quickly and accurately identify a product or row of items. Once the application recognizes the products, it will display information above the product images and rank them based on a number of criteria, such as price and nutritional value. It will also provide the shopper with any loyalty rewards or incentives that may apply and suggest complementary items based on what the customer has already viewed. For example, a shopper looking for breakfast cereal could specify they want a brand low in sugar, highly rated by consumers and on sale. As the shopper pans the mobile device's video camera across a shelf of cereal boxes, the augmented reality shopping app will reveal which cereals meet the criteria and also provide a same-day coupon to entice the shopper to make a purchase. While the app will allow shoppers to be more informed about products, it will also help retailers to better connect with their in-store customers. This innovation is actually in a testing phase.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase sales meeting the needs of a segment of busy, metropolitan customers • Higher service level 	<ul style="list-style-type: none"> • Merchant has to create an efficient service in order to deliver the right order at the right time • Create an efficient supply chain for the service • Integration with physical store
Customer	<ul style="list-style-type: none"> • Time saving (no queue, home delivery) • Possibility to exploit 	/

	<p>moment of daily life otherwise lost for shopping activities</p> <ul style="list-style-type: none"> • Gathering info on product • Possibility to find offers • Home delivery in a specific time window selected by the customer 	
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- Geofencing

A location based targeted solution that sends SMS text and emails directly to customer when they entered a specific perimeter.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Capture attention of customer in proximity of point of sales • Increase sales 	<ul style="list-style-type: none"> • Protection of sensible data • Privacy management • Implementation of ad hoc app (if app-based)
Customer	<ul style="list-style-type: none"> • Have discounts and coupons • Personalised offers and discounts 	<ul style="list-style-type: none"> • Privacy problems • Risk of spam perception

- Mobile Point of Sales

Tablet or other devices used by sales staff. In every place of the store they can do check out, check availability of a product or order a product not available at that moment in the store and plan a delivery to customer's address. Some retailers offer directly to customers the possibility to use the tablets.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Avoid loss of sales due to stock-out • Higher service level 	<ul style="list-style-type: none"> • Personnel training to the use of devices and new solutions
Customer	<ul style="list-style-type: none"> • Time saving (avoiding queue at the checkout) • Free home delivery (if product is not present in store) 	/

- **Kiosk**

The category of kiosk contains different kind of hardware and systems but they have the common characteristic to support the pre-sales and post-sales phases. Through this kind of kiosk customers for example can browse products' catalogue or have specific services and tailored offers.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Support pre-sales and post-sales phases • Higher service level • Higher customer satisfaction 	/

Customer	<ul style="list-style-type: none"> • Browse of catalogue and offers • Personalised promotions and discounts • Fidelity card management 	/
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- **Browse&Order hub**

PC fixed platform allow customer to browse, compare, select and pay products. It is a sort of kiosk but it offers more options to customer because it supports also selection and payment phases. For this reason we decided to classified it separately from the category of kiosk.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Avoid loss of sales due to stock-out • Higher service level • Higher customer satisfaction 	<ul style="list-style-type: none"> • Management of stock-out order • Medium implementation cost
Customer	<ul style="list-style-type: none"> • See product availability • Compare different products • Avoid time wasting to seek products inside the store • Avoiding queue at the checkout • Free home delivery (if product not present in store) 	/

- **Vending machine**

The vending machines, also called express kiosk, are situated in high traffic locations such as airports, casinos, malls and college campuses. They are truly

an extension of physical store, offering select premium electronics for anyone on the go.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Reach high traffic location • Higher service level (more point of sales) 	/
Customer	<ul style="list-style-type: none"> • Time saving • Info on product 	/

- **Display**

It is a simple screen placed in the store or in the window's store that shows video, images and information about product. This innovation belongs to the general category of the digital signage.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Capture customer attention • Brand awareness • Modify contents in a 	/

	dynamic way (respect to posters) <ul style="list-style-type: none"> • Ability to deliver a message in a specific location during a specific time 	
Customer	<ul style="list-style-type: none"> • See products on video (for example clothes during catwalks) 	/

- **Video label**

It is a small screen, under products exposed in shelves, which show information about product. This solution is present in the grocery sector with the function to show video about products. This innovation belongs to the general category of the digital signage.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Capture customer attention • Brand awareness • Modify contents in a dynamic way (respect to posters) • Ability to deliver a message in a specific location during a specific time 	<ul style="list-style-type: none"> • Medium implementation costs
Customer	<ul style="list-style-type: none"> • See products on video 	/

- **Interactive display**

It is a screen that shows video and images about a product when this is putted in front of the screen. It works thanks to the RFID technology that exploit some specific tags put on each product, that communicate with a reader equipped in the display.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Capture customer attention 	<ul style="list-style-type: none"> • High cost
Customer	<ul style="list-style-type: none"> • See product on video (for example clothes during catwalks) • Gather product info on selected item 	/

- **Interactive window**

Customers can browse, select and order product directly from windows present outside or inside the store. This interactive window in the most of the cases exploits the touch screen technology.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Capture customer attention • Reduce shelf space • Reduce personnel 	<ul style="list-style-type: none"> • High costs (only in flagship stores)
Customer	<ul style="list-style-type: none"> • Interact with virtual product • Get info on products • See products on videos • Consult customers' 	/

	feedbacks and ratings <ul style="list-style-type: none"> • Share products on social networks 	
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- **Augmented reality window**

Augmented reality windows are displays equipped with a camera that allow customer to brows and try products virtually through the use of a specific tag, typically made by paper.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Reduce storage cost • Expose only a limited range of product for security reasons (Jewellery, watches...) • Stimulate customer attention and curiosity 	<ul style="list-style-type: none"> • High cost (only in flagship stores)
Customer	<ul style="list-style-type: none"> • Possibility to try products not available in store virtually • Try products immediately without entering the store 	/

- **Magic mirror:** Customer can see how a product looks without trying it on. Some mirrors allow customer to browse, select and order products. It differs from augmented reality because it doesn't require a paper tag to show virtual clothes.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Reduce storage cost • Expose only a limited range of product in the store (reduce shelf space) • Stimulate customer attention and curiosity 	<ul style="list-style-type: none"> • High costs
Customer	<ul style="list-style-type: none"> • Possibility to try virtually product not available in store • Compare outfits immediately • Time saving in trying clothes • Possibility to select and order clothes in some case • Share on social network (few cases) • Feedbacks and ratings 	<ul style="list-style-type: none"> • Not so accurate (technology innovation at the beginning stage with high improving margins)

- **NFC payment (Mobile proximity payment)**

Near field communication NFC is a technology designed to exchange information securely across a short distance of a few centimeters without any physical contact. One of the technology's major advantages is that the radio connection is fast and intuitively operated. This technology is actually adopted for the payment phase using a smartphone, which is equipped with a Near Field Communication (NFC) chip.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher productivity • Simple technologies 	<ul style="list-style-type: none"> • Low diffusion
Customer	<ul style="list-style-type: none"> • Reduce payment time • Time saving (less time on queue) • Higher security 	<ul style="list-style-type: none"> • Restriction to make payment under a limited payment threshold

- **Mobile remote payment**

Mobile remote payment includes those services that allow, remotely, enabling the payment of a good or service through the phone. These services use a wireless network (either GSM network, UMTS, etc.) and are consumed through various platforms of interaction: sending a text message, navigation - Mobile sites optimized for mobile or by applications installed on personal cellphone (java or other platforms) or on the SIM.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher productivity • Simple technologies 	<ul style="list-style-type: none"> • Low diffusion

Customer	<ul style="list-style-type: none"> • Reduce payment time • Time saving (less time on queue) • Higher security 	/
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- **Fingerprint authentication point**

It is a biometric technology; meanings what this a technology used to identify or authenticate an individual's identity using the scanning of personal fingerprints. In retails is mostly used as a faster and more secure mean of payment at the checkout locations.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase productivity of checkout point (faster payment method) • Cost saving 	<ul style="list-style-type: none"> • Protection of individual privacy • Some people cannot use it for physical problems • Low diffusion and customers' suspicion
Customer	<ul style="list-style-type: none"> • No risk of fraudulent use of credit card • Easier and faster payment method • Make payment without carrying cash and ID • Loyalty card no more necessary • Simple to use 	<ul style="list-style-type: none"> • Protection of individual privacy • Some people cannot use it for physical problems • Low diffusion and customers' suspiciousness • Loss of privacy

- **Barcode card as product**

With this innovation a customer pick up a barcode card instead of the physical product at the checkout point. The product will be retired subsequently to a delivery area of the store or it will be delivered directly to the customer's

address. This innovation is adopted in “show –room” retails, in retail where only a limited range of products is exposed on the shelves (for example only one colour) or in shops that sell heavy products like appliances in which customers could prefer an home delivery and installing.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Reduce shelf space (store as showroom) • Reduce storage costs • Higher productivity • Simple and cheap 	/
Customer	<ul style="list-style-type: none"> • Time saving at checkout point 	/

- Self-service checkout kiosk

This solution is widespread in the grocery sector, and it is equal to the traditional checkout point with the only exception that no store personnel are required. Customer scans products in the cart, and pay with credit card at the specific post in the kiosk.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Reduce personnel cost 	/
Customer	<ul style="list-style-type: none"> • Less queue than checkout point 	<ul style="list-style-type: none"> • Not always time saving • In some cases even more slow than traditional checkout point

- **Personal shopping assistant**

This solution is similar to Mobile shopping assistant, with the difference that customers use shopping trolleys available in the store and not their mobile devices.

The system allows consumers to: choose favorite items, add items to the shopping list and find items in the store. Furthermore, it highlights (graphically) the products, allows to visualize (graphically) the products on the basket and products on sale, as well as to find their exact location. In this way, it becomes an interactive shopping guide, which supports consumers during their presence in the store. Hence, consumers can save time and enjoy the more efficient shopping experience.

This innovation is particularly adopted in the grocery sector. It requires a higher investment in terms respect to Mobile shopping assistant since the device is integrated in the cart and it isn't anymore a personal device of customer.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Decrease personnel cost (at the checkout point) • Gather info on customer purchases and preferences • Communicate to customer info on discounts and promotions • Higher service level • Shelf visibility • Increase quality perception of the products and retail brand • Deliver high customised info 	<ul style="list-style-type: none"> • High implementation costs • Create a powerful and easy-to-use application
Customer	<ul style="list-style-type: none"> • Time saving (less queue at checkout, product left in the cart during checkout) • Stay on budget • Comparing different proposals • Gathering info about product in store • Examine shopping list • Get discount and promotion • Know fidelity points • Product locator 	/

- **Self-shopping pod**

This solution is similar to personal shopping assistant but it offers less function respect to the last one; for example is not possible to find the exact location of products. Customer takes the pod before entering in the store after the authentication with its fidelity card, scan the products' barcode trough the pod and once finished he can pay at traditional checkout point or at self-service kiosk. Differently to mobile shopping assistant these devices are owned by

merchants, and differently from personal shopping assistant are not fixed on the cart.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Decrease personnel cost (at the checkout point) • Gather info on customer's purchases and preferences • Communicate to customer info on discounts and promotions • Higher service level • Quantify products on shelves in real time • Increase quality perception of the products and retails 	<ul style="list-style-type: none"> • Medium implementation costs
Customer	<ul style="list-style-type: none"> • Time saving (less queue at checkout, product left in the cart during checkout) • Stay on budget • Comparing different proposals • Gathering info about product in store • Examine shopping list • Get discounts and promotions • Know fidelity points 	/

- **Bodometrics scanner**

This technology innovation is a body scan location used in clothes stores to scan the body's shape of the customer in order to find the clothes that fit perfectly. Once the scan session is completed a sales assistant is able to support with a tablet the customer thanks to the information coming from scanning process, offering the dress right.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher value perceived by customers • Useful role of the shopping assistant 	<ul style="list-style-type: none"> • High cost • Train customer personnel
Customer	<ul style="list-style-type: none"> • Time saving to select clothes' size from different brands 	/

- **Free Wi-Fi zone**

More and more merchants are giving customers the possibility to use a free Wi-Fi inside the store. This solution is adopted according to the strategy of the retailers, in particular to improving the pre-sales phase; but in some cases as a support for the selection and payment phases. An example of this comes from Waterstones, a bookstores chain, which is allowing customers to buy and download content onto an electronic device using free Wi-Fi available in stores. The strategy enhances the customer experience by providing consumers with the option of purchasing an eBook, whilst physically browsing books in a traditional brick-and-mortar store. The convenience of downloading an eBook from in store also provides eBook customers with easy access to the store's specialist staff, trained to provide help and guidance on any of Waterstones' books.



	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Support pre-sales and post-sales 	/
Customer	<ul style="list-style-type: none"> • Get info on products • Compare products • Possibility to connect freely to Internet 	/

3.4 Classification of technological Innovations

Once identified the main technological innovations adopted by different merchants in brick-and-mortar store, it is important characterizing this innovation according to different axes. We identified the following drivers to classify all the technological innovations found:

1. Hardware/ Software technological innovation
2. Device used
3. Active/ Passive user
4. Covered phases of the buying process
5. Innovative degree
6. Impact of innovation
7. Diffusion degree
8. Sectors of application
9. Intra-company diffusion

3.4.1 Hardware and Software Innovations

Analyzing the innovations founded, we realized the possibility of dividing all of them in two big macro areas: *hardware innovations* and *software innovations*.

We called *hardware innovations* those innovations that requires the installation of physical equipment in store and consequently of the eventual software program installed on that equipment. The technological innovation is embedded in the couple hardware/software that could be the innovation itself or can be the mean for an innovative process.

On the other hand, we consider as *software innovations* those ones that enrich customer's shopping experience through the use of application or programs that don't require physical tools installed by merchant in the store but that are activated by customer's device (smartphone or tablet).

Hardware innovations	Software innovations
1) Mobile Point of sales	1) QR infoscan
2) Kiosk	2) Windows shopping wall
3) Browse& order hub	3) Shadow QR code
4) Video label	4) Window's store QR code
5) Display	5) Mobile shopping assistant (Scan&go)
6) Interactive display	6) Mobile augmented reality
7) Interactive window	7) Geofencing
8) Augmented reality window	8) Mobile remote payment
9) Magic mirror	
10) Self-service checkout kiosk	
11) Personal shopping assistant	
12) Bodymetrics scanner	
13) Vending machine	
14) Free Wi-Fi zone	
15) Barcode card as product	
16) NFC payment	
17) Fingerprint authentication	

Figure 3.2 – Classification between hardware and software innovation [Personal elaboration]

3.4.2 Device used

The second classification is based on the characterization of the innovations according the device's typology involved and the active user of it.

Device	Innovations
Smartphone	1) QR infoscan

	<ul style="list-style-type: none"> 2) Windows shopping wall 3) Shadow QR code 4) Window's store QR code 5) Mobile shopping assistant (Scan&go) 6) Mobile augmented reality 7) Mobile remote payment 8) Geofencing 9) Mobile remote payment
Tablet	<ul style="list-style-type: none"> 1) QR infoscan 2) Windows shopping wall 3) Shadow QR code 4) Window's store QR code 5) Mobile shopping assistant (Scan&go) 6) Mobile augmented reality 7) Mobile remote payment 8) Geofencing 9) Mobile remote payment 10) Mobile point of sales
Kiosk	<ul style="list-style-type: none"> 1) Pre-sales/post-sales kiosk 2) Browse&order hub 3) Self-checkout kiosk
Display	<ul style="list-style-type: none"> 1) Display 2) Video label 3) Interactive display
Touch screen display	<ul style="list-style-type: none"> 1) Interactive windows
Augmented reality display	<ul style="list-style-type: none"> 1) Augmented reality windows 2) Magic mirror
Body scanner	<ul style="list-style-type: none"> 1) Biometrics scanner
Vending machine	<ul style="list-style-type: none"> 1) Vending machine
Fingerprint authentication reader	<ul style="list-style-type: none"> 1) Fingerprint authentication
NFC reader	<ul style="list-style-type: none"> 1) NFC reader
Self-shopping trolley	<ul style="list-style-type: none"> 1) Personal shopping assistant
Data logic pod	<ul style="list-style-type: none"> 1) Self-shopping pod

Figure 3.3 –Classification of devices and technology supported [Personal elaboration]

According to the first classification based on devices used we can notice that the majority of innovations are based on the use of mobile devices like smartphones and tablet.

The trend shows that innovation developed and used by merchant try to push the use of mobile devices (smartphones and tablets) inside stores; this situation reflects merchants' awareness in understanding and matching the increasing importance of mobile devices in people' daily life, thus, even in the shopping process.

3.4.3 Active- Passive user

Another possible axis of classification is the following: *passive* and *active innovations*.

We define as active innovations those innovations in which customers are responsible of their activation; while in presence of passive innovations customer is not responsible of their activation, resulting a passive user.

In some cases the same innovations can be classified both as passive and as active according to the particular way of implementation decided by merchant. For example Mobile Point Sales can be a passive technological innovation if only stores' personnel use device or it can be active if merchant leaves to customers the possibility of using the device.

Active User innovations	Passive User Innovations
1) Mobile Point of sales	1) Display
2) Kiosk	2) Video label
3) Browse& order hub	3) Geofencing
4) Interactive display	
5) Interactive window	
6) Augmented reality window	
7) Magic mirror	
8) Self-service checkout kiosk	
9) Personal shopping assistant	
10) Biometrics scanner	
11) Vending machine	
12) Free Wi-Fi zone	
13) Barcode card as product	
14) NFC payment	
15) Fingerprint authentication	
16) QR infocan	
17) Windows shopping wall	
18) Shadow QR code	


- 
- 19) Mobile shopping assistant
 - 20) Self-shopping pod
 - 21) Mobile augmented reality
 - 22) Mobile remote payment

Figure 3.4 –Classification of user role with new innovations [Personal elaboration]

As we can notice the majority of innovation requires activation by the customer. This is a confirmation of trends like customer centricity and interactivity of the stores analyzed in literature. In presence of active innovations the customer can have a personalized experience because he can decide if, when, where, how and which innovative solution use in store according to his needs.

3.4.4 Covered phases of buying process

This classification shows which phases of the buying process are supported by each in-store innovation. We consider four different phases of buying process: pre-sales, selection, payment and post-sales service.

INNOVATIONS	PRE-SALES	SELECTION	PAYMENT	POST-SALES
QR Infoscan				
Windows shopping wall				
Shadow QR code				
QR Code window' store				
Mobile shopping assistant (Scan&Go)				
Mobile augmented reality				
Geofencing				
Mobile point of Sales (tablet)				
Kiosk				
Browse & Order hub				
Display				
Video label				
Interactive display				
Interactive window				
Augmented reality window				
Magic mirror				
NFC point				
Barcode card as product				
Self-service checkout kiosk				
Personal shopping assistant				
Self-shopping pod				
Mobile remote payment				
Fingerprint authentication				
Bodymetrics scanner				
Vending machine				
Free wi-fi				

Figure 3.5 – Phases supported by each innovation [Personal elaboration]

The table shows which phases each innovation supports. Some innovations allow flexible paths. Windows shopping wall, for example, usually covers pre-sales, selection, payment and post-sales (home delivery) phases, but the customer can decide to use it only during the two first phases, and after going in store to pay and pick up the products.

3.4.5 Innovation degree

For what concerning innovation degree we decided to decline it through different dimensions, with a qualitative analysis. We assigned to each dimension a score from 1 to 5. The final innovation degree is the weighted average of the six dimensions, assigning to each dimension the same weight.

The dimensions are:

- Usability: easiness degree in using the innovation (1=difficult to use; 5=immediate to use)
- Flexibility: flexibility degree offered to customer by the technology respect to the buying process (1=low flexibility; 5=high flexibility)
- Impact: impact degree in modifying the traditional buying process in physical store (1=low impact; 5=high impact)
- Technological maturity: knowledge and diffusion of the technology as application or device (1= mature technology; 5= no mature technology)

Technological Innovation	Usability	Flexibility	Impact	Tec. Maturity	Average
QR infoscan	5	1	1	2	2,25
Windows shopping wall	4	5	5	2	4
Shadow QR code	4	4	5	3	4
QR code window's store	4	5	3	2	3,5
Mobile shopping assistant (scan&go)	4	3	3	1	2,75
Mobile augmented reality	4	4	3	5	4
Geofencing	5	2	3	2	3
Mobile Point of sales	4	5	4	3	4
Kiosk	4	2	1	1	2
Browse&order hub	4	4	4	1	3,25
Display	5	1	1	1	2
Video label	5	1	1	2	2,25
Interactive display	5	2	2	2	2,75
Interactive window	4	3	3	4	3,5
Augmented reality window	4	2	2	5	3,25
Magic mirror	3	4	4	5	4
Barcode card as product	5	2	1	1	2,25
Personal shopping assistant	4	4	2	2	3
Self-shopping pod	4	3	2	2	2,75
Self-service checkout kiosk	3	1	1	1	1,5
Vending machine	4	3	3	2	3
Biometrics scanner	5	2	4	5	4
NFC payment	5	1	2	5	3,25
Mobile remote payment	4	1	2	4	2,75
Fingerprint authentication	5	3	4	5	4,25

Figure 3.6 – Innovation degree of new technology [Personal elaboration]

3.4.6 Impact of innovation

As impact we identified three different degrees: operative, intermediate and strategic.



