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Migration from multi channels to Omni-Channel: A multi-touchpoints approach in online retail shopping

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ABSTRACT

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Migration from multi channels to Omni-Channel: A multi-touchpoints approach to online retail shopping

Master’s Thesis

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Keywords: Touchpoint, Omni-Channel, Clothing, Online, Augmented reality, Virtual reality, Haptic

With the advent of online means of communication, businesses growth has accumulated considerably. Nowadays, businesses take advantage of various channels such as handheld devices, web applications, computers, screens, and etc. along their physical locations to offer diverse services. This has facilitated customers access to information and reviews regarding each product to aid them in making more informed decisions than is feasible. The goal of this research is to figure out how we can make consumers experience seamless and consistent among online channels. Then, they would have a similar experience in online clothing stores in comparison to physical clothing stores.
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1 INTRODUCTION

1.1 Background

Emerging technologies is facilitating the advent of technological communication channels which results in the creation of "digital channels" (Straker, K. (2015)). Many traditional fashion stores are extending into multi-channel contexts engaging customers, both in stores at physical locations and digital channels (Lee, Huang, Evans, Kim, 2015). However, creating the same experience as customers have in fashion retail stores in digital channels is challenging.

Retail stores let consumers touch and interact with their products, communicate with others in the shop, and get instruction from staff. Consumers can use available catalogs to look into detailed information about products while their online channels allow their consumers to read reviews. Likewise, stores can disperse promotions through offers via mobile platforms (Grewal, 2017).

Retailing experienced dramatic changes during the last twenty years as of emergence of online channels and uninterrupted digitalization. In particular retail stores, the online channel has dominated and can be considered disrupting growth (Verhoef, 2015). However, online channels can refine customer experiences in various ways and impact branding of businesses. According to (Karakaya, 2010), customers who are involved substantially in online activities are vastly inclined to select "brands/companies" regarding the online experiences they and others had.

To achieve success, retailers should let their business models to advance and implement seamlessness in shopping experiences and promotions (Grewal, 2017). Many retail shops have multi-channels (MC) such as web and mobile platforms. To keep consumers engaged, businesses adopt MCs such as social media, web and so on, this is called MC. Despite having MC, they are not essentially concentrated on maintaining seamless or consistent message among multiple touchpoints (MT).
Conventionally, resources in mobile services are used to design the communications among people and computers with separate and individual touch-points yet those touch-points are produced by a single channel. From marketing and purchasing point of view, users may use various sources of data to assist their purchase decision such as reviews in online channel or views of other people (Qin, Law, & Clemmensen, 2016). Purpose of MT is providing multiple touchpoints in different stages of the consumers purchase decision.

(new paragraph)

Omni-channel (OC) concept is meant for bringing consistency and seamlessness among those channels. To grasp an easy understanding of OC, it could be defined as MC implemented correctly. It consists of viewing the “multi-channel experience” in user’s perspective, as a result, it is “seamless”, “integrated”, and “consistent” (Howell, 2014). Therefore, it refines customer’s experience among all channels whether online or on-site.

In this thesis, I conducted research about multi-touchpoints (MT) approach toward online clothing shopping. New technologies such as Virtual Reality (VR), Augmented Reality (AR), and other sensory devices have enhanced user’s experience in a dramatic pace. Brick-and-mortar stores always had the advantage of interacting with the products such as looking at them from different angles and feel the material. However, the advent of new sensory devices reduced the gap between on-site and online stores. Looking at objects in various angles absent in homes with the help of technologies such as VR and AR by interacting and rotating could be considered an example.

1.2 Research questions

To fulfill the research purpose, in this thesis, the following questions are answered.

- What are the challenges of Omni-channel in clothes shopping (Grewal, 2017)?
- What are available technologies for creating a seamless and consistent experience among all channels?
• What is an ideal model for a consistent and seamless Omni-channel enabled clothes online shopping?

1.3 Research Method

In this research, I have concluded qualitative research on how to implement Omni-Channel among different channels of clothing stores using the MT approach.

The first part of the research includes literature reviewing and information gathering. The first phase of the research is started by reviewing the literature to collect relevant information regarding Omni-channel, challenges, information about the fashion industry and culture-related information.

Later in the research, I conducted surveys to gain an understanding of current conditions and specific information about shopping habits in different cultures.

Finally, I have proposed a model on how to design channels to be developed with consistency and seamlessness and developed a prototype to illustrate how AR can be used to enhance user experience.

1.4 Goals and delimitations

This research provided a proposed model for clothing stores to create a consistent experience to enhance their consumers experience thus increasing profit and value through both of their physical stores and online channels.

There are limitations to implement OC in retail shopping such as inaccuracy of available technologies and the cost of obtaining devices that are capable of reflecting haptic feedback for customers which present some challenges. Lack of texture haptic feedback on smartphones limits possibilities to streamline channels and consumers might not be inclined to obtain separate devices for such purpose.
1.5 Structure of the thesis

This section discusses the structure of the thesis. This thesis is divided into five chapters and each chapter will be explained briefly. The information in chapter 2 was obtained by conducting a literature review. This chapter explains different retail sales channels in an evolutionary order to understand the problem.

In chapter 3, the results of a survey that was conducted are shown and explained. Seventy-six participants responded to the survey.

In chapter 4, OC migration requirements and challenges were studied using literature review. Challenges involved in OC integration is described in section 4.1. In section 4.2, requirements for migrating from MC to OC is explained.

In chapter 5, a model is proposed based on researched data and a prototype is developed accordingly to illustrate the idea.

Finally, in chapter 6, the findings of the research and possible future works are explained.
2 RETAIL SALES CHANNELS

Retails stores mainly concentrate on physical channels to sell products but also use non-physical channels to promote or sell their intended products.

2.1 Brick and Mortar stores

Consumers might be unwilling to purchase using the internet because of its possible risks such as a probability of “credit card fraud” or not being able to touch and feel (Keng Kau, 2003). Touch and feel experience available in on-site stores is a challenging experience to recreate in other channels. That’s what makes on-site channels more attractive to customers than other channels.

Another challenge that is associated with other channels is the feasibility of financial fraud that demotivates customers to purchase clothes online. Some online consumers prefer to purchase goods from producers that they are acquainted with. Eighty percent of customers that purchased clothing online during earlier six months tend to shop on websites which are run by established stores (Welling, 2000).

2.2 Online

Online channels introduce many possibilities for retail stores to expand their business and accessibility. The advance in technologies has facilitated ways that customers could engage with their favorite brands and purchasing processes. As stated by (Forrester, 2015), sales by online retail stores in the US will extend to $480 billion in 2019. Moreover, more people have access to online means nowadays that used to be in the past.

Increase in online activities are not only limited to youths but older adults are also incrementally engaging in online activities as well. As mentioned in (Lian & Yen, 2014), the highest rise in online activities belonged to the age group of adults over 74 years' old
centered on data comparison published in 2008 and 2010 specifies increase from 4% to 16% which is significant. Such potential of online channels should be considered when decisions are made by retail stores.

2.3 Mobile

With the advent of smartphones, businesses have started to take advantage of it to promote their profits and retailers are no exceptions. There has been rapid progress in mobile since the late 90s. The mobile phones are used for far more than communication nowadays (Kiba-Janiak, 2014). However, research regarding fashion retail stores is rather rare while two billion people in the world have smartphones according to (Dedicated followers of m-branding fashion: Retail apps are playing a big part in promoting and selling products. 2015).

According to (The Economist, 2012), handheld devices will dominate trading by 2020 by taking advantage of Near Field Communication (NFC) and "geographic positioning". Retailers need to take a critical step in developing their mobile channels. There has been a 359% increase in smartphones browsing time than only a 4% increase in desktop browsing time (Dusto, 2014).

Therefore, improving mobile channels for retailers is critical. One of the ways that retailers have taken advantage of mobile channels was to introduce promotions through mobile phones. Use of mobile coupons has been increasing by retailers by distributing coupons to client's handheld devices digitally commonly in Short Message Service (SMS) form. The coupons can be redeemed while purchasing by receivers (Dickinger and Kleijnen, 2008). There are many ways to improve the applicability of these channels to make them more attractive to their consumers and therefore increase their profits.

For instance, Hesburger has provided a way to motivate its customers to use its mobile application. Hesburger offers coupons through its app in which customers can get discounts whether by paying in advance with their mobile phones or showing a Quick Response (QR) code at the counter on their mobile phones. Customers are able to locate
nearby restaurants using their phones and even have discounts specific to that branch. This has provided the customers’ ease of locating and purchasing meals and discounts incline them to choose that restaurant over others (Hesburger, 2018).

2.4 Multi-channel

Every channel alone has its strengths and weaknesses but by combining them we could remedy the weaknesses and amplify the strengths. Brick and mortar stores possess touch and feel the experience that cloth shoppers consider important for making purchase decision while online and mobile channels offer a wider range of clothing choices and more convenience.

By introducing online and mobile channels to traditional stores, we are able to reduce the gaps among them and therefore, boost their business value. Each channel offers distinct value and if combined appropriately, it can magnify strengths and reduce weaknesses. As we discussed before, some consumers are reluctant to purchase clothes online because of the feasibility of financial fraud. In the MC approach, consumers can purchase goods from the store they trust using the channel they are comfortable with.

Fashion industry’s e-commerce is facing the burden of lack of in-store experience such as touch and feel according to (Mintel Press Team, 2011). Assessing Quality of goods is difficult due to the absence of tactility available in brick and mortar stores (Citrin, 2003). However, with recent developments in multi-touchpoints technologies, such barriers are being removed and lines between online and offline shopping are being blurred.

2.5 Omni-channel

Multi-channel systems are often composed of disconnected channels implemented by retailers to meet quickly changing e-commerce world and Information technology (IT) (Saghiri, 2017). Channels functioning separately generate disintegrated supply chains and
have difficulty in delivering consistent customer experience (Saghiri, 2017). Omni-channel
tries to solve this problem by delivering seamlessness, consistency and more trustable
services by taking advantage of technologies through all channels.