Figure 3.7 – Degrees of impact for a new innovations [Personal elaboration]

We defined as strategic innovation an innovation that *has long-term, significant and non-reversible* effects on the final goal of the organization. The implementation of this innovation effectively and efficiently requires a *large amount of resources*.

The extreme an operative innovation has short-term and reversible effects; and it requires a low amount of resources. This is the result of an operative approach. A tactical innovation is in between the two extremes.

Technological Innovation	Impact of Innovation
QR infoscan	Operative
Windows shopping wall	Strategic
Shadow QR code	Tactical
QR code window's store	Tactical
Mobile shopping assistant (scan&go)	Tactical
Mobile augmented reality	Strategic
Geofencing	Tactical
Mobile Point of sales	Strategic
Kiosk	Operative
Browse&order hub	Strategic
Display	Operative
Video label	Operative
Interactive display	Operative

Interactive window	Tactical
Augmented reality window	Operative
Magic mirror	Strategic
Barcode card as product	Strategic
Personal shopping assistant	Strategic
Self-shopping pod	Tactical
Self-service checkout kiosk	Strategic
Vending machine	Strategic
Bodymetrics scanner	Strategic
NFC payment	Tactical
Mobile remote payment	Tactical
Fingerprint authentication	Strategic
Free Wi-Fi	Operative

Figure 3.8 – Impact of new innovations [Personal elaboration]

3.4.7 Diffusion degree

As diffusion degree we considered the actual level of diffusion both in term of diffusion between different sectors and diffusion across different countries. It has been assigned a score from 1 in situation of low diffusion degree to 5 a situation of a widespread diffusion degree.

3.4.8 Diffusion between sectors

This classification aims at identifying which are the sectors that use a higher number of technological innovations in their physical stores.

With the next table it is possible also pointing out if a specific innovation is adopted in different sectors.

	MERCHANT'S SECTOR							
INNOVATION	Apparel	Publishing	Health&Beauty	Electronics	Jewelry/Watch	Grocery	Home improvement	General
QR Infoscan								
Windows shopping wall								
Shadow QR code								
QR Code window' store								
Mobile shopping assistant (Scan&Go)								
Mobile augmented reality								
Geofencing								
Mobile point of Sales (tablet)								
Kiosk								
Browse & Order hub								
Display								
Electronic label								
Interactive display								
Interactive window								
Augmented reality window								
Magic mirror								
NFC point								
Barcode card as product								
Self-service checkout kiosk								
Personal shopping assist.								
Self-shopping pod								
Mobile remote payment								
Fingerprint authentication								
Bodymetrics scanner								
Vending machine								
Free wi-fi								

Figure 3.9 – Sectors that introduce new technology innovations [Personal elaboration]

From the table it is possible to underline that there are in particular two sectors in which the majority part of innovations are developed and adopted; these sectors are the apparel and the grocery one. Health and Beauty is the third in terms of innovations adopted while the other sectors have more or less the same innovation degrees. These clusters represent a general indication of the actual innovation degree of one sector; the more the innovations developed and used

the higher will be the sector's innovative degree. This doesn't mean that in a sector characterized by the adoption of few innovative solutions there is no need to evolve the physical retail; but for example in some cases a sector with a low innovation degree could require an impelling innovation necessity, while a sector with a high innovation degree could result in an overload of solutions. QR Infoscan, windows shopping wall and augmented reality are the innovations having the higher diffusion across sectors.

It is important to underline that there could be the possibility to have ignored the presences of some innovation in some specific sectors due to the impossibility to make a census of the overall companies around the world; in any case this situation cannot change the general evidence that we made above.

3.4.9 Intra-sector diffusion

With this dimension it has been considered the diffusion degree of the innovation inside each company. The intra-company diffusion can have three different stages:

- 1) ALL: the innovation is applied in each store of the company
- 2) FLAGSHIP STORE: the innovation is present only in the flagship store
- 3) LIMITED: the innovation is present in some store, but not in everyone.

In this case the implementation coverage along company's stores can be due to different reasons like nature of the project or differences in the final market.

In this sense when a company adopts the following innovations can decide to apply them to all stores, only in the flagship store or in a limited number of stores.

Technological Innovation	Intra-company diffusion
QR infoscan	ALL
Windows shopping wall	ALL
Shadow QR code	LIMITED
QR code window's store	ALL-LIMITED
Mobile shopping assistant (scan&go)	ALL
Mobile augmented reality	ALL
Geofencing	ALL-LIMITED
Mobile Point of sales	ALL-LIMITED
Kiosk	ALL
Browse&order hub	LIMITED
Display	ALL
Video label	LIMITED
Interactive display	FLAGSHIP
Interactive window	FLAGSHIP

Augmented reality window	FLAGSHIP
Magic mirror	FLAGSHIP-LIMITED
Barcode card as product	FLAGSHIP
Personal shopping assistant	LIMITED
Self-shopping pod	LIMITED
Self-service checkout kiosk	ALL
Vending machine	ALL
Bodymetrics scanner	LIMITED
NFC payment	ALL
Mobile remote payment	ALL
Fingerprint authentication	ALL-LIMITED
Free Wi-Fi	ALL

Figure 3.10 – Intra-sector diffusion [Personal elaboration]

In some cases there is a different degree of intra-company diffusion that depends on the singular choices made by the company. This is due to different sectors, different final markets and different strategies or policies.

3.5 Technological innovations' classification

Once defined the classifications' drivers it is possible use them in different combinations in order to find possible clusters and trends. The following graphic shows in green all the different kind of classifications used to determine specific clusters of innovations and conclusions.

In the following chapters we are going to analyze the technological innovations according to different axes of classification.

3.5.1 Active-Passive/ Software-Hardware

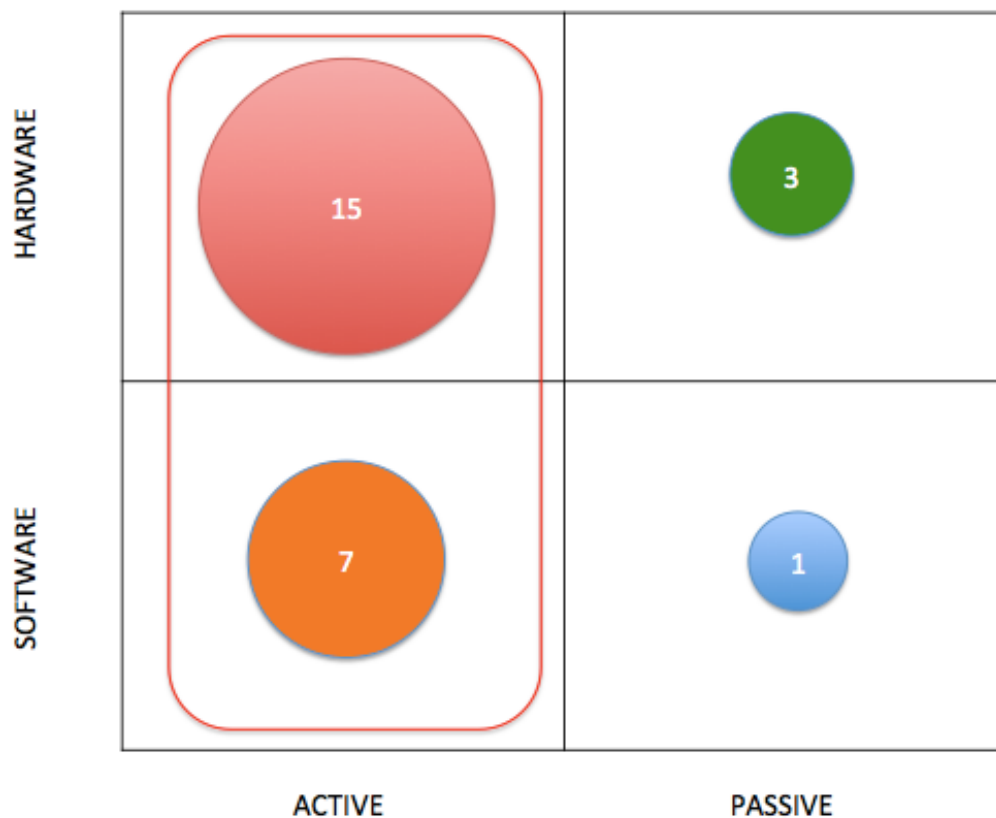


Figure 3.11 – Active-passive/ Software-Hardware classification [Personal elaboration]

The cluster more crowded is the Hardware-Active innovations characterized by an active role of the customer on a hardware innovation implemented by the merchant directly in store.

A second cluster very crowded is the Software-Active innovations. The result coming from this analysis registers two main ways to innovate in store based on the common denominator of the customer interactivity.

3.5.2 Diffusion degree/ Device used

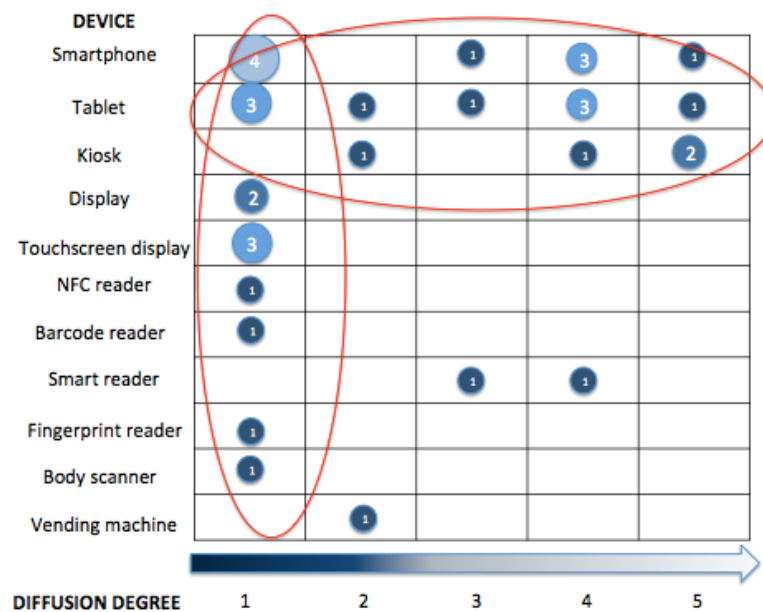


Figure 3.12 – Diffusion degree/ Device used classification [Personal elaboration]

As the graph above shows, firms are exploiting above all the mobile channel because they believe (and numbers give them reason) that it will be a crucial channel in the present and future of retail. Most of the innovations found need specific app or the use of devices like smartphone or tablet. These innovations are already widespread among the population.

On the other hand, firms are trying to offer a more enjoyable experience to customers with the introduction of new innovations. Because these innovations are costly and there is the need to test the reaction of clients before their introduction in all the markets, the level of diffusion is generally low.

3.5.3 Impact of innovation/ Device used

DEVICE	OPERATIVE	TACTICAL	STRATEGIC
Smartphone	2	5	2
Tablet	2	4	3
Kiosk	1		2
Display	3		
Touchscreen display	1	2	
NFC reader		1	
Barcode reader			1
Smart reader		1	1
Fingerprint reader			1
Body scanner			1
Vending machine			1

IMPACT OF INNOVATION

Figure 3.13 – Impact of innovation/ Device used classification [Personal elaboration]

This table shows that the innovations implying the use of mobile devices (smartphone, tablet) have cross impacts from an operative impact to a strategic one.

Other innovations, especially some hardware innovations are more costly, thus, they have a strategic impact.

3.5.4 Impact of Innovation/ Diffusion degree

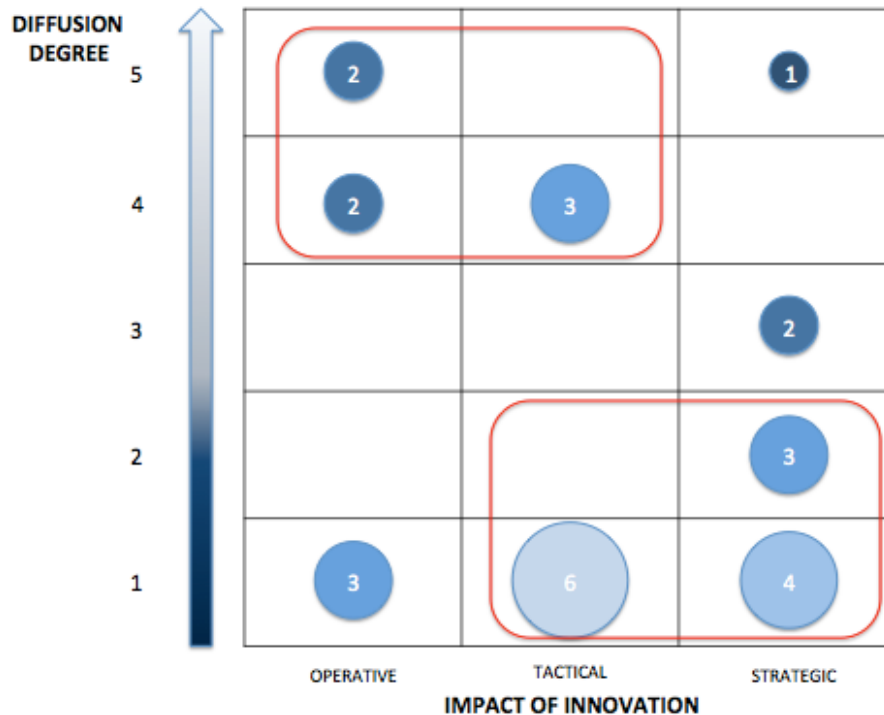


Figure 3.14 – Impact of innovation/ Diffusion degree classification [Personal elaboration]

From this table it is possible to distinguish two main clusters:

First cluster include innovations with high and very high diffusion with operative or tactical impact. The reason why, this kind of innovations are very diffuse, it is because they offer relative benefits to merchant with low cost of implementation.

Second cluster of innovations belong to the category of low diffusion and tactical or strategic impact. The implementations of these innovations are usually characterized by high investments, a low degree of reversibility and long run benefits, not always easy to quantify. Given the higher impacts, they need to be tested before a firm decides to implement them in its entire stores.

3.5.5 Diffusion degree/ Innovation degree

The next graphic is the result of the innovations' plotting on the basis of the innovation and diffusion degree axis.

DIFFUSION DEGREE

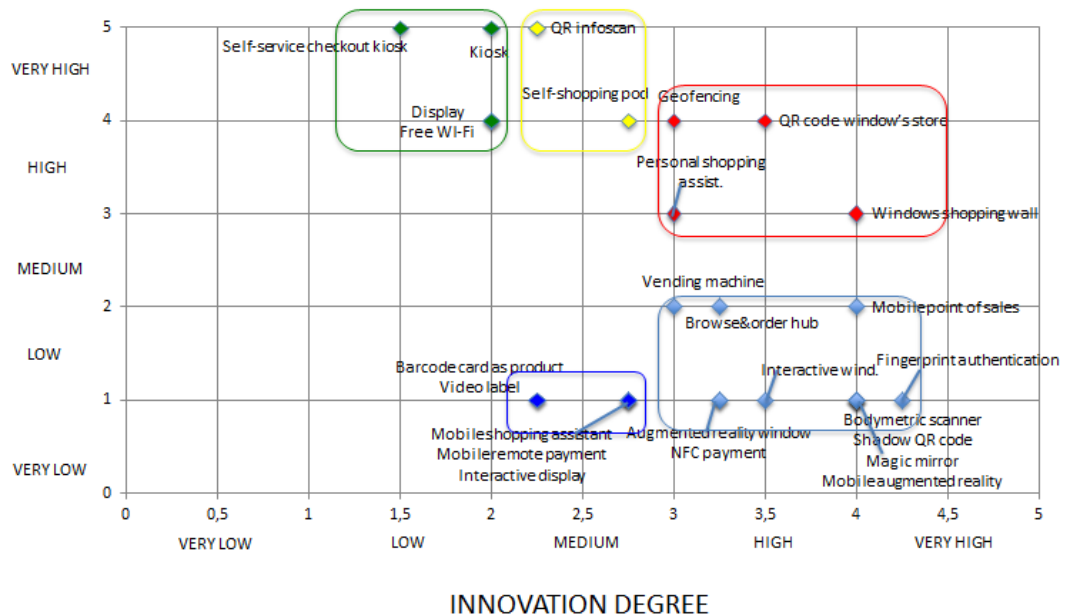


Figure 3.15 – Diffusion degree/ Innovation degree classification [Personal elaboration]

From the graphic we can identify five different clusters in the corresponding areas:

- RED: Innovation degree H-VH/ Diffusion degree H-VH
- LIGHT BLUE: Innovation degree H-VH/ Diffusion degree VL-L
- BLUE: Innovation degree M/ Diffusion degree VL-L
- YELLOW: Innovation degree M/ Diffusion degree H-VH
- GREEN: Innovation degree VL-L/ Diffusion degree H-VH

The most representative cluster is the red one, because it is possible to find some common characteristic between the innovations that belong to it.

In fact the red clusters contains four different innovations based mainly on the smartphone's use, with the exception of personal shopping assistant.

This means that the innovations with the higher innovative and diffusion degrees are based on the mobile; and they are able to support the multi-channel. This reflects that merchants are focusing in integrating the physical store with the rising of the mobile channel.

The light blue cluster is composed by different innovations that apparently don't have a common minimum denominator. In fact we can find two main groups inside. The first one is constituted by innovations that have a low diffusion degree since these technologies are at the beginning stage of development and they have high implementation costs. In this group we can notice magic mirror, Bodymetric scanner, augmented reality window and interactive window that require better performances and lower costs in order to reach a high diffusion. There are, instead, other innovations like NFC payment and in particular fingerprint authentication that are well developed, but they still have a low diffusion level for example caused by the customers' retention and suspiciousness. These probably will become a standard in the next decade. For our purpose the most interesting cluster is the red one with its attention to the mobile interactivity and the support to multi-channel.

3.5.6 Innovation degree/ Impact of innovation

IMPACT OF INNOVATION

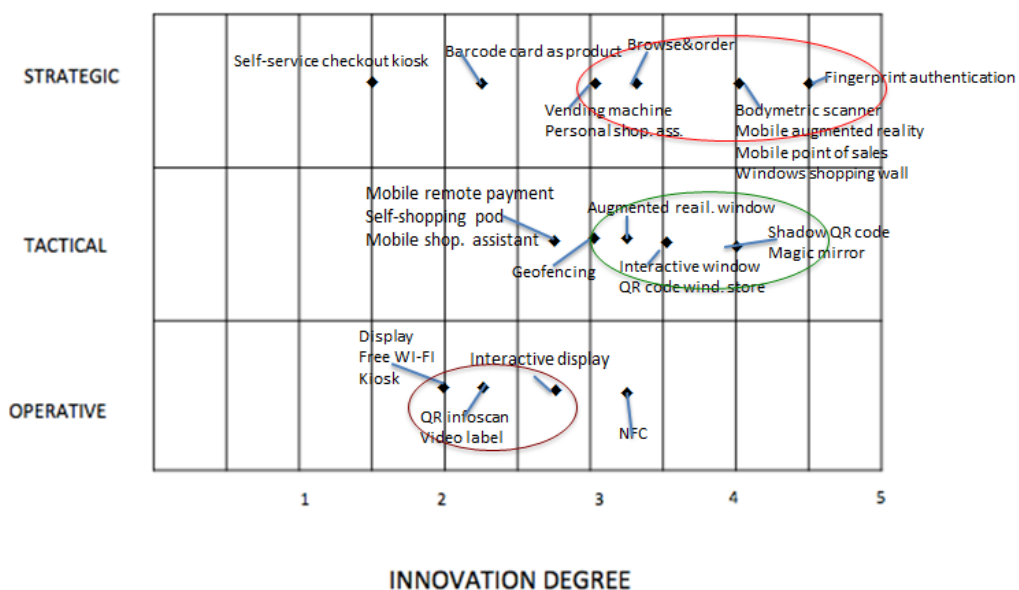


Figure 3.16 – Impact of innovation/ Innovation degree classification [Personal elaboration]

From the graphic above it is possible identifying three main clusters:

- RED: high innovation degree-Strategic impact
- GREEN: Medium-High innovation degree- Tactical impact
- BROWN: Medium innovation degree- Operative impact

From this situation it is possible notice a correlation between the innovation degree and the impact of innovation, in fact the higher the innovation degree the higher the impact of innovations.

3.6 Multichannel models: State of the art

This chapter has the goal to present the state of the art of the multichannel solutions adopted by actual retailers.