In Omni-channel, customers might begin from one channel and can continue in another
channel (Howell, 2014). To illustrate, Apple has implemented a feature called continuity in
which users can start writing an email on their iPhones and continue writing on another
device such as iPad or MacBook (Apple Support, 2018). Therefore, it creates a consistent
and seamless experience for the customer.
3 SURVEY RESULTS

3.1 Introduction

The purpose of this survey is to collect information about feasible customer preferences and parameters that could affect their purchasing decision (survey questions are available in Appendix A). In this questionnaire, eleven questions are asked from the participants, six of which are related to experience, and the other five questions are about personal information excluding identity information to maintain the anonymity of the survey. However, asking questions about gender and age estimate of participants are relevant to the research, thus it was necessary to include them, but participants were given the option not to mention their age estimate and/or gender.

In this survey, 76 respondents participated, 53 percent of which were male participants and 47 percent were female participants (figure 1). The participation between male and female participants was quite close which is a positive result for this research.

![gender chart](image)

**Figure 1 – gender chart**

Majority of participants were young. Eighty-five percent of the total number of respondents were among the ages between 18 to 35 years old.
Different nationalities have participated in this survey in which the majority of them were from Iran, Russia, and Finland. Respondents from twenty different nationalities have answered the questionnaire as shown in figure 3.

Majority of respondent's education level was in graduate level. Fifty-five percent of participants were of graduate level as shown in figure 4.
3.2 Online shopping

3.2.1 Introduction

In this survey, two questions were asked to assess participants' experience regarding online shopping. In the following, you will find the interpretation of the results.

3.2.2 Challenges

In this question, we asked participants to prioritize their challenges when it comes to shopping online. Participants were asked to order the common challenges according to their own experience. Results of this question will help me design the desired system accordingly. You can see the overall result in figure 5.
According to figure 6, the majority of respondents considered visual sense as their most challenging experience making it the most critical aspect to consider while designing online systems for clothes shopping. For many people, the appearance of clothes are the main drives for purchasing the product. In online shopping, shoppers can see product photos but not a full sense of it as the photos are two dimensional and unable to see them from different angles as well as not being able of trying the clothes on. Therefore, almost fifty-eight percent of respondents considered visual sense as their most challenging experience and nearly thirty-seven percent considered it as their second most challenging experience.
Majority of respondents considered touch experience as their second most challenging experience as presented in figure 7. Feeling the material of the clothes gives a sense of quality to the shopper. However, implementing such a feature for online channels were always a challenge but in recent years’ considerable progress has been made. Thirty-eight percent of respondents considered touch experience as their second most challenging experience, nearly sixteen percent as their most challenging experience, and thirty-one percent of them ranked it as their third most challenging experience.

Figure 7 – Second priority (76 participants)

The cost was considered the third most challenging experience among respondents. Buying online gives a customer a variety of choices but often the shipping fee is high especially if the product is being shipped from overseas. More than twenty-six percent of respondents considered cost as their most challenging experience and more than twenty-two percent as their second most challenging experience.
The smell, on the other hand, was of lesser priority for participants as none considered it as their most challenging experience and lesser than three percent considered it their second most challenging experience. Nearly seventy percent of participants reflected it as less important. Consistent with this survey, people rarely consider smell as an important factor.
However, the results differ among female responders and male responders slightly. Female respondents tend to value touch experience more than the cost while male counterparts prefer cost over the touch feeling as shown in figure 9 and 10.

Figure 9 – Survey result for online shopping challenges according to female respondents.

Majority of female respondents considered cost as their third priority, while the majority of male participants considered cost as their first or second priority. Furthermore, more women considered visual experience as the most challenging experience than men by more than ten percent difference.

Figure 10 – Survey result for online shopping challenges according to male respondents.
3.2.3 Reviews impact on purchase decision

The average ranking was 3.75 out of 5 indicating that majority of respondents believe online reviews does impact their decisions to at least some extent. Participants were asked to rank the impact of online reviews on their purchasing decision from one which is a lesser impact to five that is the highest impact on their purchasing decision.

![Chart for impact of online reviews on purchasing decision](image)

According to the survey, sixty-eight percent of the participants ranked it above three which indicates higher impact of online reviews on their purchasing decision, seventeen percent considered online reviews somewhat effective. However, fifteen percent ranked impact of online reviews less than three meaning online reviews would have a lesser impact on their purchasing decision.

We can conclude that online reviews play an important role for customers purchasing decision making it an essential factor to consider while designing different channels of clothing stores. However, in offline channels, implementing reviews does not have a straightforward solution. Though, if implemented, shoppers can review the clothes even without purchasing the product.
3.2.4 Purchase decision influence parameters

Survey participants were asked to prioritize parameters that influence their purchasing decision. Parameters that were considered in this survey included production location, manufacturer, delivery time, design, quality, and price. In total, the majority of respondents considered quality as their first priority when making a purchasing decision.

![Figure 12 – Purchasing decision parameters overall chart](image)

According to survey results, the majority of respondents chose quality as their first and second priority when purchasing online as seen in figure 12. Measuring quality in online channels mostly rely on reviews received by customers who purchased and received that product earlier. As mentioned earlier, the majority of respondents considered reviews with a high impact on their purchasing decision. Though reviews help shoppers decide, it does not give them a sensible feel of product's quality.

Among the top three priorities, quality, and design received the most attention. However, in the same categories, the price received considerable attention. Thirty percent of participants considered price as their first priority, and thirty-three percent considered
price second priority. Delivery time, manufacturer, and production location were ranked as the fourth, fifth, and sixth priority in order. However, priorities were marginally different among male and female participants.

Figure 13 – Highest ranked purchasing decision parameters chart for female participants

Giving survey results, slightly more female respondents considered price their first priority rather than quality (figure 13) while significantly more male participants considered quality as their first priority as shown in figure 14.

Figure 14 – Highest ranked purchasing decision parameters chart for male participants
Additionally, participants were asked to rank the likeliness of purchasing clothes online. In this specific question, respondents were asked if they have encountered a cloth that they desired to buy but not the right size or color, and if so, whether they would buy the clothing online if appropriate one was found. Majority of participants were more inclined to buy the product if they haven't found the desired in on-site store but in the online store. In average, this question received 3.16 out of 5, one being the least likeliness, five being the most likeliness. Thirty-three percent are less likely to make the purchase while sixty-seven percent are more likely to make the purchase as shown in figure 12.

![Figure 15 – Online purchase decision chart](image)

### 3.3 In-Store

#### 3.3.1 Introduction

Customers experience in brick and mortar stores is quite different from online experience. For example, giving feedback in the on-site store is mostly about the overall experience of customers rather than specific products. Besides, in on-site stores, different parameters impact customer's experience compared to online stores such as interaction with the
store's staff. To assess participants, we asked them to prioritize in-site experience challenges that occurred to them.

### 3.3.2 Challenges

In the survey, respondents were asked to prioritize challenges that they faced during shopping in-store. The options were chosen based on literature review and are as follows: Availability, information on clothes, and cost. (Vasiliu, 2015)

![Figure 16 – On-site challenges](image)

As seen in figure 13, availability was ranked as first by the majority of respondents. Having different styles and colors of clothes is challenging as supplying every kind is costly and inefficient in brick and mortar stores while in online stores, as supplying does not necessarily have to be concentrated in one place, availability is less challenging.

Thirty-two percent of participants ranked cost as their first priority and fifty-one percent as their second priority. Due to the higher cost of supplying products in brick-n-mortar stores, products tend to have a higher price than their online counterpart.

However, it is possible to blur the lines between online channels and on-site channels if Omni-channel implemented among them correctly. If online was integrated with on-site...
channels, retail stores would only store most sold clothes and consumers whom could not find what they were looking for in retail stores, can shop for clothes on-site using their online channels and either pay with their bank card or by cash at the counter.
4 OMNI-CHANNEL

4.1 Challenges

Omni-channel retailing’s (OCR) purpose is to streamline multi-channel retailing (MCR) models in an approach which represents consumer’s requirements in an incrementally technology-dependent world. However, integrating multiple touchpoints intricacies and insufficiency of paradigms of best practices means high risks (Larke, 2018).

“Complete data integration (CDI)” or a joined, solo view of the consumer through channels would be the ultimate position for a company (Neslin, 2006). As argued by the article, the ultimate database would be the one that displays every phase of the process of deciding by the customer. In online channels, it is feasible to observe every interaction customer has, therefore, making it conceivable to assess every step of the purchase decision making process. However, in brick-and-mortar stores, customers shop without providing information regarding identity (Neslin, 2006).

However, concerns increase when there is tighter integration among online and offline communication channels regarding data security (Chen, 2018). With the rise of the internet, different ways of committing fraud have come to light. According to (Riquelme, Román, & Iacobucci, 2016), customers’ concerns regarding deception seems to be developing. Such incidents can be damaging to retailer’s reputation and it could be damaging its sales rather than boosting them.

Implementing MC and later OC is associated with different types of costs such as delivery, development and maintenance costs. Customers often purchase goods online in small quantities and such small transactions need to pick up and packaging operations that have higher costs either in forms of workforce intensity or if mechanized, in form of “high capital investment” (Ishfaq, 2016). It can be restrictive for a number of online retailers to open nation-wide stores (Zhang et al., 2010). Development costs are not only limited to online stores, but on-site stores are also subjected to such costs but rather for services like development and maintenance related to web and mobile applications. Brick-and-mortar
stores in order to migrate to MC and eventually to an OC environment, need to develop online channels and to do so, they need to either recruit developers or outsource them which both will increase their expenditure. Furthermore, they need to maintain different channels by increasing their workload and complexity.

4.2 Multi-channel to Omni-channel

To migrate from MC to OC in clothing stores, several aspects have to be considered. Different human senses must be considered when OC is being implemented such as visual and touch senses are of most importance based on the surveyed data.

There are ways to achieve OC considering different senses mentioned earlier. In recent years, different technologies have eased simulation of different senses through online channels such as augmented reality (AR), virtual reality (VR), haptic devices, and even devices that simulate smell or taste.

We will introduce haptic and visual technologies in this section and later will discuss how to integrate haptic and visual technologies together to create consistency and seamlessness among different channels.

4.2.1 Visual

There is a higher tendency to return goods while shopping online by consumers according to (Shaw, 2015). People return goods more specifically because of color, shape, and size according to the report. All of these attributes are assessable through a sense of vision. However, looking at two dimensional photos cannot reflect the full experience in regard to clothing. Users tend to interact with the product, look at it from different angles, and most importantly, try it on to see if the clothing fits and suits them well. Majority of survey respondents considered visual sense most challenging experience when it comes to online clothing shopping (figure 5).
Remedying such challenges requires adaptation of new technologies such as extended reality (XR) which enables us to interact with virtual objects. VR and AR are often grouped as XR according to (Rubin et al., 2018). Such technologies can enhance different aspects of our lives and contribute to industry processes improvement. In the following paragraph, the definition and applications of VR is explained.