It is possible defining different macro-models, but we are going to consider only the ones that include the interaction with the offline channel, given the objectives of our research.

The macro-models identified are three:

- a) Store (offline) +online
- b) Store (offline)+ mobile
- c) Store (offline)+ social

In every macro-model we identified all the possible paths of interaction between customers and merchants; in fact every macro-model includes many multichannel models.

3.6.1 Offline and Online

We started considering the first macro-model characterized by the interaction of physical store (offline channel) and online channel. We identified seven different models classified on the basis of the channel used to support each one of the four phases charactering the buying process.

The seven model identified are the following:

a) InfoCommerce

This multichannel model is adopted by merchants who have a physical store, and jointly a website. In this case the pre-sales phase happens online to support the future purchase in the physical store.

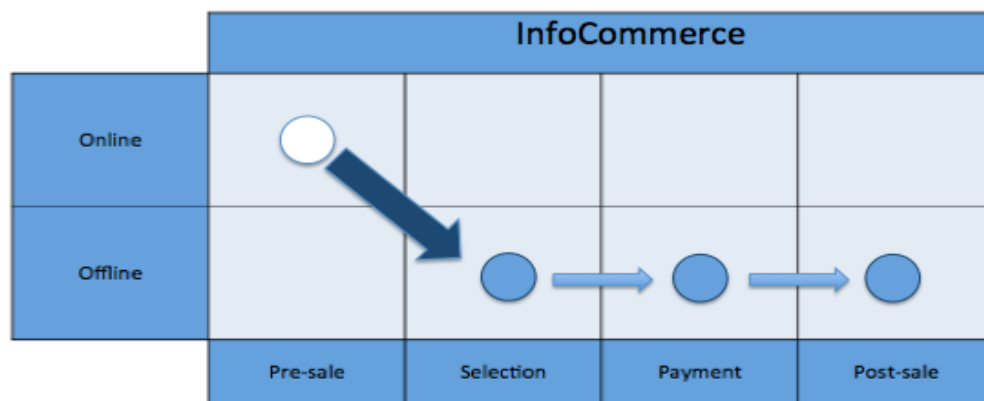


Figure 3.17 – InfoCommerce [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher sales force efficiency • Effective and efficient communication • Higher customer satisfaction • Higher service level 	<ul style="list-style-type: none"> • Sales force not sufficiently prepared • Need of integration between different catalogues
Customer	<ul style="list-style-type: none"> • Having a higher knowledge of products before buying them • Easy and fast comparison of products • Consulting ratings and feedbacks of other customers • Flexibility in gathering info 	/

b) Info Store

This model consists in the supply of information about the product inside the physical store for a future purchase at home through the online channel

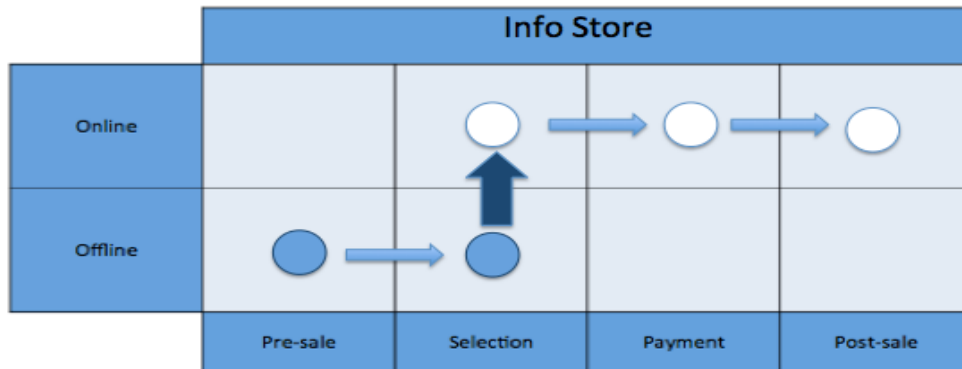


Figure 3.18 – Info Store [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Possibility to avoid stock out • Higher sales force efficiency • Higher customer satisfaction • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Having a higher knowledge of products before buying them • Direct contact with sales force • Interaction with product available in store 	/

c) In-store support

This is based on the online purchase of the product while the offline channel supplies the post-sales phase like the returned item management and in-store assistance in general.

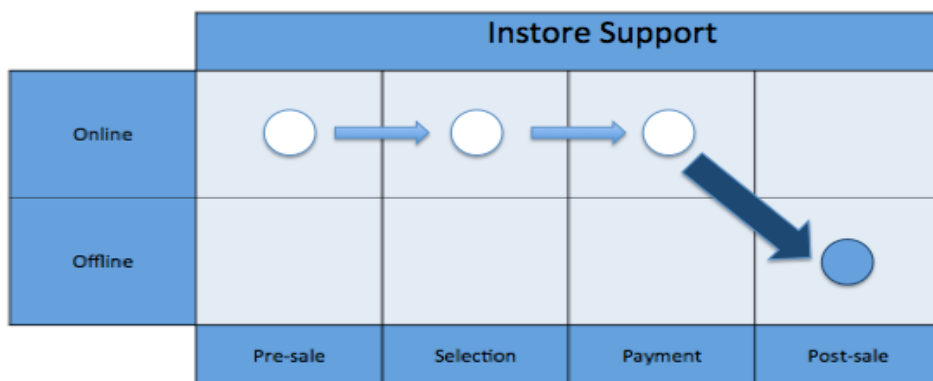


Figure 3.19 – Instore Support [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Possibility to avoid stock out • Higher sales force efficiency • Higher customer satisfaction • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Having a higher knowledge of products before buying them • Direct contact with sales force • Interaction with product available in store 	/

d) Online support

This model is specular to the in store support, in this case the post-sales phase is supported by the online channel while the other phases by the brick-and-mortar store.

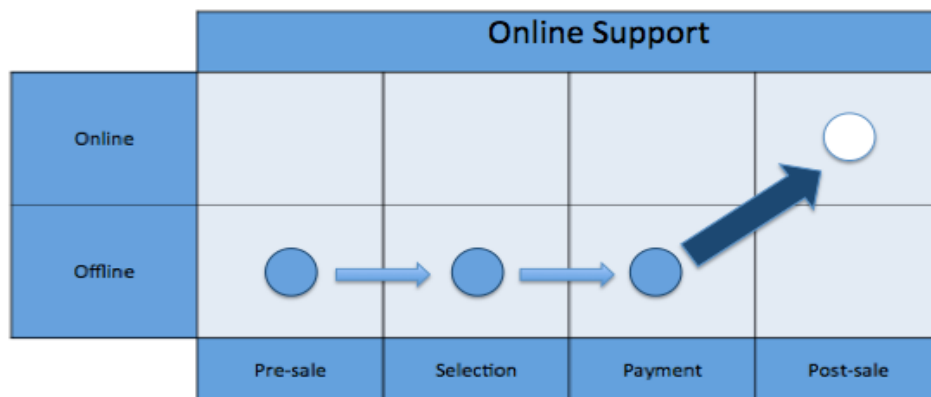


Figure 3.20 – Online support [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Possibility to avoid stock out • Higher sales force efficiency • Higher customer satisfaction • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Having a higher knowledge of products before buying them • Direct contact with sales force • Interaction with product 	/

	available in store	
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e) Book and collect

It consists in the online booking of the product with the pick-up and payment directly in physical store.

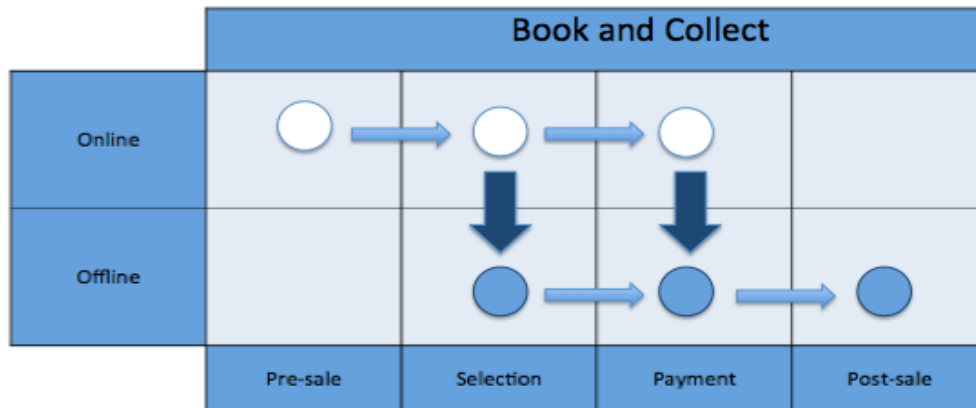


Figure 3.21 – Book and collect [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> Higher confidence degree perceived by customer Higher service level Customer management 	<ul style="list-style-type: none"> Integration of stock management in the two channels
Customer	<ul style="list-style-type: none"> High control on the process (time and modalities) Possibility to see and touch product before buying 	/

f) Pick and pay

Pick and pay process is similar to book and collect, the process is online except for the retrieval and payment of the product that is made in a physical building owned by the firm or a third party.

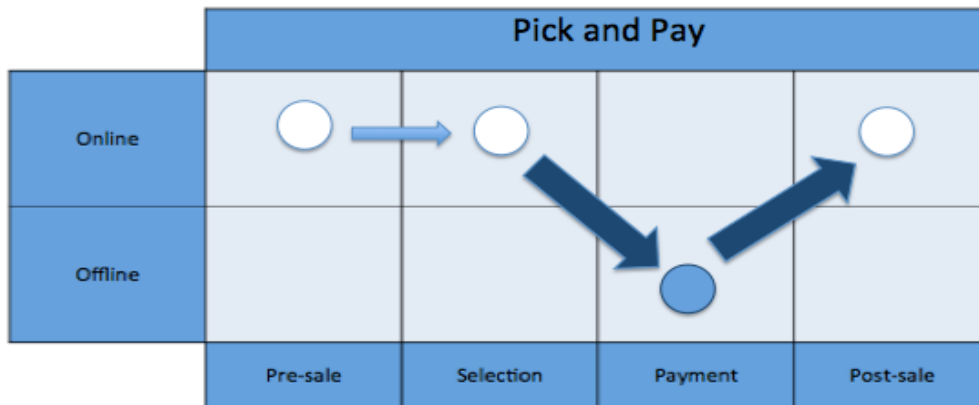


Figure 3.22 – Pick and pay [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher confidence degree perceived by customer • Higher service level • Customer management • High conversion rate 	<ul style="list-style-type: none"> • Integration of stock management in the two channels
Customer	<ul style="list-style-type: none"> • High control on the process (time and modalities) 	/

g) Info Touch

The store is used as a physical showroom, so there is the opportunity to see the products that will be purchased by customers on the online channel.

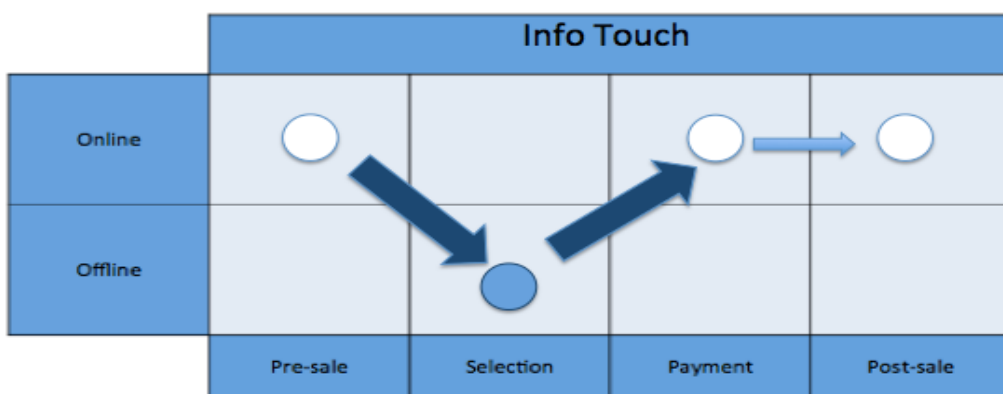


Figure 3.23 – Info Touch [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Possibility to show an higher range of product • Reduce shelf space (store as showroom) • Reduce storage costs • Support and advise customer in store • Higher productivity 	/
Customer	<ul style="list-style-type: none"> • Possibility to be supported inside the store 	/

3.6.2 Offline and Mobile

Concerning the second macro-model with the interaction of the mobile channel and offline, we identified the following models:

- Store locator

Store locator is a service that falls within the pre-sale phase allowing the consumer to find the store nearest to him.

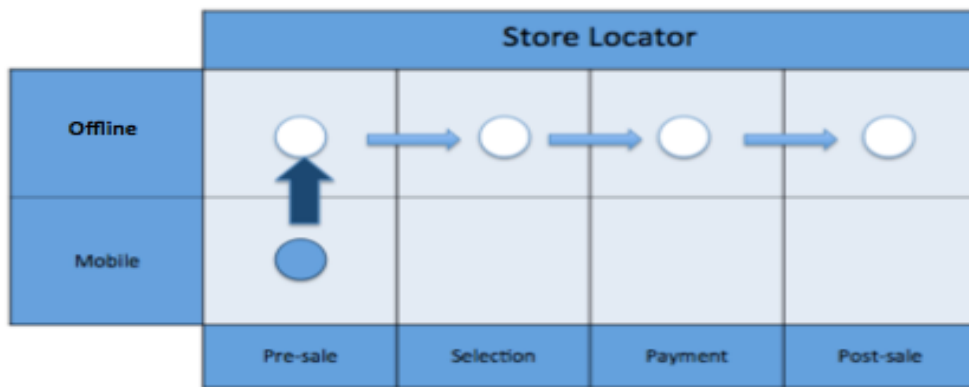


Figure 3.24 – Store locator [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Geo-localisation of point of sales • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Possibility to find the closest point of sale 	/

- Info Mobile

Info mobile model includes all the applications or optimized mobile sites that allow customer to find product information, discounts and couponing through the use of Mobile channel.

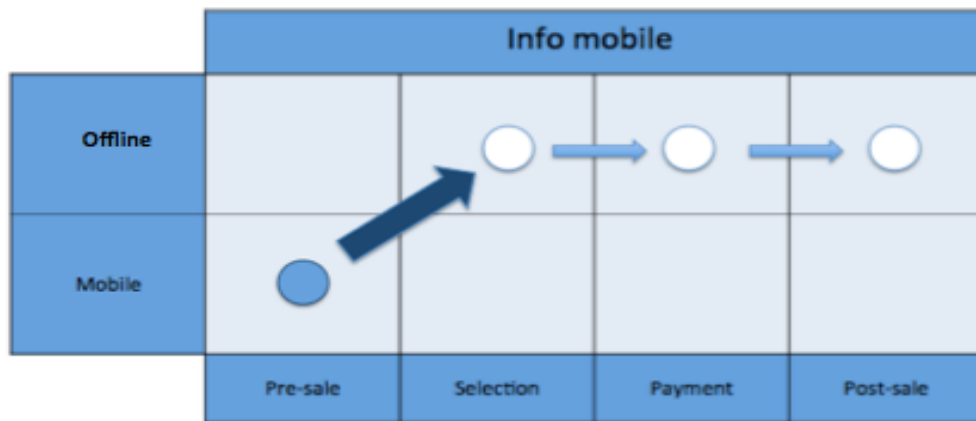


Figure 3.25 – Info mobile [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Attract customers • Increase impulse of buying • Higher service level 	/
Customer	<ul style="list-style-type: none"> • Info anywhere and anytime 	/

- Mobile Commerce

This model is based on products' purchasing via mobile channel with smartphones.



Figure 3.26 – Mobile commerce [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Increase impulse of buying • Higher service level • Customer management 	/
Customer	<ul style="list-style-type: none"> • High flexibility • Possibility to get discount 	/

- Mobile Support

It supports after-sales services through Mobile as tracking, technical support and loyalty cards.

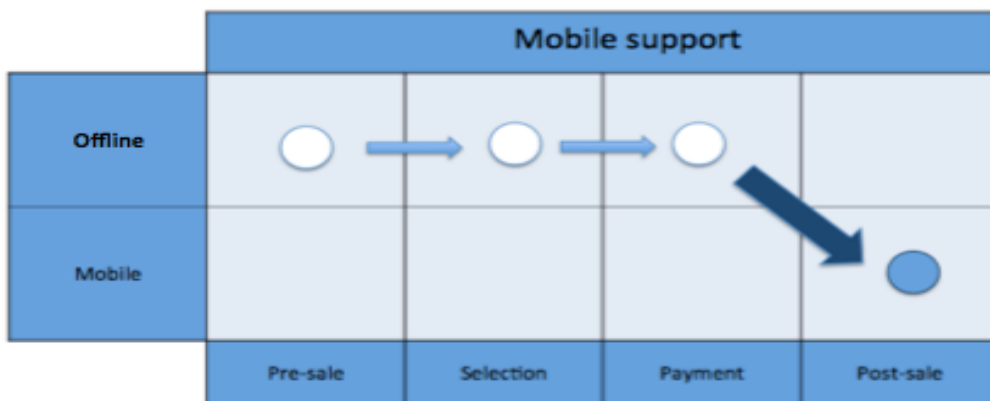


Figure 3.27 – Mobile support [adapted from Osservatorio eCommerce B2C]

	Benefits	Drawbacks
Merchant	<ul style="list-style-type: none"> • Higher security degree perceived by customer • Higher service level • Customer management 	/
Customer	<ul style="list-style-type: none"> • High control on the process 	/

3.7 How can tech. innovations and multichannel be integrated?

In this chapter we analyze how technological innovations and multichannel models, handled until now separately, can converge together in single solutions. We identified, in other words, all the innovations able to support multichannel paths.

3.7.1 Technological Innovations which imply a multichannel approach

This axes is one the most important to classify the technological innovations in store, given the goal of the thesis.

Each innovation has been defined as one of the following configuration:

- 1) YES: the technological innovation enables multi-channel paths
- 2) NO: the technological innovation doesn't enable multi-channel paths
- 3) POSSIBLE: the technological innovation can enable multi-channel paths. This depends, in first analysis, from the merchant's decisions in implementing the innovation with the support to multichannel paths or not. For example windows shopping wall enables a multichannel path if there is the possibility of picking up products directly in store, otherwise this innovation cannot support multichannel. In second analysis, once implemented the support to multichannel, a customer can decide to exploit it or not, because there isn't a mandatory approach.

Technological Innovation	Multi-channel support
QR infoscan	YES
Windows shopping wall	POSSIBLE (if pick up in store)
Shadow QR code	POSSIBLE (if pick up in store)
QR code window's store	YES
Mobile shopping assistant (scan&go)	NO
Mobile augmented reality	YES
Geofencing	YES
Mobile Point of sales	YES
Kiosk	POSSIBLE
Browse & order hub	YES
Display	NO
Video label	NO
Interactive display	NO
Interactive window	NO
Augmented reality window	NO
Magic mirror	POSSIBLE (if present social sharing)
Barcode card as product	NO
Personal shopping assistant	NO
Self-shopping pod	NO
Self-service checkout kiosk	NO
Vending machine	NO
Bodymetrics scanner	NO
NFC payment	NO
Mobile remote payment	NO
Fingerprint authentication	POSSIBLE (possible future integration between mobile, online and offline authentication)
Free Wi-Fi	YES

Figure 3.28 – Innovations supporting multichannel [Personal elaboration]

3.7.2 Analysis of technological innovations able to support multichannel

It is possible to analyze the technological innovations that support a multichannel approach with the classification axes. A couple of examples follow.

3.7.2.1 Hardware-Software/ Support to multichannel

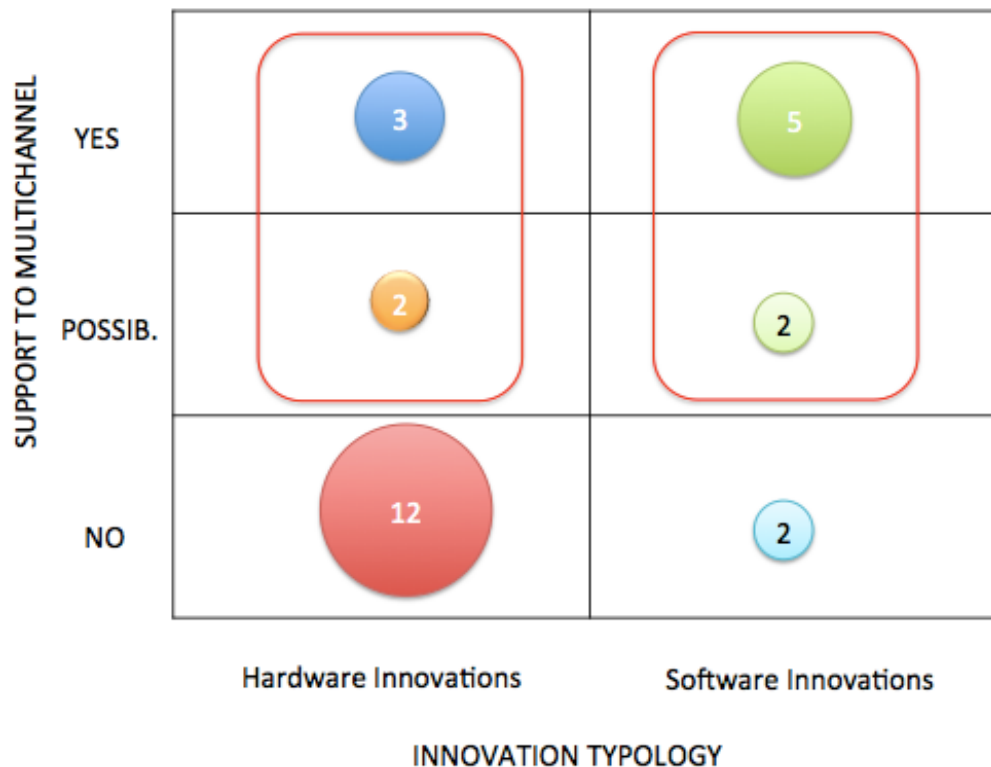


Figure 3.29 – Hardware-Software/ support to multichannel [Personal elaboration]

A first result coming from this analysis shows that most of the technological innovations that enable multichannel paths are based on the use of mobile devices, and in particular of smartphone. Examples of these innovations are: windows shopping wall, shadow QR code, QR code window's store, mobile augmented reality, geofencing and mobile point of sales. There is also a small group of hardware innovations able to support a multichannel approach like for example kiosk and browse&order hub. The major trend, anyway, is based on the implementation of jointly solutions implying the use of mobile devices. This trend is expected to increase given the continuing diffusion of smartphones and their evolution in a unique multipurpose device used as info search instrument, digital wallet, communication instrument between customer and merchant also on social networks.

3.7.2.2 Multichannel support- Innovation degree

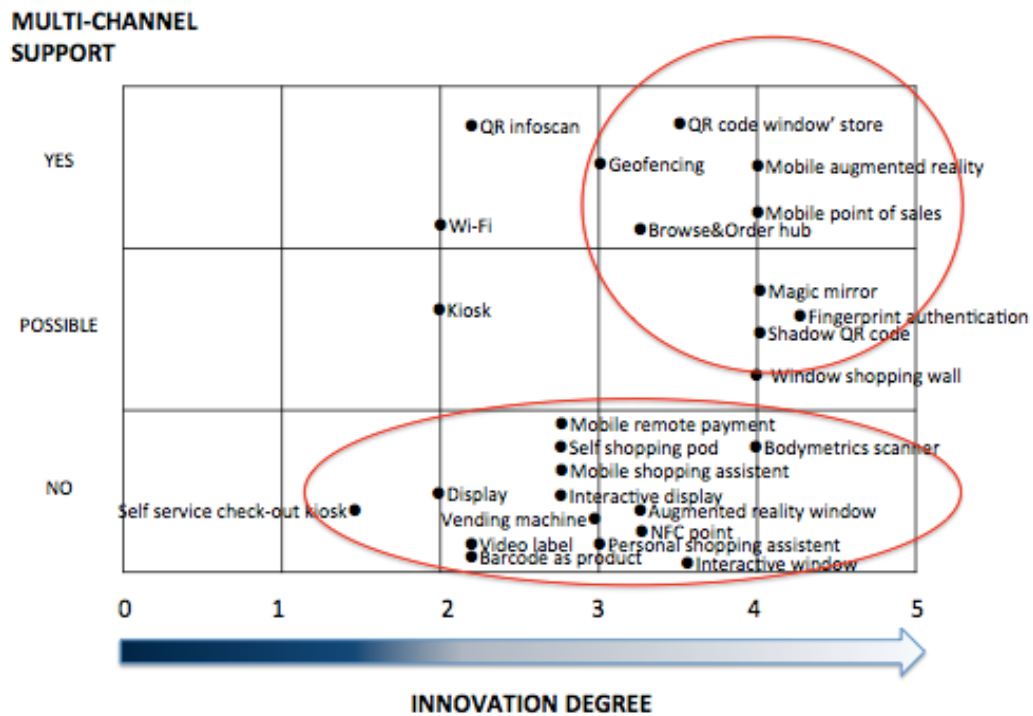


Figure 3.30 – Innovation degree/ multichannel support [Personal elaboration]

Two areas can be distinguished: innovations which support multichannel have usually a high or very high level of innovation. That is because firms are still in the experimenting phase of these new technology innovations. Second cluster, it is the one about innovations that do not support multichannel, and as it can be seen by the graph; these innovations are more distributed along the entire axis of the innovation degree.

4 Empirical analysis: Geofencing

4.1 Introduction to geofencing

The diffusion of mobile devices modified deeply consumers' habits and their shopping behaviors. Today's mobile subscribers can select from a wide range of methods to communicate through their handset. Besides traditional voice and a wide range of messaging services (short, instant, and multimedia messaging), they can engage in mobile e-mail and Web-browsing sessions. The advent of smartphones, data plans, and application stores revolutionized the cellphone from simple communication device to a unique multipurpose device used as info search instrument, digital wallet, communication and entertainment instrument.

For example a customer using his smartphone can compare prices of a product directly in the retail and decide to buy it online. Customers with mobile devices have the power not only to buy anywhere and anytime but also to find more info about a product, to get special coupons and discounts, to manage personal account data and even to pay. The importance of location to mobile communication was anticipated long before the application was conceived.

As presented by Khalifa and Shen (2008), merchants know that far from killing off stores as a viable shopping channel, mobile technologies offer an opportunity to enhance the store experience exponentially, not only meeting consumer needs and expectations more efficiently, but also assisting in the delivery of the hyper-personalized and hyper-contextual experience.

An example of how physical retailers can exploit the opportunities coming from mobile is geofencing.

Geofencing belongs to the category of Location based Services, LBS, able to point out the approximate location of a mobile phone in order to send particular information to the LBS subscribers. Some examples of LBS are fleet tracking applications, friend locator and directory services.

Potentially all mobile phones, old and new models, can be tracked through different methods. One process that gives a rough estimation of the position is the recognition of the Cell-ID, a unique number associated with a base station in a particular area. The accuracy of this method varies from 500 to 3500 meters. Another process is based on the trilateration of cell towers using the round-trip delay measurement between the mobile device and the nearest cell tower. This method is more accurate than the previous one but the order of magnitude varies from 50 to 200 meters. The last method is the most accurate one; it is based on the use of GPS (Geographic Positioning System), which works on the trilateration of satellites principle. The accuracy of GPS chips is between 5 and 50 meters.

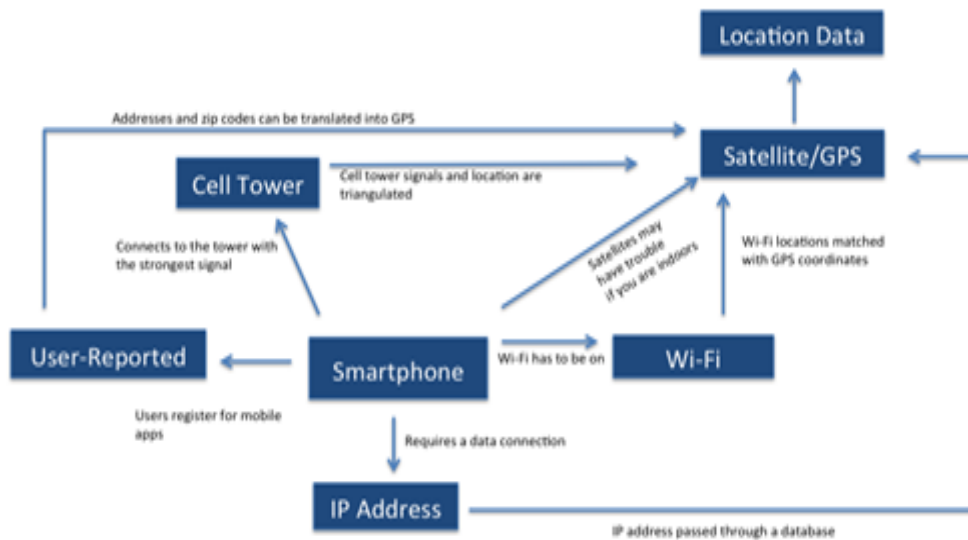


Figure 4.1 – Process of collecting location data [Business Insider]

4.2 Geofencing in Retailing

From the analysis of the state of the art, we identified geofencing as a technological innovation applied to physical stores to increase foot traffic and therefore sales. The use of geofencing enables a multichannel path for customers; in particular it is based on the *Info Mobile model* where pre-sale phase is supported by the mobile channel, while other phases are performed by customer in the offline channel.

Geofencing is a LBS that uses software programs to define a virtual perimeter, denominated *fence*, around a real-world geographical area. After deciding a radius of interest, the entrance (or the exit) of a geo-enabled device like a cell phone, in the monitored zone, trigs an action like a message delivery, like SMS or e-mail. This approach is called push-based service, because customers trespassing the fence initiate the service.

It differs from the pull-based service processes, where the customer is the first to send a request to inquire the presence of relevant message in his actual position, for example asking which the restaurants in his proximity are.

A geofence can be dynamically generated as a circumference around a store or different point of interest. This kind of fence is called *stationary fence*, in order to distinguish it from *moving fence*, where the fence is not based on fixed coordinates but it is a moving object (i.e. tracks).

There are two kinds of possible geofencing: application based geofencing and network-based geofencing.

App-based geofencing is a LBS that works with an application: customer has to download the application, authorize the use of personal data, and enter the app in order to be geo-localized and receive a message. For an app-based geofencing the incurred costs are: the build of the application which can vary from 50.000\$ to 150.000\$ and its maintenance that amount of around 300\$ per month.

Network-based geofencing is different because a Mobile Network Operator (MNO) enables it. Customers once opted-in to the geofencing program, every time they enter a fence, an alert will be generated and the firm, through the MNO, will send an automatic notification. No download of any application is needed. The creation of a geofencing platform can be offered by the MNO exclusively for subscribers to its network or a third party can host it. In this case multiple MNOs can be link to it and different methods of localization can be supported.

For a network-based geofencing the incurred costs are: the implementation cost which varies from 25.000\$ to 50.000\$, the cost of a single SMS, around 0,035\$ and the cost to look up customers which is between 2.000\$ and 5.000\$ per month.

The total costs of messages are variable since they depend on the total notifications forwarded to customers. Lifetime costs are instead semi-variable because they don't depend on the quantity of messages delivered, but they are function of how many times per day the fence should be switched on.

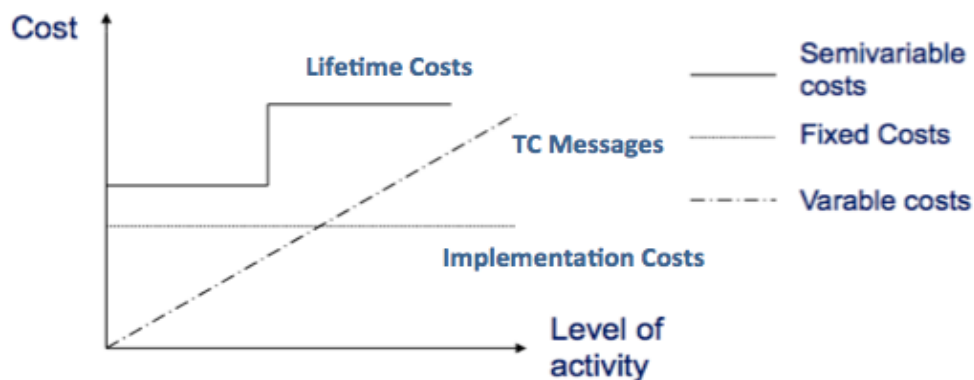


Figure 4.2 – Geofencing costs [Personal elaboration]

The next table summarizes a comparison of app-based and network based geofencing based on the following characteristics:

	App-based Geofencing	Network-based Geofencing
Location Source	GPS	Network Location
Customer Reach	57% of cellphone users	100% of cellphone users
App requirements	Dependent on not only having, but running an app	No app needed
Battery Life	Constant access of GPS data (required for geofencing) via the app drains battery life fast	No impact on customers' battery life
Location Acquired	User initiated	On demand
Cost	Upfront costs to not only build an app but also to maintain	No upfront costs involved. Cost is determined on a per-location lookup basis and can be dialed up or down as required

Figure 4.3 – App-based geofencing vs. Network-based geofencing [Direction magazines - How to use geofencing correctly]

4.3 Network-based geofencing: process description

We decide to analyze and model the Network-based geofencing (NBG) for two main reasons. First of all NBG can reach not only smartphone users, but also all mobile phone users; secondly because it is the firm that start engaging customers with a push-notification. These two elements can amplify the possible advantages coming from a geofencing implementation.

We tried modeling the principal process of geofencing: opt-in, sending coupon and customer's path.

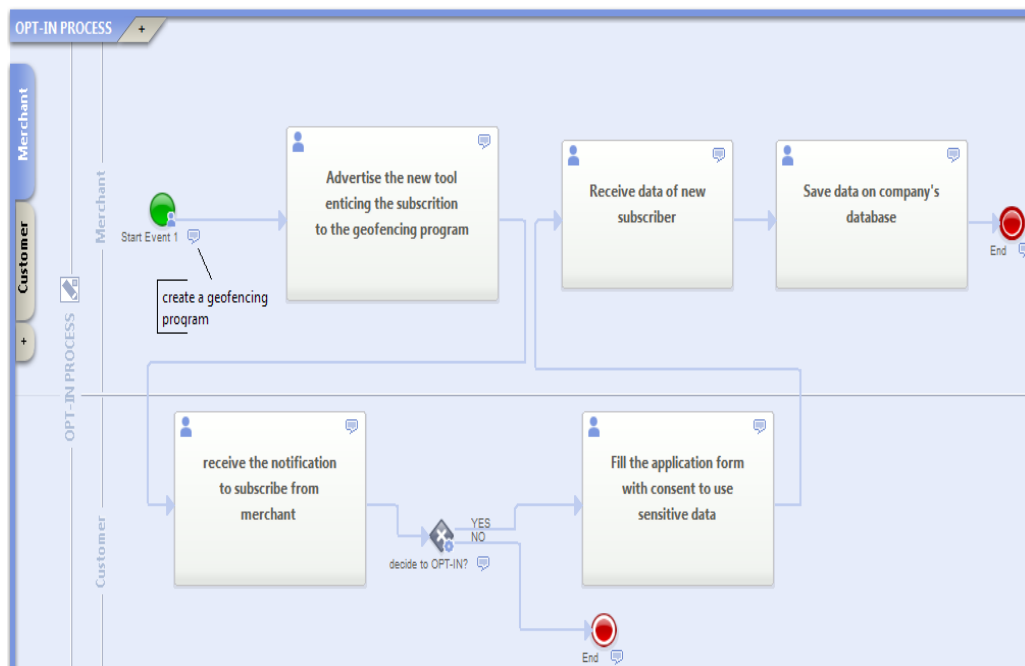


Figure 4.4 – Opt-in process [Personal elaboration]

Through the opt-in process, a potential customer authorizes the company to use personal sensitive information like the tracking of his position for marketing purposes. This process is common to both the application-based and network-based geofencing and it is the first and more difficult step to do: without customer's permission the company cannot initiate the geofencing campaign. Usually this problem is avoided if the firm is a famous and well-known brand because customers will have more faith in its activities otherwise the company should explain very well that information gathered will be used and stored only for marketing purposes and they will not be spread outside the company.

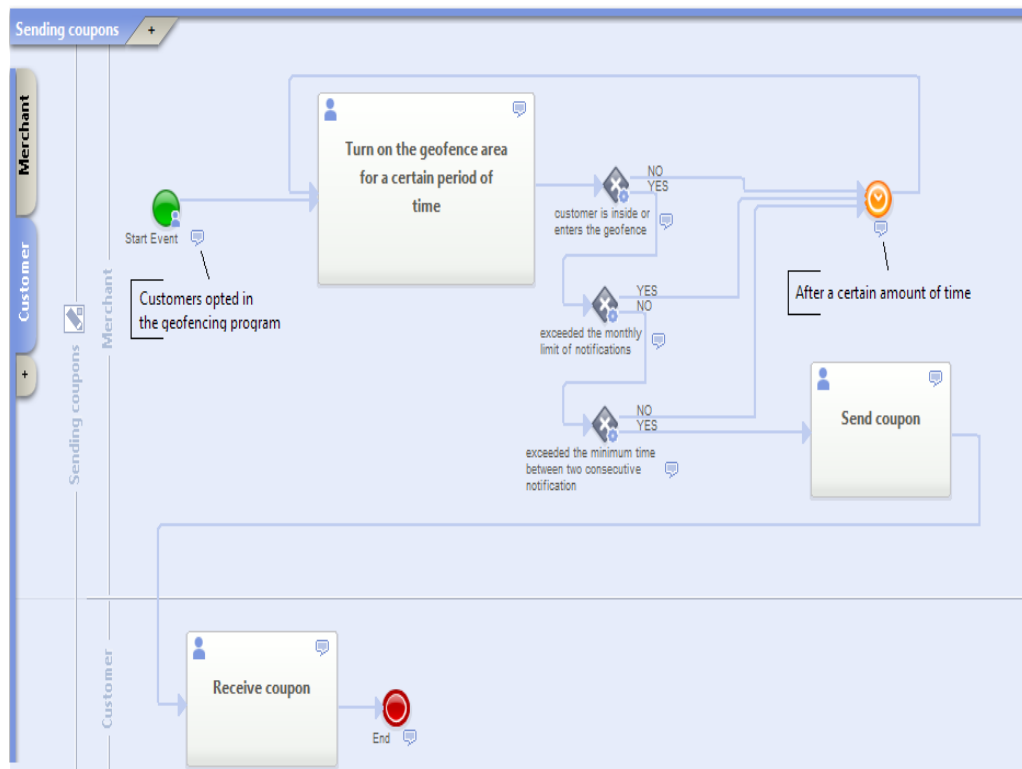


Figure 4.5 – Sending coupon process [Personal elaboration]

The second process illustrated how network-based geofencing works. The customer entering the fence triggers the whole process, but it is the merchant's system that performs all the subsequent activities like switching on the fence or tracking subscribers' position. The graphic of the sending coupon process is based on push notification.

Usually a fence is not activated for all day long but just in determinate hours. To avoid spam, firms implement some kind of parameters like the maximum number of notification per customer per month and a time interval between the sending of two consecutive notifications, which we are going to extensively explain in the next chapter.

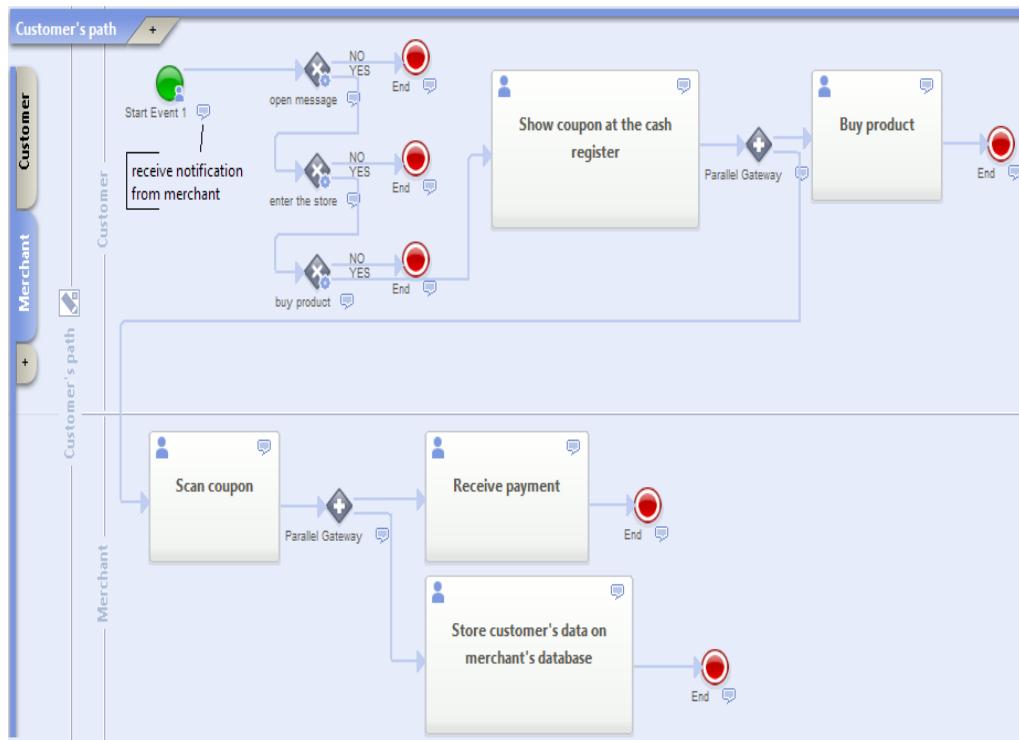


Figure 4.6 – Customer’s path after receiving message [Personal elaboration]

Third and more difficult process to map is the customer’s path. What are customer’s reactions once received the message? If the SMS contains a link to visit in order to get the coupon is simple to quantify the click-through rate but usually the SMS has only the coupon attached so it is impossible to count how many of these messages are being opened or not. Another important measure is the foot traffic inside the store but it is impossible to know how many customers decide to enter the store after they received a notification unless you ask this question to all of them. The only possible measure is to know how many coupons were used because a reader at the cash register scans them, so the firm can store customer’s data in its database.