According to Mariam-Webster dictionary, VR is an artificial ecosystem that is experienced through “sensory stimuli” like visions and sounds delivered by a computer and actions of a person decides what occurs in the ecosystem (“Definition of VIRTUAL REALITY”, 2018). An example of VR application in medical treatments is rehabilitation. As seen in figure 17, a “trans humeral amputee” controls a virtual hand using pattern recognition of the “myoelectric activity recorded on the surface of the subject’s stump” (Ortiz-Catalan, 2014). VR can considerably enhance medical treatments, but its applications are beyond the medical field. VR is used in behavioral sciences, training, tourism, and other areas as well. (Peckmezian, 2015; Schwebel, 2016; Reynolds, 2017). Contrary to VR, AR overlays virtual objects and data simultaneously on real-world views (Marr, 2018).
Definition of the word “augment” is to supplement, expand, or improve and it can be comprehended as a form of VR in which the real world is extended or improved by usage of virtual elements, often coating those elements on the scenes of the real world by using a visual device (Fisher, 2018).

4.2.2 Haptic

Survey data suggest that participants consider touching their second priority among challenges regarding clothes online shopping making it critical to consider while developing online clothes channels. Hurdles to touch feeling prevents gaining information through haptic, therefore, decreasing confidence in assessing products for high need for touch (NFT) consumers in comparison to low NFT consumers (Peck, 2003). In on-site stores, shoppers are able to touch and feel the clothes texture and make a more informed decision when purchasing. Quality is partially perceived through touch by consumers. Developing the feeling of touch was not feasible in online until new haptic technologies emerged.

People study the world through interaction, much of which is mostly eased by a sense of touch (Wallraven, 2014). Haptic technologies can improve the virtual environment (VE) by adding the touch sense (Gonzalez-Badillo, Medellin-Castillo, Lim, Ritchie, & Garbaya, 2014). The usage of Haptic interfaces is meant to generate a kinesthetic or tangible stimulus of the collaboration amid a user and a VE (Dang, Vermeiren, Dequidt, & Dambrine, 2015).

An example of a haptic technology application is Tanvas technology. Tanvas technology’s goal is to generate virtual touch on electronic devices (“About – Tanvas”, 2018), which can facilitate implementing texture touch feeling. Users, therefore, are able to experience the product’s texture which can assist them in making their purchasing decision.
5 PROPOSED MODEL

5.1 Online

Consumers in fashion industry choose on-site retail stores often because they have the ability to experience the product. Consumers tend to put on clothes to measure the size, texture, and the style in which are easily feasible in physical stores. However, creating such experience in online channels requires integrating different technologies into one application.

Most challenges in online fashion shopping include product multi-dimensional vision and touch experience available in physical locations but challenging in online counterparts and according to surveyed data, participants believe these attributes are considerably important. To tackle these issues, visual technologies such as AR or VR, and haptic technologies can be used. To create a unified experience in different channels, it is required to integrate different technologies into one application in a way that preserves the simplicity of it simultaneously.

Creating an application compromising all these features at once is puzzling. It means that, AR/VR and haptic feedback need to be fused into one application and yet be easy to interact. Adding more tabs, buttons, or screens in the application requires more attention so that it does not complicate it to use or find as users need to find the features handy and would not need the training to use them. It is, therefore, recommendable to integrate the features into most relevant parts of the application and not to clutter it with many options.

One way of avoiding complicating the application is to blend features such as haptic feedback into existing features. For example, the haptic feedback can be blended into images of the product. Users are able to touch the texture of the clothing from the image to get a near authenticate feeling of product quality and yet preserve the simplicity of the application. Incorporating AR or VR in the application while avoiding muddling and cluttering the application presents more challenges.
Integrating VR or AR in the application, adding more screens and buttons seems inevitable. Yet, it is possible to make it seamless and easy to use by rethinking the application design. It requires personalization based on user’s characteristics and preferences. Therefore, developing the application traditionally with filters and adjustments is not preferred. When setting up the application, it is important to record user’s features and likings to further simplify the application usage. Some of the important information includes gender and body features of the end-user.

Information about end-users such as gender or body features allows for customizing characters in AR/VR and also to filter products accordingly. Features such as user’s body dimensions can allow for customizing virtual character accordingly and check clothes fittings more accurately. In the application, users can choose to put clothes of their choice on the virtual character and see how it fits and whether the clothing is the right size and style for them. Furthermore, they can combine different clothing to get a more complete sensation of how they would look. This can reduce returns resulting in lower costs for the business in the long run.

However, privacy and security must be considered when using information such as body features. As it was mentioned earlier in the OC challenges, data security is important in consumers decision making process and needs to be addressed. Information about the user’s body characteristic is sensitive data and thus need to be handled carefully. A suggestion would be to store these data locally encrypted to further protect user’s data.