4.4 Parameters of implementation

During the implementation phase of geofencing there are many elements to be considered for a correct use of geofencing. These parameters are called parameters of implementation and they must be selected independently the use of a network-based or an app-based geofencing.

1) Location

A geo-fence is a virtual perimeter for a real geographic area. The choice of where setting this virtual perimeter is fundamental to reach successful results.

The most common approach is to set up a geo-fence around the store, where the merchant wants to drive foot traffic, thus, increasing sales. There is anyway the possibility to locate geo-fence in other places that not necessarily correspond to the proximity area of retail.

The main driver that merchants should consider in locating their geo-fence is the identification of the customers' target. This means that they should build geo-fences where they believe their customers are, not necessarily where they want them to be; for example it could be more useful for them select airports for busy travelers, schools for moms. In other words the most popular places between the target customer respect to their own lonely outlets.

2) Number of geo-fence

Geo-fence has the option to be in several places; in fact merchants have the option to implement it in one or more areas.

For instance, if a company has several locations, they could have geo-fences around all their existing stores. In another perspective a merchant could decide, for example, to set one area in the store's perimeter, and another one nearby the competitor's store in order to capture customers that could buy from the competition.

An excessive number of geo-fence could bring to a negative effect because, for example, it could cause spam-annoying customers with too many notifications.

3) Shape and size

By definition, a geo-fence can be any size or shape. It could be dynamically generate, as in a radius around a store or point location. Or a geo-fence can be a predefined set of boundaries, like school attendance zones or neighborhood boundaries.

Building huge geofences just doesn't work. The rule of thumb here is that the perimeter should be less than four minutes travel time from the targeted location, whether that's on foot (like in a mall) or driving (within blocks of the location).

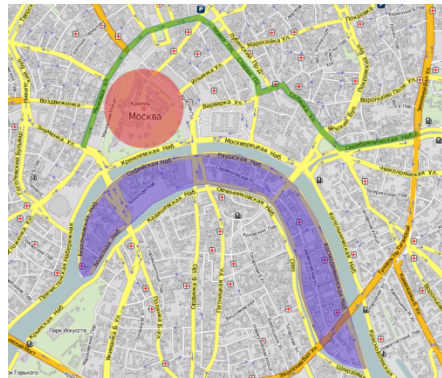
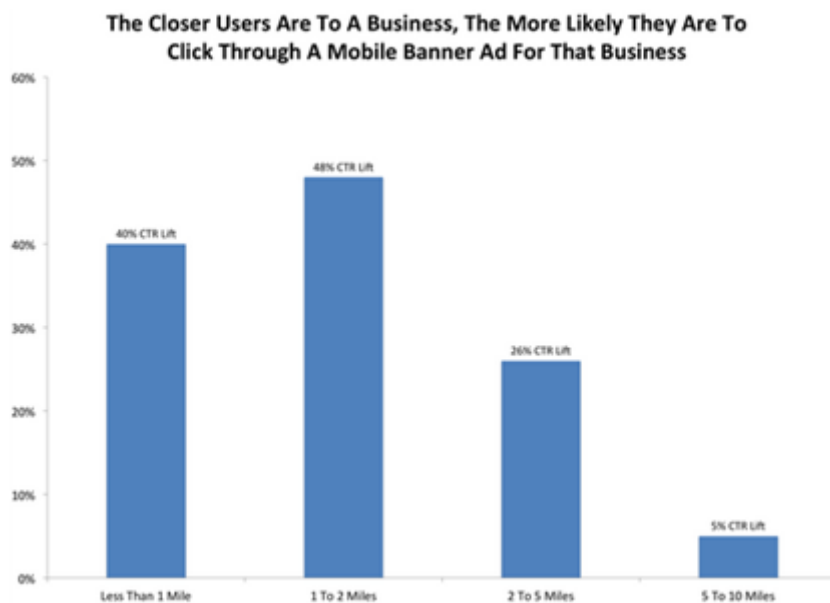


Figure 4.7 – Example of virtual fence



Graph 4.1 – Percentage of click-through-rate related to store distance [Placecast – how mobile text alerts and location affect consumer retail behavior]

4) Timing

A geofence is not just a place on a map; it is also a place in time. When a merchant takes action on a trigger and when it notifies a customer to do something is just as important as where. The choice of a right timing implies the right choices of two sub-parameters: time window during the day and specific day in which the message is sent to customer.

The time window, the period in which geofence is switched on and trigs push message to people inside the fence, depends by products or services sold and by the customers' habits. Timing of a message is key, as a restaurant marketer

could send out a lunch coupon to nearby consumers around 11:30am. Mall marketers could drive traffic to their locations around 6:30 or 7pm on weekdays after consumers have left work, and hotel marketers could send their offers later in the evening after they return from day trips.

American Eagle found, for example, that location-enabled geofence campaigns demonstrated that location, coupled with time of day was hugely predictive of interest and intent for consumers considering the purchase of any real-world product or service.

A company should know what time of day marks the highest propensity for spending among its customer segments. For American Eagle, geofences demonstrated a measureable shift in customer behavior. Location-relevant messages sent at the most opportune time in a consumer's day drove purchase behavior as high as 65 percent.

5) Maximum threshold of notifications (in a given period)

There is the perception that as a customer crosses a geofence they are automatically sent a notification. In practice, to make that happen, the marketer or brand would need to be constantly accessing GPS data or pinging the customer's device to get the network-based location. This is costly, time-consuming and, if pulling GPS data through an app, a sure fire way to rapidly drain your customer's battery.

This incorrect use of geofencing could cause negative effects toward customers that could perceive these notifications as spam, deciding to opt-out from the geofencing service.

For this reason is a good practice fixing a maximum threshold of notifications that a customer can receive in a given period, typically a month. For example Kiehl's, a cosmetic company, set this threshold at 3 messages that can be delivered to a customer in a month.

6) Minimum time between the forwarding of two messages

Once defined the maximum number of messages that a merchant could send in a specific period to a customer, it is important to establish the minimum time between the forwarding of two messages. In this way a merchant can avoid, for example, the situation in which three messages (threshold) are forwarded to a customer in the same day, simply because this customer entered three time in that day in the geo-fence area. This situation could bring to a useless practice of geofencing; and for this a reasonable setting of this parameter is important.

7) Discount

The text message can contain a coupon offering a discount on the total amount of customer's purchase or in other cases it is valid only for the purchase of specific products. The second typology of discount is used when merchants want to push up the sales of a particular product to reduce the stocks. The

decision of discount typology depends on many elements, and it can be changed according to merchant's needs in a specific moment.

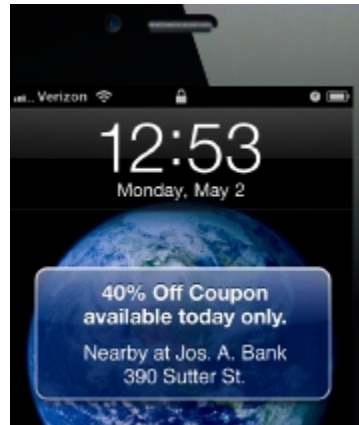


Figure 4.8 – Example of coupon received with geofencing

Another important element of the discount is the expiration date of the discount. Typically the discount is valid only for the same day when customer receives it or it last for few days. Merchants adopt this approach to push customers to buy immediately in the store, leveraging mainly on two elements: the temporal restriction of the discount, and the closeness of customers to the store.

Each merchant should set these implementation parameters correctly, in order to reach the desired results from an investment in geofencing. It is important to underline that many of these parameters are strictly related to company's strategy in general, and in particular to marketing strategy. They aren't untied from the sector in which the company operates, from the products and services sold by the company, from the geographical area and from the particular characteristics of the customer segment that merchant wants to address with geofencing.

In this way every company should consider each of this elements and its particular situation to set these parameters.

4.5 Benefits

There are many potential benefits coming from a right application of geofencing. It is important in this way to track both tangible and intangible advantages with the aid of the *value tree*.

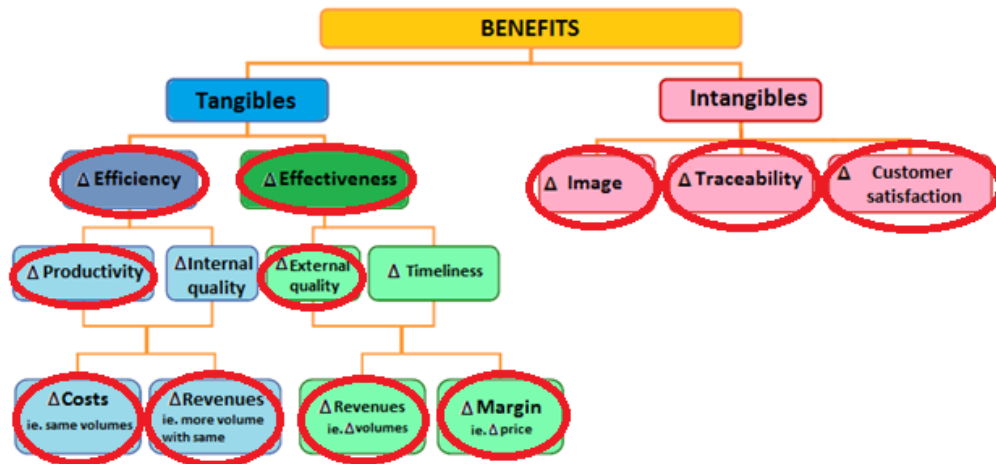


Figure 4.9 – Impact of geofencing on tree of benefits [Personal elaboration]

Tangible benefits:

- A. Efficiency increase
 - a) Productivity increase: this is due mainly to the higher revenues and it could depend also on the reduction of cost.
Practical cases show that a geofencing implementation increases marketing ROI respect to the traditional marketing campaign. Independently how marketing ROI is assessed, the impact on sales increases the nominator of marketing ROI.
Concerning impact on cost, geofencing implementation could lower costs; but this depends how merchant do the advertising. For example implementing geofencing could be done in substitution of a more expensive advertising approach reducing costs; or it could be added to already existing ones increasing costs. Geofencing can be also more costly than other campaigns. Anyway benefits coming from the revenues are higher than a possible cost increasing, and this is visible in ROI indicator.

B. Effectiveness increase

- a) External quality increase: this is due mainly to the increase in revenues. Another factor influencing the effectiveness is margin. This aspect is negatively affected since coupons contain discounts. This negative impact is much overwhelmed by the increase of sales, in fact even if the unitary contribution margin (cm(u)) decreases by the effect of discount, the total contribution margin increases (CM). Another element of increases revenues is that the average expenditure of a coupon user is higher than a normal customer.

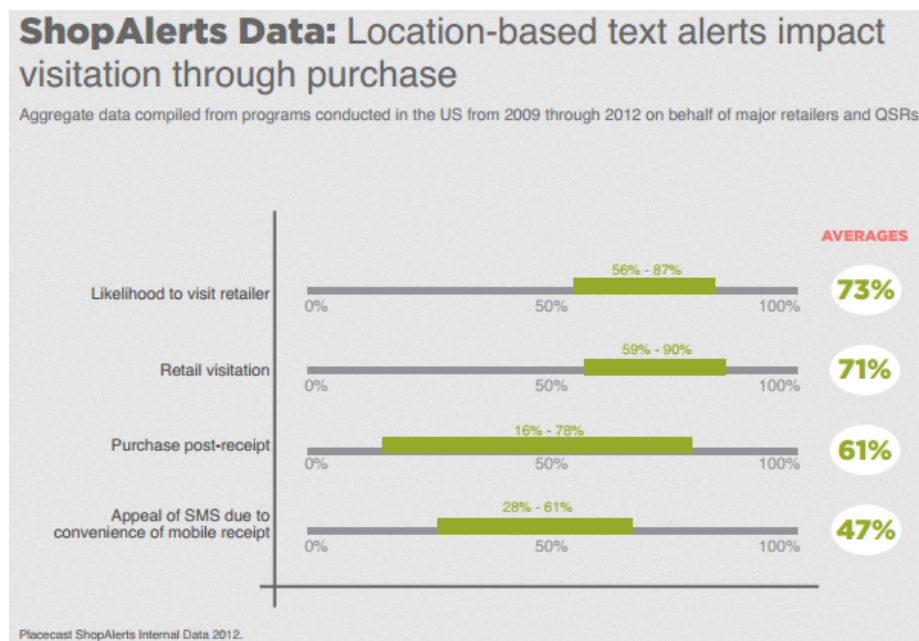


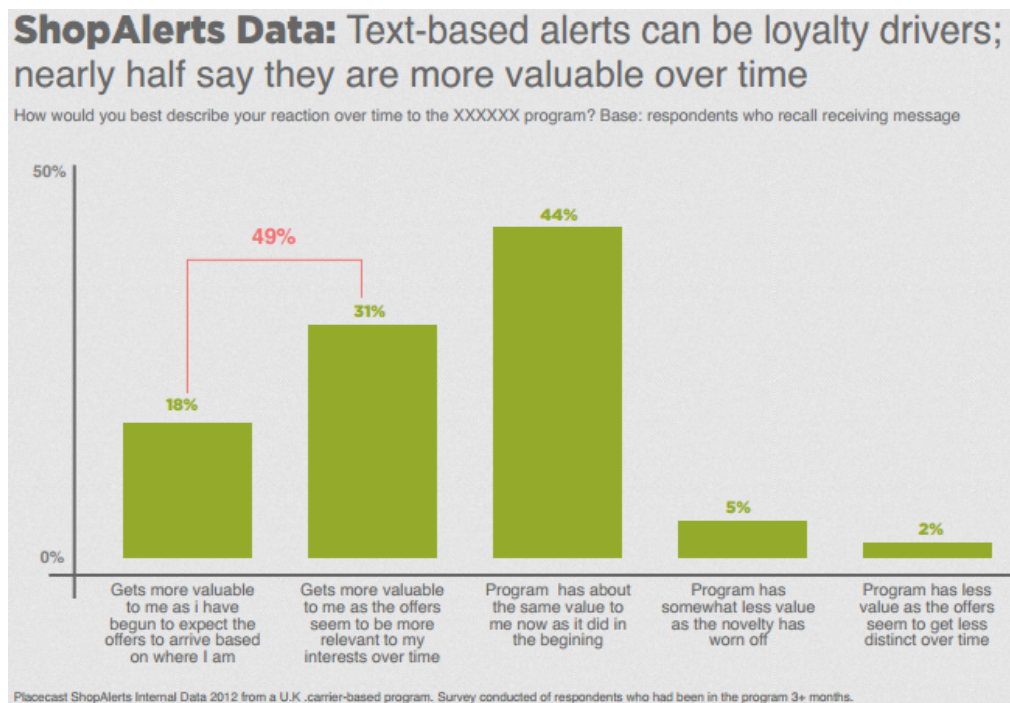
Figure 4.10 – Impacts of geofencing messages [Placecast – Behind the geofencing]

Intangible benefits:

- A. Traceability increase: through the geofencing introduction it is possible to trace past purchases, preferences and many other information on customers. Through the use of forwarded coupons merchant has the possibility to have much more customer info and track all these elements. For example a customer could receive future coupons based on its past purchase.
- B. Brand awareness increase: geofencing messages can be used, not only to promote a specific call-to-action, but also to build brand equity and loyalty amongst existing customers. Geofencing enables customers and

fans of a brand to stay connected about last products, local events and many information.

- C. Customer's satisfaction increases: the impact on customer's satisfaction can be verified, for example, by the increase of the customers' loyalty registered after the implementation, as is shown by many cases. Customers' loyalty depends on the marketing relevance of messages. Geo-targeting improves the relevance of mobile ads delivered to consumers. Local-based mobile technology ensures that the marketing messages are delivered to the right persons which are most likely to take action, leading to above-average conversion rates and results



Graph 4.2 – Impacts of text-based messages on loyalty [Placecast – Behind the geofencing]

4.6 Performance measurement

Before starting the implementation phase, it is important to define a set of KPIs that allow to merchant monitoring the performances of geofencing.

Once defined a specific set of KPIs a merchant should track metrics, in order to find out if the resources the merchant is putting into geofencing are getting result. If not, the merchant either could tweak the efforts or pursue other techniques that get results it needs.

We proceeded by using the following key steps:

1. Analysis and definition of the critical success factors for the business process
2. Definition of the relevant performance dimensions and possible KPIs

4.6.1 Analysis and definition of the main CSFs

The objective of implementing a geofencing is to increase the operating profit of the company, impacting on revenues and costs.

They can be sum up by the following graph:

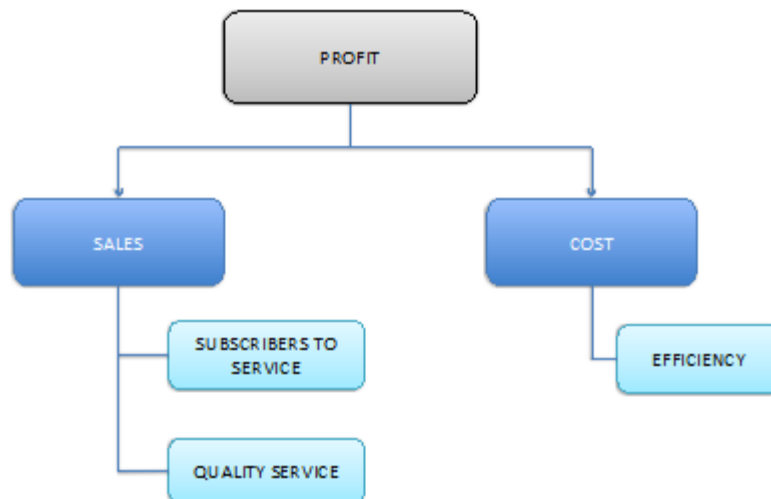


Figure 4.11 – Value driver map [Personal elaboration]

The main CSFs are three:

- **Number of subscriber to Geofencing service:** this is the main CSF that allows a company to implement successful results. The higher is the number of subscribers who opt-in the higher the possibility of revenues. The capability of the company to reach a consistent base of opted-in customers depends on many elements, not always directly linked to the geofencing itself. It depends for example from the company's appeal and brand its brand awareness, from the discount entity offered, and from the different characteristics of customer segment. For example there could be differences in terms acceptance of the service for privacy issue according to the country, or the different age of customers. The main question of a merchant should be: "How many shoppers are willing to relinquish more of their privacy to make it worthwhile for retailers?"
In countries like the US, the willingness of consumers to 'let it all hang out' has traditionally been greater than in countries like Europe or Australia. Research suggests, though, that the generational differences in attitudes toward privacy may be greater than cross-country differences. Another challenge for geo-fencing is finding that sweet spot for customers who have opted into a program, to ensure they don't get annoyed by receiving too many promotional messages. In the Kiehl's example, customers received an average of three messages per month. The first objective of the company is to evaluate the specific context in which operate and trying to increase as much as possible its subscribers to have a higher probability to drive foot traffic in store, thus, to push up the sales.
- **Quality service of Geofencing:** this CSF is strictly related to the merchant's ability in implementing a geofencing service characterized by a high effectiveness. This CSF reflects the effectiveness toward customers, and for this reasons it depends on the capability to set the parameters of implementation in the right way.
The level of effectiveness is driven also by the capability in creating interesting messages. Bland messages don't work, the company shouldn't think of them as ads, but it should think of them as a call to action that will engage the targeted user. The message needs to be brief, location relevant and prompt action. The message also needs to be important enough that the user will want to take that action, because money, in term of discount, always drive actions.
The other important thing is that the products promoted into the messages should be in line with the customer's preferences, and possibly with their habits and past purchase.

- Efficiency: it measures the ability of the merchant in leveraging resources. In this case it measures the efficiency of the geofencing marketing campaign respect to the traditional methods. It can be measured through indicator like ROI, which reflects the ability of the geofencing to generate sales given the investment.

4.6.2 Analysis and definition of a set of KPIs

Proceeding with a detailed analysis of the process, we found 22 different KPIs. Most of them are related to all CSFs, it has been decided to maintain all the KPIs in an aggregate form clustering them according to their dimensions (General, Internal, External), without showing their impacts on the single CSF.