Furthermore, it is recommendable to adapt user experience and products to their cultural background as well. Companies have put efforts into conquering new markets as the number of users are increasing worldwide and surprisingly much of these efforts yielded failures in favor of local substitutes according to (Reinecke & Bernstein, 2013). Stated in the paper, localization does not satisfy the traditional ambiguity of numerous users. Companies tend to design one channel per country or region in which every resident receives the same interface regardless of their cultural background. In many cultures,
people wear different styles according to their national and traditional values and therefore it is critical to consider the differences when developing the channel’s differences.

5.2 On-site

Streamlining offline channels with their online channels is as important. In in-store channels, survey participants ranked availability as their most challenging experience comparing to online channels. Unlike online channels, in-store channels face limited storage area while in online channels, this issue is resolved by distributed storages. However, it is possible to improve customer’s experience by streamlining online and offline channels.

One way is to install touch screens in the store where customers can access a variety of available clothes in retail’s online channel. By providing this option, customers can explore a variety of products if not found in the store and make a purchase decision there. This allows customers to compare items based on their features such as color and style and access variety of items not available in store.

Sometimes, customers find the clothes they are interested in but not the right size or color. This issue can be resolved by developing an application or integrating a feature in the retail’s mobile application. By including identification information on clothes such as quick response (QR) codes or bar codes, a feature can be developed to recognize the product and show a variety of it to the potential customer. Customer, then, can explore the options and select the right size or color and pay for it in the cashier or online using his mobile device.

The advantage of this against shopping in online channels includes more informed decision based on size, color, and payment options. In online channels, customers need to assess the right size and color by reading instructions and buy with uncertainty. However, in on-site stores, customers are able to fit the clothes they are interested in and order the right color, style, and/or size from the online channel. Furthermore, customers are able to pay
by cash through the cashier which is not available online and have the item(s) delivered either to their homes or to store to pick up.

5.3 prototype

5.3.1 Introduction

In this thesis, a prototype is designed for the purpose of illustration and demonstration of how such technologies can be advantageous. For the prototype, I decided to choose Augmented reality as a way to illustrate the possibilities presented in these technologies. Using the prototype, the user is capable of choosing different T-shirts and see it on a character in an AR environment. In this prototype, survey data is used to produce personas and scenarios, but names, gender, photos, and ages are random.

The idea is that users are capable of choosing clothes they desire and fit it on a virtual character in AR environment. They can explore different t-shirts and select them and then touch a button to switch to AR mode and see their chosen clothes fitted on the character that is customized to their body types and dimensions to measure size, color, and style based on their attributes. For purpose of illustration, the app is named ARECS abbreviated form of AR Enabled Clothing Shop.

5.3.2 Requirements

The application can be developed using different development tools for different platforms such as web and mobile. However, the application requires access to the camera for AR to be performed. Users must be able to login and/or register through the application with their basic information. The application would ask for user’s preferences and personal information relevant to personalization of products according to the user’s interests. Furthermore, users must be acknowledged about the possible usage of their information and critical information preferably be stored only locally.
The application will be implemented in the iOS platform using ARkit framework provided by Apple and rest API written in PHP with the lumen, a mini framework built for creating API based application.

5.3.3 Personas

Alan Cooper has introduced the idea of persona for the first time, and it refers to a model user, an example of kind of a person who will interact with the system. Basically, to have an effectual design, the system needs to be designed for a particular user and names given to personas are random and basically are untrue people which rely on one’s knowledge of real users ("Personas: An Agile Introduction", 2018).

In this section, two personas are developed based on randomly chosen survey responses but with made-up identity information such as names, ages, gender, marriage statuses with different perspectives. Creating personas will allow us to understand user needs and design the system accordingly. Therefore, the final application would be more efficient and user-friendly.

In figure 18, the person faces different challenges related to clothes sizes and styles. The character finds different clothes sizes sometimes unavailable in brick-n-mortar stores and is uncertain to choose the right size in online counterparts because she cannot try them on to see how they fit. Moreover, the person is unable to which style suits her in online channels as she is not able to see herself wearing them in front of a mirror. Therefore, it is important to consider a solution for solving these challenges when developing the application.
In figure 19, the person also struggles with size and also is frustrated with the lack of proper certification of clothes coming from some countries. The person finds different sizing units across different countries confusing and since he likes to buy traditional clothing from online channels, it is challenging for him to find clothes with the proper size. Furthermore, the person is concerned about health issues related to clothing such as allergies because of lack of appropriate certification for products shipping from other countries.
5.3.4 Scenarios

A usage scenario, or scenario briefly, explains a real-life illustration of in what way an individual or several persons or establishments interrelate with a system. They present the steps, events, and/or actions that happen during the interaction ("Usage Scenarios: An Agile Introduction", 2018). Well-written scenarios assist us to understand who the user is, what motivates them to use our service, and what the user needs from our channel (Affairs, 2018).

In this section, two scenarios are developed per each persona. These scenarios let us understand user’s motives, goals, and needs. Therefore, we can design our product accordingly to further increase the application’s usability.
Figure 20 - Scenarios for Jaana

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Needs</th>
<th>Feature</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>She is looking for dresses in a store and finds her favorite dress. However, she has difficulty finding the appropriate size and can’t be certain about the sizing of clothes in online channels because she cannot try them on.</td>
<td>Find the appropriate size of her desired dress</td>
<td>ARECS application AR capability</td>
<td>She signs up in ARECS application and sets up her preferences and physical attributes. She finds her favorite dress, selects it, and fits it on a virtual character that was customized based on her physical attributes and looks at it to measure the size and style.</td>
</tr>
<tr>
<td>Jaana is shopping online for clothes, try to find a shirt and a jean that would match each other and also her physical attributes. She finds it hard doing it online since she cannot try them on to look into the mirror.</td>
<td>Find a shirt and a jean that would match each and her physical attributes</td>
<td>ARECS application AR capability</td>
<td>She logs into ARECS application, explores the shirts and jeans, chooses a combination of them, fits them on the virtual character that was personalized, looks at it in AR environment to assess how she would look.</td>
</tr>
</tbody>
</table>

As seen in figure 20, there are two instances in which Jaana benefits from ARECS application to fit her needs. She struggles with finding the appropriate size of clothing in stores for the dress she is interested in and finds a solution to her problem by using ARECS application. Furthermore, in another situation whereby she is shopping online, she is uncertain about the style of products that she is interested and whether they would look good on her. By using ARECS AR capability, she can dress the virtual character that was personalized for her to see how she would look.

In figure 21, Ville also gets benefitted by ARECS application in two different situations. In the first situation like the persona Jaana, Ville faces the challenge of choosing the right size and takes advantage of ARECS AR capability to solve his problem. However, in the second situation, Ville faces a different challenge as he cannot find properly certified traditional clothing. So, he turns to ARECS application’s products listing to find properly certified traditional clothing.
### 5.3.5 Journey maps

A diagram which visually demonstrates the “user flow” over your channel beginning with preliminary interaction or finding and enduring within the process of engaging into lasting devotion and support is called a user journey map or customer journey map ("User Journey Map", 2018). It helps UX designers in understanding the user better ("User Journey Map", 2018). In the following paragraph, journey map terms are explained.

The journey maps defined in this section includes four categories such as “Pain point”, “Action”, “Touchpoint”, and “Emotion”. “Pain points” refers to burdens and obstacles which prevent a user from using a feature. An example of such obstacle could be the cost of the service. “Action” is how user interacts with the channel and what actions they undertake. “Touchpoint” refers to places that customers can interact within the channel. Finally, “Emotion” refers to how customers feel during each phase of the journey (Agius, 2018).

In this section, we will create a journey map per each persona to understand how users would interact with ARECS application. This allows us to further improve the mockups of the application and the design to better suit the users.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Needs</th>
<th>Feature</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ville is exploring products in an online fashion shop and a shirt catches his attention. However, he is confused by sizing units and does not know which size is appropriate for him.</td>
<td>Find the appropriate size of his desired shirt</td>
<td>ARECS application AR capability</td>
<td>He signs up in ARECS application, explores the products, chooses his favorite shirt, uses its AR capability to find the proper size of the shirt for himself by observing it on a virtual character that is customized according to him.</td>
</tr>
<tr>
<td>He is shopping online and tries to find traditional clothing from an Asian country. However, the products he finds do not provide proper certification regarding potential allergies.</td>
<td>Find properly certified traditional clothing</td>
<td>ARECS application listing</td>
<td>He logs into the application, filters product type to traditional clothes and even filters them further by the country.</td>
</tr>
<tr>
<td>Timeline</td>
<td>Step 1</td>
<td>Step 2</td>
<td>Step 3</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Pain point</td>
<td>She is frustrated in finding combination of styles that would suit her</td>
<td>She decides to register in the application, but it is time consuming</td>
<td>She tries to find clothes of her choice and faces different styles</td>
</tr>
<tr>
<td>Actions</td>
<td>Jaana finds ARECS app</td>
<td>Jaana starts the registration and fills identity information and preferences</td>
<td>Jaana exploring the products in the listing and tries to find product of choice</td>
</tr>
<tr>
<td>Touch point</td>
<td>Jaana installs the application from the app store</td>
<td>Clicks on sign up button on the application</td>
<td>Scrolls in the home page of application</td>
</tr>
<tr>
<td>Emotions</td>
<td>Negative – User is frustrated</td>
<td>Negative – it is time consuming process and confusing</td>
<td>Positive – she finds different choices</td>
</tr>
</tbody>
</table>

**Figure 22 – Journey map for persona of Jaana in the mobile channel**

As can be seen in figure 22, five phases from deciding to use the application to how the application is used by Jaana is demonstrated. From this journey map, it can be understood that Jaana might struggle with registration and trying a different combination of clothes. It gives us some clues to make improvements in the design. For example, Jaana needs to try a different combination of clothes on a virtual character, therefore, she needs to switch to AR mode several times. One way to tackle this problem is implementing a feature in which user can choose several clothes and change them in AR mode in real-time.
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain point</td>
<td>He is frustrated with finding clothes in international online shops with proper size as sizing units are different among different countries.</td>
<td>He decides to sign up in the application that requires some time to fill out.</td>
<td>He looks for shirts in the products list, and reading the details such as health information individually making it cumbersome</td>
<td>He selects different shirts and switches to AR mode to measure for every shirt.</td>
</tr>
<tr>
<td>Actions</td>
<td>Ville finds ARECS app</td>
<td>Ville starts the registration and fills identity information and preferences</td>
<td>Ville is browsing products on the application to select the clothes that he is interested in.</td>
<td>Ville switches to AR mode</td>
</tr>
<tr>
<td>Touch point</td>
<td>Ville performs the installation of the application</td>
<td>Clicks on sign up button on the application</td>
<td>Scrolls and opens products page</td>
<td>Looks at a virtual character through the AR mode in different angles</td>
</tr>
<tr>
<td>Emotions</td>
<td>Negative – User is frustrated</td>
<td>Negative – it is time consuming process and confusing</td>
<td>Positive – he finds variety of shirts with information such as health</td>
<td>Positive – The AR mode solves his challenge</td>
</tr>
</tbody>
</table>