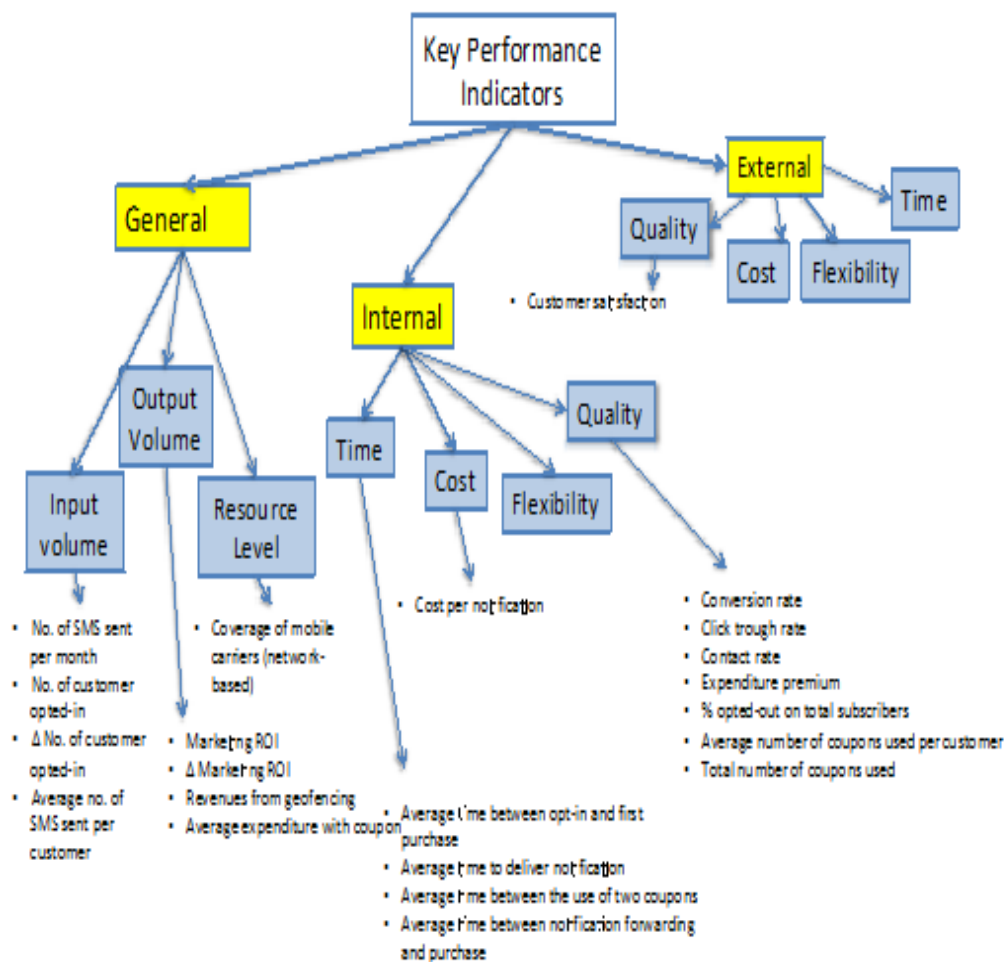


Figure 4.12 – Classification of KPIs divided by typology [Personal elaboration]

Every KPI has been evaluated according to three different dimensions:

- *Comprehensibility*: it measures the easiness in understanding the objective of the KPI by those who use it or who are evaluated through it.
- *Measurability*: easiness to assess the measurement of a KPI expressed in terms of time and costs necessary to obtain and elaborate it.
- *Frequency*: it measures the coherence between the time frame over which the performance is measured and the time frame over which the value changes. A high score corresponds to a high correspondence between the two different time frames.

We assigned to each of them a rating from 1 to 5, and then we assessed the average score of the KPI.

The next tables show the KPIs selected to monitor geofencing performances.

Number of SMS forwarded per month	
Formula	/
Unit of measure	(Absolute number)
Frequency of measure	Month
Target	N.A.

Number of customer opted-in	
Formula	/
Unit of measure	(Absolute number)
Frequency of measure	Month
Target	General increase

Average no. SMS sent per customer	
Formula	Total SMS sent in month T/Number of subscribers at beginning of month T
Unit of measure	(Absolute number)
Frequency of measure	Month
Target	N.A.

Revenues from geofencing	
Formula	Sales with coupon/ Total Sales
Unit of measure	(Absolute number)
Frequency of measure	Year
Target	General increase

Marketing ROI	
Formula	
Unit of measure	(Absolute number)
Frequency of measure	Year
Target	General increase

Δ Marketing ROI	
Formula	
Unit of measure	(Absolute number)
Frequency of measure	Year
Target	General increase

Average time between opt-in and first purchase	
Formula	Date 2 –Date 1
Unit of measure	Days
Frequency of measure	Monthly
Target	General decrease

Average time between the use of two coupons	
Formula	Date 2- Date 1
Unit of measure	Days
Frequency of measure	Monthly
Target	General decrease

Conversion rate	
Formula	No. Coupons used in a month T/ Total No. of coupon sent in a month T
Unit of measure	%
Frequency of measure	Monthly
Target	General increase

Click trough rate (CTR)	
Formula	No. Coupons visualized in month T/ Total No. Coupons sent in a month T
Unit of measure	%
Frequency of measure	Monthly
Target	General increase

Expenditure premium	
Formula	Average receipt expenditure with coupon/ Average receipt expenditure without coupon
Unit of measure	%
Frequency of measure	Monthly
Target	N.A.

% Opted-out on total subscribers	
Formula	Customers opted-out in month T/ Total subscribers at beginning month T
Unit of measure	%
Frequency of measure	Monthly
Target	General decrease

Average No. Coupons used per person	
-------------------------------------	--

Formula	No. Coupons used in month T/ Total subscribers at beginning month T
Unit of measure	%
Frequency of measure	Monthly
Target	General increase
Total No. Coupon used: % increase	
Formula	No. Coupons used in month T; (Coupons Month T- Coupons Month T-1) /Coupon Month T-1
Unit of measure	%
Frequency of measure	Monthly
Target	General increase
Customer satisfaction	
Formula	Survey
Unit of measure	Qualitative
Frequency of measure	Monthly
Target	General increase

Figure 4.13 – Description of the selected KPIs for monitoring geofencing performances
[Personal elaboration]

4.7 Geofencing: impact on income statement

The use of geofencing aims at increasing the sales. For this reason it impacts on both total revenues and on Selling & Marketing expenses. If we consider the income statement by nature in IAS/IFRS standard, geofencing affects the continuing operation by increasing the line of total revenues and increasing the line of distribution (selling) costs.

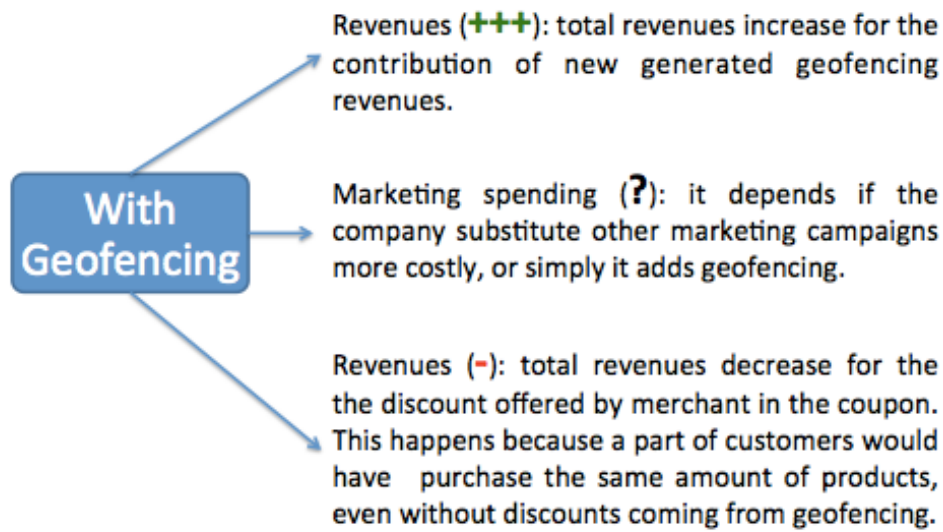
IS BY FUNCTION
Continuing Operation
Revenue
Cost of Sales
<i>Gross Profit</i>
Other operating income
Distribution (selling) costs
Administrative expenses
Other operating expenses
<i>Operating profit</i>

The geofencing effects on total revenues can be split into two different contributes. The first contribute impacts positively on total revenues since geofencing should increase in-store traffic foot, bringing consequently to an increase on sales.

The second one decreases total revenues because of the discount offered by the merchant in the coupon. This negative contribution is related only to those sales that would have occurred in any case without discounts coming from geofencing. This negative effect is in this sense related to the cannibalization effect.

The introduction of geofencing usually increases also the selling costs in the income statement, unless company decides to substitute other more costly marketing campaigns with it.

It is anyway possible to affirm, given the results of the real cases available, that the effect of geofencing on the income statement is positive. This is due by the bigger weight of the revenues increase generated by geofencing respect to the other two effects.



It could be risky and misleading to evaluate the impact of geofencing on the variation of total sales. This is true not only for geofencing, but also for marketing investments in general; in fact sales are not related only to marketing actions and expenses, but they rely on a multiplicity of factors like economic situation, company’s strategy, sector and many others.

In order to evaluate correctly geofencing’s impact it is important circumscribing its contribution dividing the total revenues into revenues coming from geofencing and into standard revenues. This is possible given the easiness in tracking coupons and their linked sales.

As geofencing revenues we consider the amount of revenues directly attributable to geofencing. There are different revenues typologies, which contribute to total geofencing revenues, according to discount type. Not all of them are directly traceable.

General discount	Product discount
<ul style="list-style-type: none"> Revenues from purchased products with coupons (traceable) 	<ul style="list-style-type: none"> Revenues from items featured in SMS (traceable) Revenues from items featured in SMS plus not discounted products (traceable) Revenues from items different than what was featured in SMS. (Not traceable)

Hereafter we will consider only geofencing revenues and costs, and their related cash flows to evaluate a geofencing investment.

Furthermore we will focus on a model development based on general discount, since it is possible to track all sales generated by geofencing.

This model can be anyway extended to a product discount approach, simply introducing a factor able to consider all the revenues that a merchant can have when a customer, warned by a push SMS containing a discount on a specific product, enters the store and buys other products instead of the discounted one. In this case is not possible to track directly, through the use of coupons, this contribution, but a merchant can decide to estimate it through surveys dispensed to final customers.

In the next chapters we analyze geofencing investment with ROI, NPV and Payback time through the development of a specific model.

4.8 Geofencing: Cash Inflows and Outflows

In order to evaluate geofencing investment it is necessary shifting from the accrual to the financial logic, and for this reason we have to define all cash inflows and outflows generated by the investment.

Some previous considerations should be done before proceeding with the modeling of Cash Inflows and Outflows:

- Geofencing doesn't require CAPEX. This because geofencing is a sort of marketing investment, thus, marketing funds aren't 'tied' up in plants and inventories, but they are typically 'risked.' Marketing spending is typically expensed in the current period. The only expenses that are not in the current period are related to the implementation costs, which are totally allocated to year 0.
- Accrual events correspond to their related financial events. This is always true for Revenues and Cash Inflows because in a B2C market the accrual event related to sales and the financial event related to cash payment by customers occur at the same time. We can make a reasonable hypothesis on considering the geofencing costs (recorded under the voice distribution/selling costs) correspondent to the related cash outflows. Under these hypothesis there isn't any variation on the operating working capital (OWC).
- Due to the fact that there aren't investments in fixed assets and in OWC, the Net cash flow (NCF) is equal with the Cash flow (CF).

We make two further hypotheses before starting with the model:

- No taxes
- No external financing: only shareholders are considered as financiers (K=Ke)

A. Cash Inflows

This formula is able to assess the cash inflows coming from geofencing:

$$\text{Cash Inflows} = \left(\text{Average expenditure per coupon} \left(\frac{\$}{\text{coupon}} \right) * \# \text{ coupon used (coupon)} \right) * (1 - \alpha)$$

The following graphic shows all the elements and their relations that contribute, at different level, to the assessment of Cash Inflows coming from geofencing.

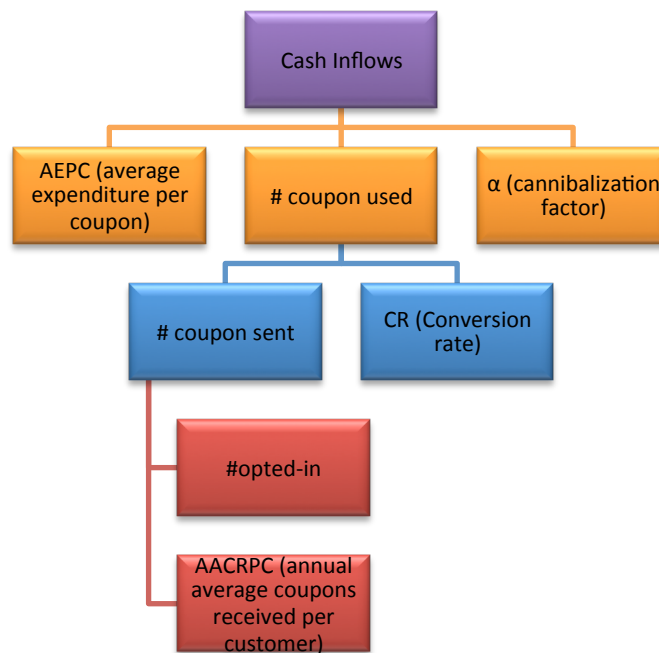


Figure 4.14 – Layout of cash inflow factors [Personal elaboration]

We are going to analyze each level and all factors in detail.

a) *Level 1: Number of coupons used to purchase*

Coupons used (coupons)

$$= \# \text{Coupons forwarded (coupon)} * CR \left(\frac{\# \text{coupons used}}{\# \text{coupons forwarded}} \right)$$

b) Level 2: Number of coupons forwarded to customers

Coupons forwarded (coupons)

$$= \# \text{customers opted_in} * AACRPC \left(\frac{\# \text{coupons}}{\text{customer}} \right)$$

c) Level 1: Cannibalization factor

$$\alpha = \frac{\text{Revenues cannibalised by geofencing (considered without discount)}(\$)}{\text{Revenues attributable to Geofencing} (\$)}$$

B. Cash outflows

This formula is able to assess the cash inflows coming from geofencing:

Cash Outflows

$$= (\text{Revenues from geofencing}(\$) * COGS (\%)) + (IC (\$) + \text{Lifetime cost} (\$) + \text{Total costs messages} (\$))$$

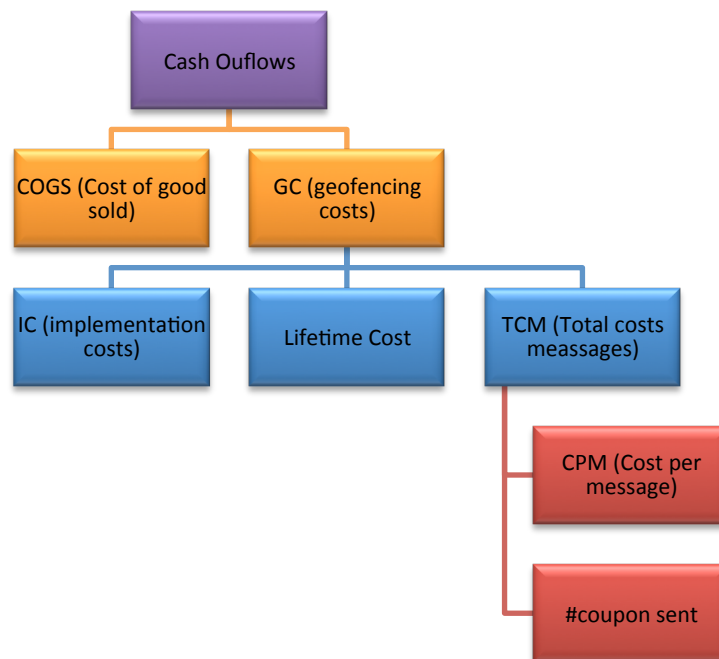


Figure 4.15 – Layout of cash outflow factors [Personal elaboration]

We are going to analyze each level and all factors in detail.

a) Level 1: Geofencing costs

There are three types of costs coming from the implementation of geofencing:

1. Implementation cost (Upward cost)
2. Lifetime cost (switch-on cost)
3. Cost per SMS

Geofencing costs

$$= \text{Implementation costs} + \text{switch on cost} \\ + (\text{cost per SMS} * \#\text{coupon forwarded})$$

b) Level 1: Cost of goods sold

$$\text{Cost of goods sold} = \text{Revenues attributable to geofencing} (\$) * \text{COGS} (\%)$$

4.9 Investment appraisal models: basic case

We used two categories of appraisal models:

- Discounted cash flow methods (DCF), which consider the time value of money: NPV and Payback time
- Not discounted cash flow methods (not DCF), which don't consider the time value of money: ROI

We developed a basic case of mass-market apparel sector in order to evaluate geofencing investment with NPV, Payback time and ROI.

We considered in our model the implementation of only one fence for a single store. This basic case was built in part using values coming from successful cases of geofencing implementation in the apparel sector, and in part with hypothesis due to lack of data. For this reason even if these data are reasonable it should be necessary to test the model basing it on real cases.

We were able to gather concordant values characterizing the geofencing costs of a network-based solution: implementation costs, lifetime costs and cost per message. These costs are independent from the sector in which the company operates. Cost per single SMS, Cost of initial investment and monthly lifetime

costs have been raised by companies specialized in the implementation of geofencing like Locaid.

GENERAL DATA	
Cost single SMS	\$ 0,035
Cost of initial investment	\$ 50.000,00
Monthly lifetime cost	\$ 5.000,00

We found other data specific of the apparel sector for some factors like conversion rate, number of opted-in and annual average coupon received per person. The values of these factors depend on the specific sector, geographical area and many other conditions.

DATA FROM APPAREL SECCORS	
#opted-in	800
AACRPC	18
conversion rate	25%

We estimated by scratch other data like the cannibalization factor, since we didn't find any document showing possible values of this factor. We estimated also the average expenditure per coupon equal to 70\$ and a Cost of goods sold equal to 30% of revenues.

In the next table are shown these estimated factors:

ESTIMATED FACTORS	
Cost of equity K_e	9,68%
Cannibalization factor	20%
COGS	30%
Average expenditure per coupon	€ 70,00
NCF growth	0%

We discounted all NCF with the cost of capital. We took as cost of capital the cost of equity of the apparel sector. We used the cost of capital of the apparel sector equal to 9,68%; this value comes from NYU Stern School of Business database. We estimated a growth of Cash inflows and outflows equal to 0 during all the years.

a) NPV

The formula of NPV is the following:

$$NPV = -I(0) + \sum_{t=0}^{\infty} \frac{NCF(t)}{(1+K)^t}$$

Geofencing hasn't a determined life expectancy but once a company decides to sustain the implementation costs it can generate positive NCFs for unlimited periods. Under the hypothesis of having all the NCFs from year 1 to + ∞ equal to NCF (1), a part in year 0 when the company has to sustain the implementation costs, we can use the simplified formula of perpetuity at growth=0:

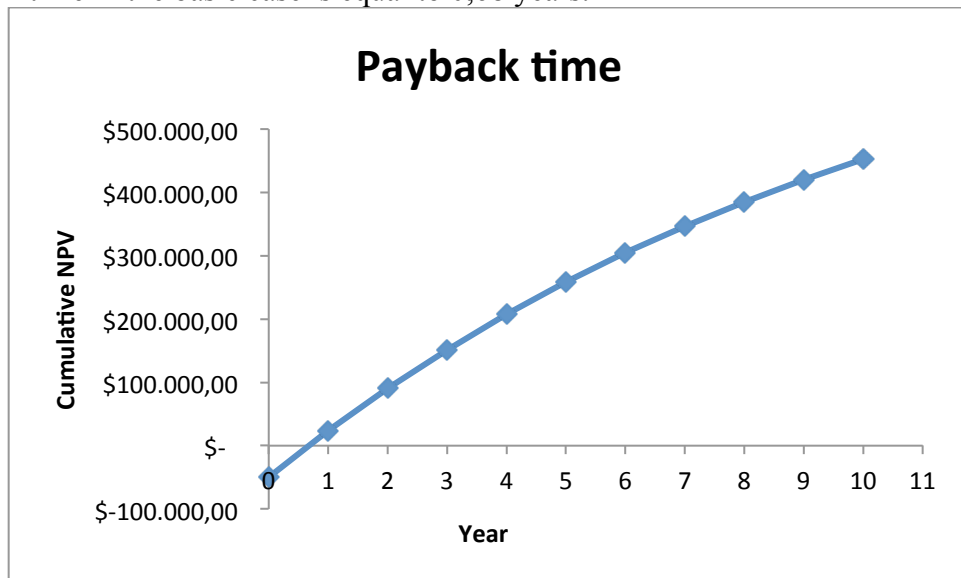
$$NPV = -I(0) + \sum_{t=0}^{\infty} \frac{NCF(t)}{(1+K)^t} = -I(0) + \frac{NCF}{Ke}$$

In the basic case the investment in geofencing ensures a positive NPV equal to 782.810 \$.

b) Payback time

$$Payback(t) = \sum_{\alpha=0}^t \frac{NCF(\alpha)}{(1+K)^\alpha}$$

Payback time in the basic case is equal to 0,68 years.



Graph 4.3 – Payback time of basic case [Personal elaboration]

c) ROI

Basic case	year 0	1st year	2nd year	3rd year	4th year	5th year
Inbound CF	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
Revenues from Geofencing (RAG)	\$ -	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00	\$ 252.000,00
gross profit	\$ -	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00	\$ 176.400,00
Gross profit with cannibalization	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
# opted-in	0	800	800	800	800	800
#annual coupon received per person	0	18	18	18	18	18
#coupon sent	0	14400	14400	14400	14400	14400
Conversion rate	0	25%	25%	25%	25%	25%
Annual coupon used	0	3600	3600	3600	3600	3600
Average expense per customer	\$ -	\$ 70,00	\$ 70,00	\$ 70,00	\$ 70,00	\$ 70,00
Contribution margin	0	30%	30%	30%	30%	30%
Cannibalization factor	0	20%	20%	20%	20%	20%
TOTAL COST	\$ 50.000,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00
Implementation cost	\$ 50.000,00	\$ -	\$ -	\$ -	\$ -	\$ -
Annual lifetime cost	\$ -	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00	\$ 60.000,00
Cost per total SMS	\$ -	\$ 504,00	\$ 504,00	\$ 504,00	\$ 504,00	\$ 504,00

Basic case	year 0	1st year	2nd year	3rd year	4th year	5th year
Cash Inflow	\$ -	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00	\$ 141.120,00
Cash Outflow	\$ 50.000,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00	\$ 60.504,00
Cumulative Cash Outflow	\$ 50.000,00	\$ 110.504,00	\$ 171.008,00	\$ 231.512,00	\$ 292.016,00	\$ 352.520,00
NCF	\$ -50.000,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00	\$ 80.616,00
Cumulative NCF	\$ -50.000,00	\$ 30.616,00	\$ 111.232,00	\$ 191.848,00	\$ 272.464,00	\$ 353.080,00
Simple ROI	-1,00	0,28	0,65	0,83	0,93	1,00

Figure 4.16 – Return on Investment table [Personal elaboration]

The use of ROI for an investment like geofencing can be risky and misleading because ROI is a Not DCF, which doesn't consider the time value of money. The use of ROI can be a good instrument to evaluate the return of a traditional marketing investment like advertising on TV or newspapers; in fact these campaigns have a limited temporal horizon, typically equal to some months or a years. Geofencing, instead, hasn't a determined life expectancy but once the company decides to sustain the implementation costs it can generate positive NCF for unlimited periods. Summing NCF of different years without discounting them can lead to worse performance in decision-making respect to appraisal models like NPV or Payback time.

Anyway in the first years of the investment, since the discounting effect is less evident, it is possible to use ROI simply using the cumulative cash inflows and outflows; so for example ROI₂, ROI at the 2nd year is:

$$\begin{aligned}
 &ROI(\text{at the end of year 2}) \\
 &= \frac{(\text{Total Inflows at the end of year 2}) - (\text{Total Outflows at the end of year 2})}{(\text{Total Outflows at the end of year 2})} \\
 &= \frac{NCF \text{ year 0} + NCF \text{ year 1} + NCF \text{ year 2}}{CF \text{ out year 0} + CF \text{ out year 1} + CF \text{ out year 2}} = 65\%
 \end{aligned}$$

4.10 Sensitivity analysis

The sensitivity analysis is used as a tool to verify the impact of geofencing in different scenarios.

Before starting with a sensitive analysis is important to remark that there could be profound differences in terms of results depending on the retail's sector, brand awareness, geographical area and many other elements.

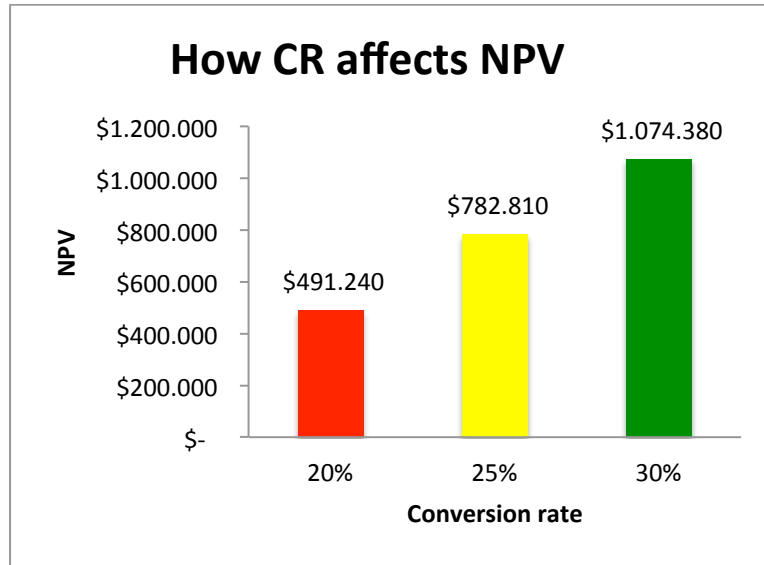
We performed a two steps sensitivity analysis: based on critical factors found and on different scenarios.

4.10.1 Sensitivity analysis on critical factors

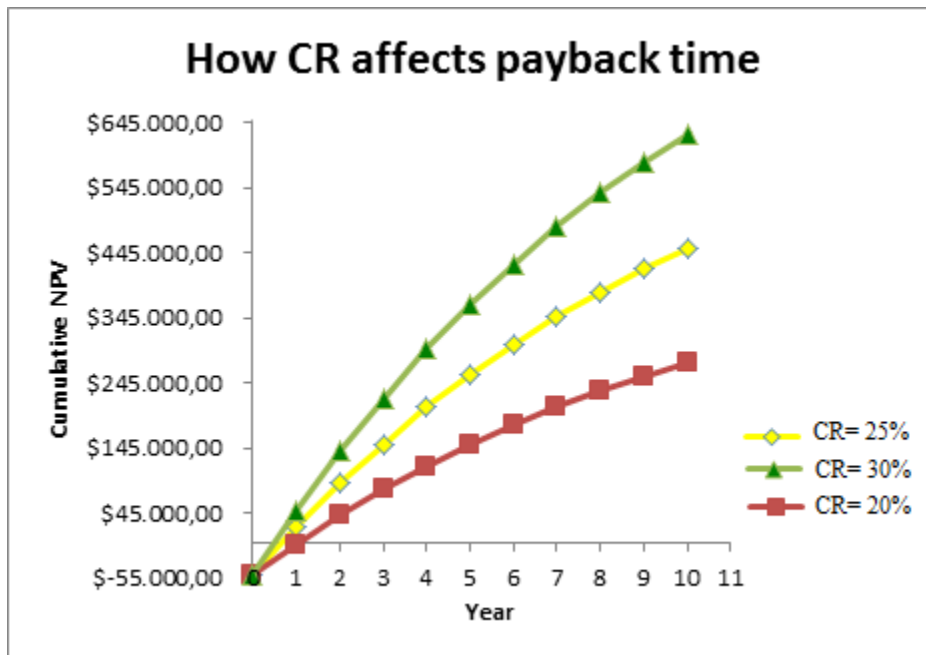
We decide to analyze each factor independently to assess how a little factor variation is able to change the total outcome. These factors are: number of subscribers, annual average coupons received by each person, conversion rate, and cannibalization percentage and average expenditure per coupon. Every parameter was changed by a different percentage typical of each factor. Tables with our analysis will follow.

a) *Conversion rate (CR)*

We varied the initial value of 25% of conversion rate, considering a deviation of +/- 5%. With the new values the Net Present Values varied of +/-37,25% while Payback time of +54,54% and -25,93%.



Graph 4.4 – Effects of conversion rate on NPV [Personal elaboration]

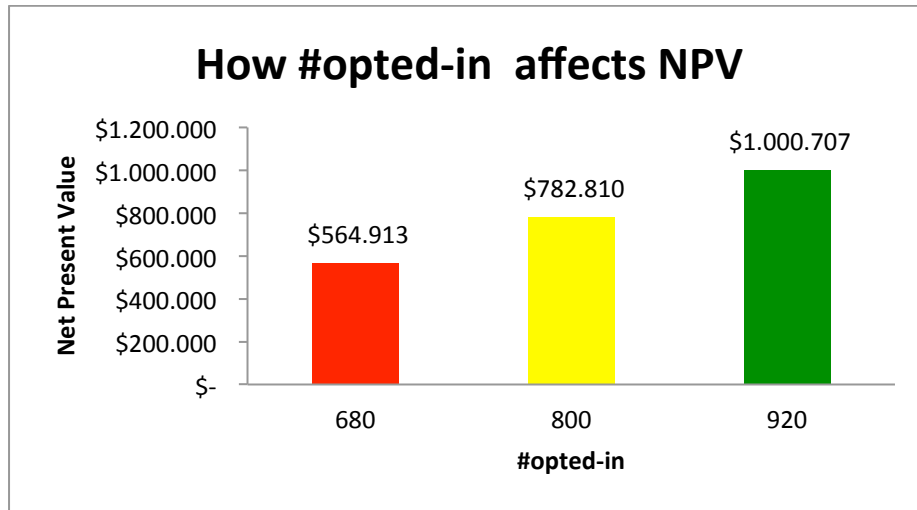


Graph 4.5 – Effects of conversion rate on payback time [Personal elaboration]

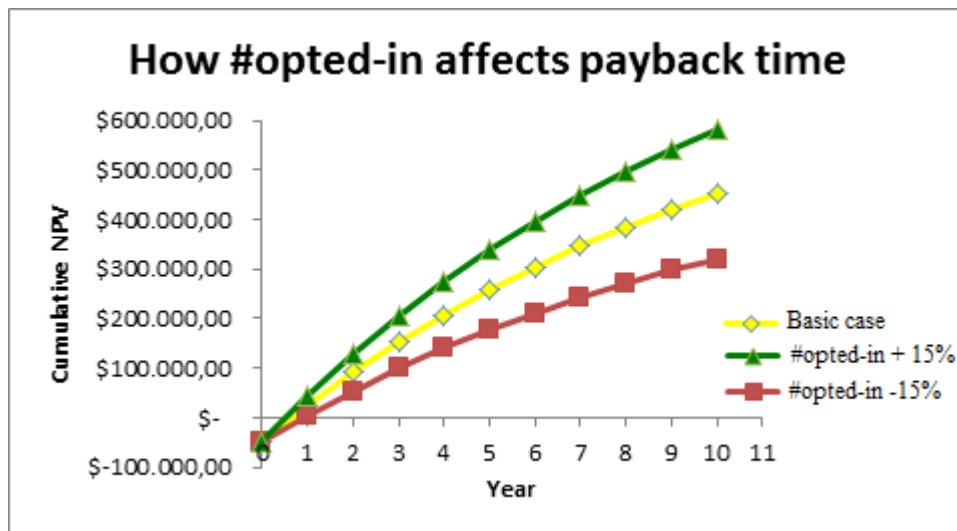
b) Number of subscribers (#opted-in)

We varied the number of opted-in by a -15% and +15% from the initial value of 800. From our analysis we found that a +/-15% change in the number of opted-

in will bring a +/- 27,84% difference in the Net Present Value respect to the basic case. Concerning Payback time we registered +35,44% respect to 0,68 years of the basic case for -15% of opted-in and -20,74% for a +15% of #opted-in.

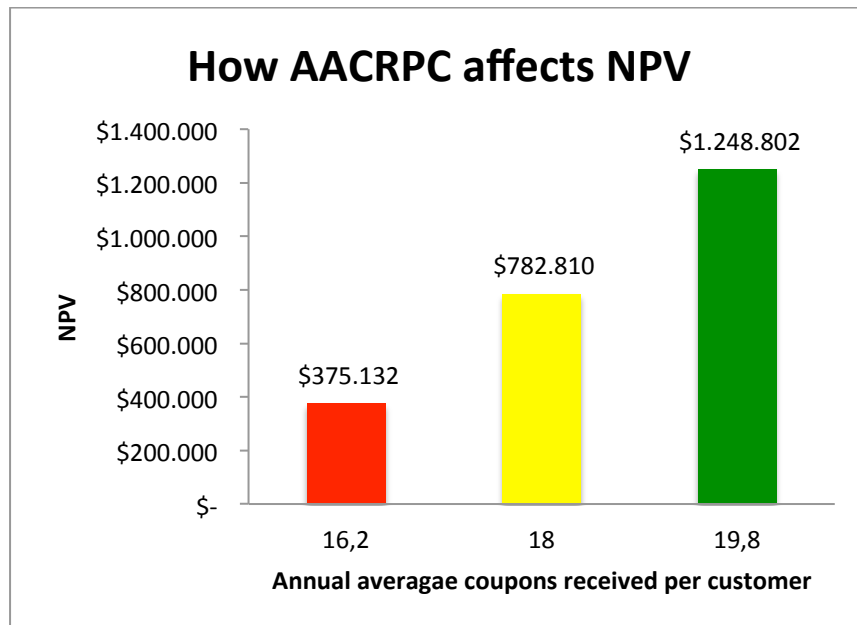


Graph 4.6 – Effects of number of subscribers on NPV [Personal elaboration]

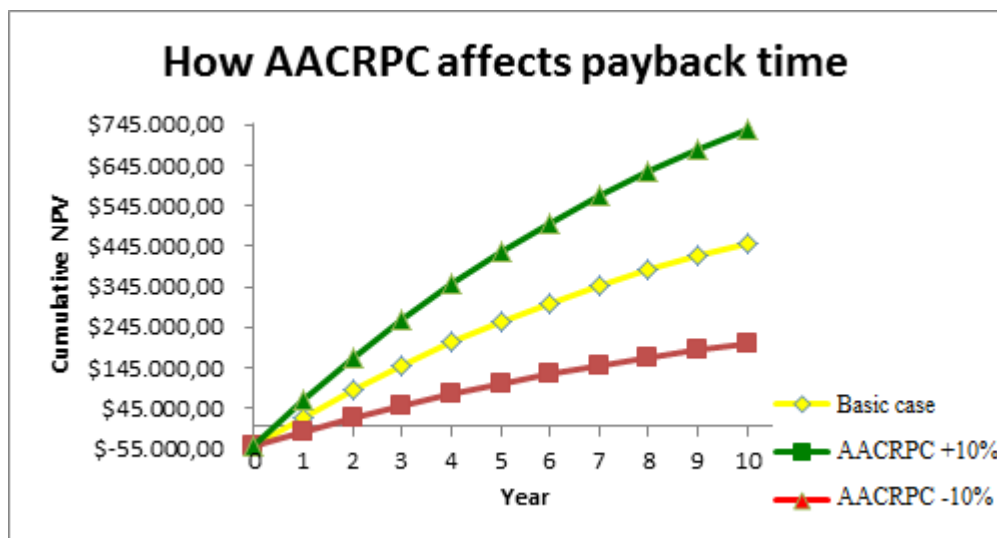


Graph 4.7 – Effects of number of subscribers on payback time [Personal elaboration]

- c) Annual average coupons received per customer (AACRPC)
We decide to vary the annual average coupon received by each person from 18 to a +/- 10%. With the new values, the Net Present Value was -52,08% and +59,53% while payback time changed of +100,63% and -35,88%.



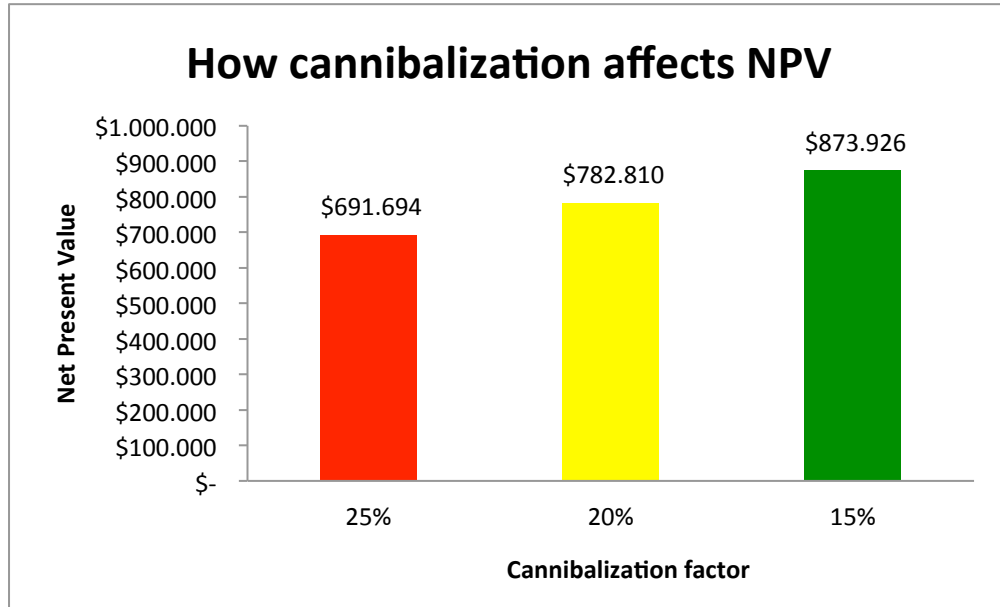
Graph 4.8 – Effects of number of messages received per customer on NPV [Personal elaboration]



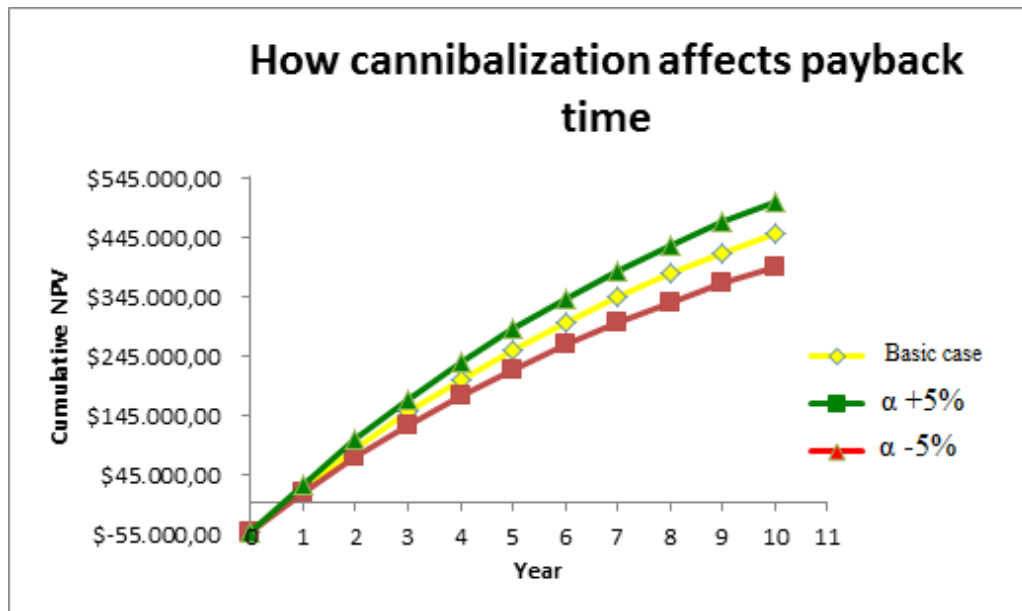
Graph 4.9 – Effects of number of messages received on payback time [Personal elaboration]

- d) Cannibalization factor (α)
 From the initial value of 20%, we varied the percentage of cannibalization by a deviation of +/- 5%. These change caused a variation in the Net Present

Value of +/- 11,64%, while in Payback time caused a variation of +12,28% and -9,86%.



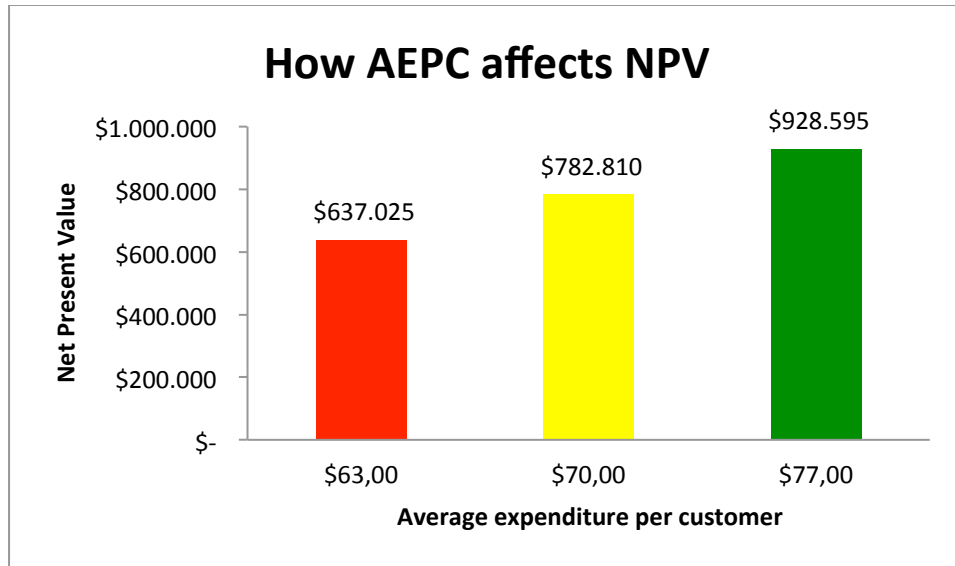
Graph 4.10 – Effects of cannibalization on NPV [Personal elaboration]



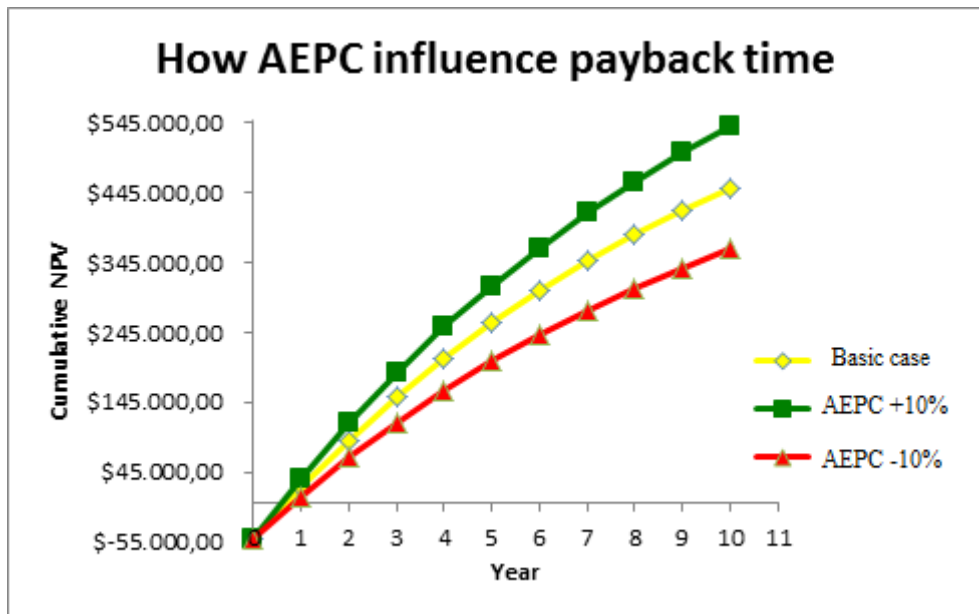
Graph 4.11 – Effects of cannibalization on payback time [Personal elaboration]

e) Average expenditure per coupon (AEPC)

We varied the average expenditure of 70\$ with +/- 10%. The results show that Net Present Values varied of +/- 19,44%. Payback time varied of +21,22% with -10% and -14,90% with +10% of 70\$.



Graph 4.12 – Effects of average expenditure on NPV [Personal elaboration]



Graph 4.13 – Effects of average expenditure on payback time [Personal elaboration]

It is possible to synthetize the result obtained in the following table:

Summary of results	CR	#opted-in	AAEPC	Cannib. fact.	AEPC	NPV	Delta NPV	PBT (years)	Delta PBT
Basic case	25%	800	18	20%	€ 70,00	\$ 782.810		0,68	
Negative case CR -5%	20%	800	18	20%	€ 70,00	\$ 491.240	-37,25%	1,05	54,54%
Positive case CR +5%	30%	800	18	20%	€ 70,00	\$ 1.074.380	37,25%	0,50	-25,93%
Negative case #opted-in -15%	25%	680	18	20%	€ 70,00	\$ 564.913	-27,84%	0,92	35,44%
Positive case #opted-in +15%	25%	920	18	20%	€ 70,00	\$ 1.000.707	27,84%	0,54	-20,74%
Negative case AACRPC -10%	25%	800	16,2	20%	€ 70,00	\$ 375.132	-52,08%	1,36	100,63%
Positive case AACRPC +10%	25%	800	19,8	20%	€ 70,00	\$ 1.248.802	59,53%	0,44	-35,88%
Negative case cannibalization factor +5%	25%	800	18	15%	€ 70,00	\$ 691.694	-11,64%	0,76	12,28%
Positive case cannibalization factor -5%	25%	800	18	25%	€ 70,00	\$ 873.926	11,64%	0,61	-9,86%
Average expenditure per coupon -10%	25%	800	18	20%	€ 63,00	\$ 637.025	-18,62%	0,82	21,22%
Average expenditure per coupon +10%	25%	800	18	20%	€ 77,00	\$ 928.595	18,62%	0,58	-14,90%

Figure 4.17 – Results of factors’ sensitivity analysis [Personal elaboration]

As table shows in our example the factors that influence mostly the variation of NPV and PBT are the annual average coupons received per customer, the number of opted-in and the conversion rate. Average expenditure per coupon and cannibalization factor seem to have lower impacts.

The PBT varies almost always within the first year, this because we built our example of basic case with values of a successful cases in the apparel sector.

Anyway in order to have better feedbacks on which are the factors that influence mostly the investment value it should be opportune testing the model on a real case. This because our basic case was built in part using values coming from a successful cases in the apparel sector and in part with hypothesis due to lack of data.

4.10.2 Sensitivity analysis on scenarios

The second step of the sensitivity analysis is based on a scenario analysis.

We identified two main drivers that influence geofencing results:

- a) Economic situation: this driver reflects the economic situation in general, and in particular for the specific market in which the company is operating. It is an exogenous variable.
- b) Implementation correctness: this driver reflects the capability of the company to set a correct geofencing approach, leveraging on the parameters of implementation and in the ability to create messages able in converting alerts to action. This is an endogenous variable.

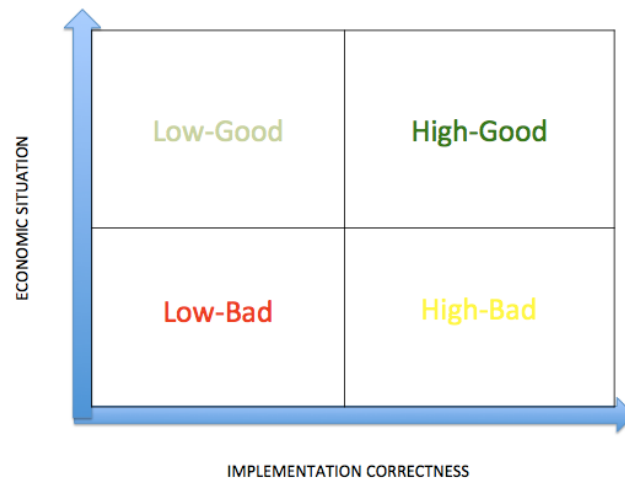


Figure 4.18 – Outline of the different scenarios [Personal elaboration]

From this graphic we can identify four different possible scenarios to use in a sensitivity analysis:

1. Low-Bad: Low implementation correctness and bad economic situation
2. Low-Good: Low implementation correctness and good economic situation
3. High-Bad: High implementation correctness and bad economic situation
4. High-Good: High implementation correctness and good economic situation

Factors that are more sensitive to different scenarios are: number of opted-in, conversion rate and average expenditure per coupon.

We didn't find a logic relationship between scenarios and cannibalization; in other words cannibalization, according to our evaluations, doesn't depend on implementation correctness and economic situation.

Number of opted-in depends on the implementation correctness, if it is low we have at the same time less new subscribers because bad word of mouth and more opted-out because technical problems and low level of satisfaction.

Conversion rate varies according to the implementation correctness and the economic situation. Average expenditure per coupon varies on the basis economic situation; in a bad economic condition customers tend to spend less than in a good economic situation. A higher AACRPC, always within the maximum established annual threshold, is an indication of a correct implementation because for example it is due by the right location of the fence.

We did a qualitative analysis using 0 if there is no influence; +1 if there is a positive influence and -1 if there is a negative influence.

4 Empirical analysis: Geofencing

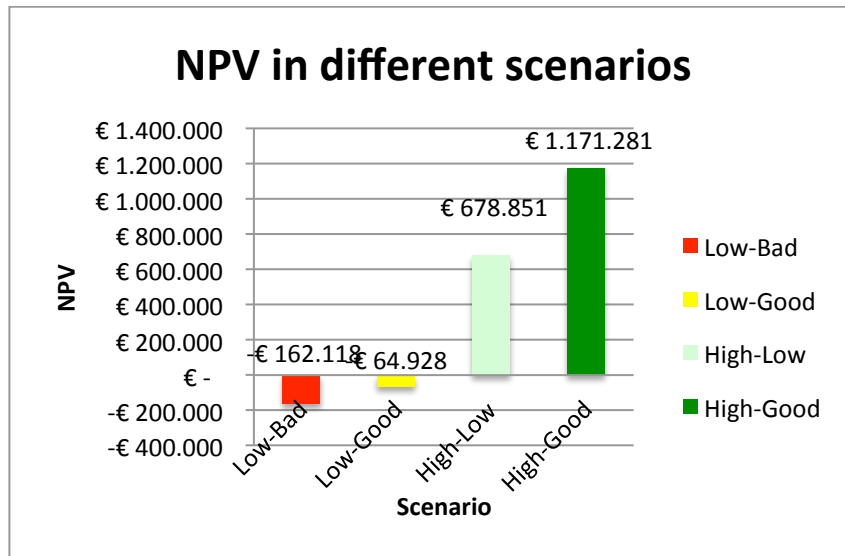
	Low-Bad	Low-Good	High-Bad	High-Good
# Opted-in	-1; 0	-1; 0	+1; 0	+1; 0
CR	-1; -1	-1; +1	+1; -1	+1; +1
AEPC	0; -1	0; +1	0; -1	0; +1
AACRPC	-1;0	-1;0	+1;0	+1;0

Figure 4.19 – Qualitative analysis of critical factors depending on scenarios[Personal elaboration]

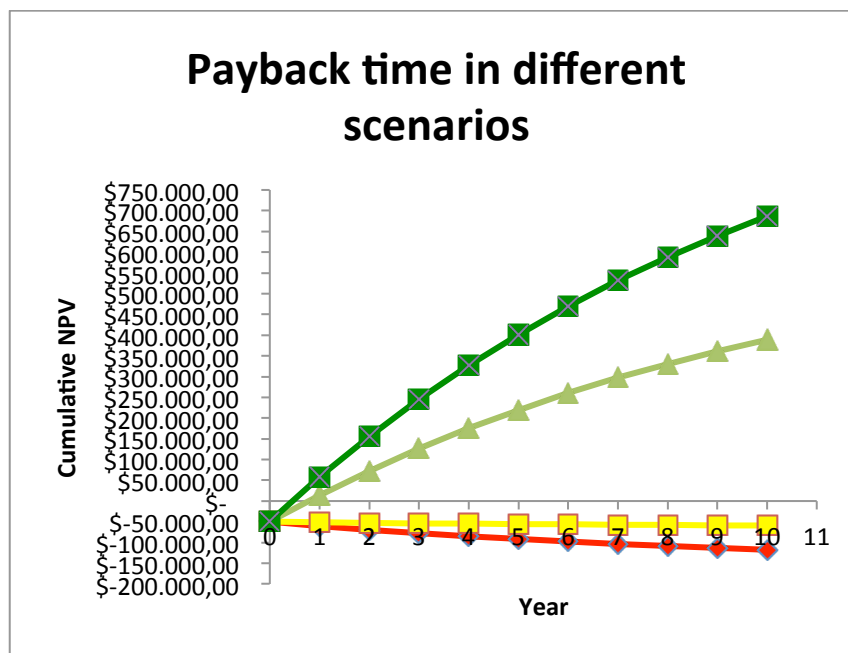
The results are the following:

	Low-Bad scenario		Low-Good scenario		High-Bad scenario		High-Good scenario	
	0 year	1st year	0 year	1st year	0 year	1st year	0 year	1st year
Inbound CF	\$ -	\$ 49.392,00	\$ -	\$ 58.800,00	\$ -	\$ 131.084,80	\$ -	\$ 178.752,00
Revenues from Geofencing (RAG)	\$ -	\$ 88.200,00	\$ -	\$ 105.000,00	\$ -	\$ 234.080,00	\$ -	\$ 319.200,00
gross profit	\$ -	\$ 61.740,00	\$ -	\$ 73.500,00	\$ -	\$ 163.856,00	\$ -	\$ 223.440,00
Gross profit with cannibalization	\$ -	\$ 49.392,00	\$ -	\$ 58.800,00	\$ -	\$ 131.084,80	\$ -	\$ 178.752,00
# opted-in		500		500		800		800
Average annual coupons received per person		14		14		19		19
#coupon sent		7000		7000		15200		15200
Conversion rate		18%		20%		22%		28%
Annual coupon used		1260		1400		3344		4256
Average expenditure per coupon		\$ 70,00		\$ 75,00		\$ 70,00		\$ 75,00
COGS %		30%		30%		30%		30%
Cannibalization factor		20%		20%		20%		20%
TOTAL COST	\$ 50.000,00	\$ 60.245,00	\$ 50.000,00	\$ 60.245,00	\$ 50.000,00	\$ 60.532,00	\$ 50.000,00	\$ 60.532,00
Implementation cost	\$ 50.000,00	\$ -	\$ 50.000,00	\$ -	\$ 50.000,00	\$ -	\$ 50.000,00	\$ -
Annual lifetime cost	\$ -	\$ 60.000,00	\$ -	\$ 60.000,00	\$ -	\$ 60.000,00	\$ -	\$ 60.000,00
Cost per total SMS	\$ -	\$ 245,00	\$ -	\$ 245,00	\$ -	\$ 532,00	\$ -	\$ 532,00

Figure 4.20 – Results of the sensitivity analysis per different scenarios [Personal elaboration]



Graph 4.14 – NPV of different scenarios [Personal elaboration]



Scenario	PBT (years)
High-Good	0,46
High-Bad	0,78
Low-Good	∞
Low-Bad	∞

Graph 4.15 – Payback time in different scenarios [Personal elaboration]

From this analysis it seems possible to affirm that the scenarios characterized by good implementation correctness give back positive NPV and shorter payback time, within the first year. The other scenarios characterized by low implementation correctness give back to negative NPV and infinite PBT.

It is possible to conclude, in this sense, that a correct implementation is the prerequisite to have positive results from the investment in geofencing; in fact also in the scenario High-Bad where there is a negative economic condition we have positive results.

Further on we affirm that in a good economic condition both NPV and Payback time have better value respect to the correspondent scenarios in a negative economic condition, even if a company can have positive results also in negative economic conditions if it implements geofencing correctly.

As already said in the conclusion of the factor sensitivity analysis in order to have better good results we should test the results on different scenarios starting from a real case study.

5 Conclusions

This last chapter includes the conclusion of this research. It is divided into two sub chapters: the first one dedicated to the general analysis of multichannel and technological innovation, and the second one related to the specific analysis of geofencing. Each chapter includes the results of our research, the possible future research and the limitations of our analysis.

5.1 General conclusions

The results from this research showed that retailers are trying to change their physical stores in order to avoid the decrease of their performances caused above all by the economic downturn, the rising of pure players competitors, the sales' cannibalization between channels and the increase of customers' expectation and power.

We think that brick-and-mortar store will be, even in the future, the reference channel for customers. The physical store is going to be integrated with other channels in order to offer a seamless integration shopping experience to the final customers. It is going to be also empowered with technological innovations able to offer customized solutions and to serve consumers in a better way, in order to create superior value that goes beyond satisfying customers' basic needs. As our analysis shows, multichannel and technological innovations aim at increasing merchant's efficiency and effectiveness.

We focused the incoming revolution of brick-and-mortar stores through the analysis of in store technological innovations and multichannel strategy that are creating new ways of interaction between physical store and final customers.

The state of the art of innovation technologies shows that many and different innovations were developed and they were introduced especially in USA, UK, Japan and South Korea. It is possible to affirm that the adoption degree of each innovation is different from geographical area and sector, in fact some of them fit well in a particular sector. The sectors that showed the highest level of innovation introduction are the apparel and the grocery one.

The evolution of physical store through the introduction of innovations is a phenomenon that increased in the recent year, and it is going to in the next years. For this reason, actually, there is a few numbers of scientific researches on this issue given the high degree of novelty; and the majority of data and information comes from the analysis of consulting papers, companies' websites, articles of experts and videos.

Interesting future researches could be done on our list of innovations, making for example a census on the use of each technology between merchants in a

specific sector across countries. In this way it should be possible for example evaluating the innovation degree of grocery sector in Italy respect to the UK's one, and assessing possible changes over the time. Alternatively it is possible to assess the performances coming from the introduction of a particular innovation basing this analysis on real case studies.

The same considerations could be done for the multichannel models, even if with multichannel it possible to find more information and research studies, since this issue is more consolidated and it has been much more treated.

Multichannel strategy seems to be the right way for B2C firms to offer a seamless experience to their customers and to attract new ones. It is not easy to implement a good multichannel strategy because it needs time and money and they could be wasted if the purpose is not clear. In our analysis we wanted just to classify the different multichannel models utilized by store without entering into to many details, just a small description with the main advantages and drawbacks is proposed.

To conclude we analyzed how the two perspectives of technological innovations and multichannel models can be integrated each other; this trough the identification of all the technological innovations that enable and support a multichannel model.

A first result coming from this analysis shows that most of the technological innovations that enable multichannel paths are based on the use of mobile devices, and in particular of smartphone. Examples of these are: windows shopping wall, shadow QR code, QR code window's store, mobile augmented reality, geofencing and mobile point of sales. There is also a small group of hardware innovations able to support a multichannel approach like for example kiosk and browse&order hub.

The major trend, anyway, is based on the implementation of jointly solutions implying the use of mobile devices. This trend is expected to increase given the continuing diffusion of smartphones and their evolution in a unique multipurpose device used as info search instrument, digital wallet, communication instrument between customer and merchant also on social networks.

5.2 Geofencing conclusions

We found different typologies of in store innovations that work in different ways, with specific peculiarities. For this reason, in order to assess all real potentialities coming from the investment in a specific innovation, it is necessary developing dedicated models able to evaluate its performances and to assess its economic value. In particular it is complicated to assess the value of an investment in a new technology that has a strategic impact; since it has

probably non-monetary benefits and it results complicated to quantify the future cash flows.

We decided to analyze in detail “*Geofencing*” as an example of innovation than enhance multichannel paths.

We provided a general model able to evaluate the investment in geofencing, independently from the type and sector in which merchant operates. Once defined the specific model able to assess all the cash inflows and outflows, we evaluated the investment in geofencing in a basic case through the use of ROI, NPV and payback time.

We performed a two steps sensitivity analysis: the first step was based on factors and the second one was based on different scenarios.

In the first sensitivity analysis we identified some critical factors able to influence more the geofencing results: the number of subscribers, the average messages received by each person, the conversion rate, the cannibalization factor and the average expenditure per coupon.

The capability to reach desired results from a geofencing campaign depends on a multitude of factors, like for example the economic condition or the company’s ability of having a correct implementation of geofencing service, setting all the implementation variables in relation to its strategy. These factors are able to influence some variables composing the evaluating model like conversion rate, average expenditure per coupon and others: this brings to alternative scenarios represented in a sensitive analysis. From the results of this scenarios sensitivity analysis it seems that a correct implementation is the prerequisite to have positive results in terms of NPV and payback time from the investment in geofencing. In fact also in the scenario High-Bad where there is a negative economic condition we have positive results from geofencing. Further on we affirm that in presence of a good economic condition both NPV and Payback time have better value respect to the correspondent scenarios in a negative economic condition.

Possible future researches can show, considering different samples, how some factors like for example conversion rate or average expenditure per coupon vary across sectors (i.e. apparel, beauty in a given country).

It should be possible also analyzing how a specific variable like the conversion rate changes in function to a specific condition like the economic situation. From this analysis it is possible raise different considerations, like the conversion rate could be less sensitive to economic downturns in the beauty sector respect to the apparel one.

It is important to underline the fact that is not possible to compare geofencing results coming from different merchants in terms of sector, dimension and strategy, only results coming from similar companies can be compared.

We built the assessing model of cash inflows and outflows from a deep analysis and study of the geofencing working principles. Anyway it is important to highlight some limitations of our model that come from the fact that results of the basic case, and of the sensitivity analysis are not based on a real case study, but in part they come from data raised by real cases and in part from estimated data. For this reason even if they are reasonable it should be necessary to test the model basing it on real cases.

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