Figure 23 – Journey map for persona of Ville in the mobile channel

In figure 23, Ville uses the application to figure out what size is appropriate for him and to get information on products health-related certification. Switching to AR mode to measure the size of shirts and opening every product to look at hygienic information was cumbersome to Ville. Therefore, it is better to store the user’s information related to his health and size is important and later the size can be converted internally and match the size of other clothes to exclude unfitting clothes for the buyer.

5.3.6 Mock-ups

A user interface mock-up includes of a single or some static images which look like the prospects of UI of the application in as many aspects as feasible (Kieser, 2018). Mock-ups are generated in digital form and mock-ups can represent what UI of the application and its functionality would look like.
In this section, a preliminary design of ARECS application is developed and through these mock-ups, we are able to perceive how the application would look and function in the future.

The first of application is a simple page in which user chooses to login if he has an account already or sign up if he is using the application for the first time as can be seen in figure 24. To register, the user needs to complete four steps according to figure 25. As can be seen in figure 25, in the first step of registration, basic personal information and credentials for identification of the user will be recorded.
In the second step of registration, users are able to customize the three-dimensional character using different inputs to better suit their own body type. Users can observe the changes to the character in real-time according to figure 26. These inputs include height, weight, chest, waist, inseam, and hips. These parameters were retrieved from body visualizer website ("Body Builder", 2019).
In the third step, users are capable of defining variants of health-related issues that they might have to further limit the products variants to make their shopping easier and more hassle-free as seen in figure 27. The user fills out information regarding his attributes and health information such as information related to materials that user might be allergic to.

![Register](image)

**Figure 27– Third step of ARECS registration mock-up**

In the last step, users are required to agree to the terms of the application to be able to use the application according to figure 28.

![Register](image)

**Figure 28– Fourth step of ARECS registration mock-up**
In figure 29, mock-up for products listing is shown. Users in this page can perform actions such as browsing and searching products in the list, add items of interest in their shopping cart, and access their shopping cart as well.

![Figure 29 – Products listing](image)

After users select their items, they can press the shopping cart button placed on the top right of the screen (shopping cart icon) as shown in figure 30. After pressing the shopping cart button, a dialog will pop up with two options of previewing the products which switch to AR mode and proceeding to checkout.
Instead of seeing their selected products in a conventional list, they can preview their selection in AR environment on a 3d character customized according to their preferences as it can be seen in figure 31. They can choose their different selections in AR mode to see how the choices fit on the character in real-time as illustrated in the interface.
As can be observed in the mock-ups, users are able to register for the application, customize the character, browse products, add them to their shopping cart and preview them in AR mode instead of conventional listed items. It is important to note that in the prototype, the issue of privacy of data was not researched and requires further assessment.
6 CONCLUSION

Retailing has experienced dramatic changes in the past years due to digitalization and is continuously expanding into MC contexts. Expanding into MC is not enough, and businesses must implement OC in their online channels. To implement OC in clothes online shopping, we needed to understand the challenges and available technologies to create that experience among channels.

To fully comprehend the issue and find solutions, we needed to answer three questions. Firstly, we needed to understand the challenges involved in creating OC in clothe online shopping. Secondly, we needed to find technologies that can assist in creating seamlessness among channels. Finally, we needed to derive an ideal model based on findings that businesses can follow to create seamlessness among their channels. In the following paragraphs, findings related to the questions are explained.

A survey was conducted to understand challenges related to developing OC for channels of clothes online shopping in which seventy-six participants answered. Those responses helped to understand challenges that shoppers face in clothe online shopping and later, used to create more realistic personas and scenarios in prototype section. Furthermore, based on survey data, we could understand participants preferences and parameters that were effective in their purchase decision.

In the research, available technologies suitable for creating a seamless and consistent experience among channels were studied. A literature review was conducted to understand existing technologies that could be used to create OC among clothes shopping channels.

Eventually, based on research done, a model was proposed to create consistency among channels. In the model, suggestions were made on how to create a user-friendly and
consistent experience between different channels. Moreover, a prototype was developed to illustrate the idea of AR-enabled online clothing store.

A similar application was developed to allow consumers to try on lipsticks before purchasing them by Meitu which is called MakeupPlus. Consumers then are able to purchase the product after they have chosen the right shade and brand. However, to extent of my research, there has not been an application to try on clothes virtually.

The sense of smell was not studied in this thesis and requires more research to further improve the seamlessness and consistency of clothes online shopping. Moreover, more research is needed to better adapt a cultural aspect in the channels and how different cultures could affect the experience regarding clothing shopping.
7 REFERENCES


16. Apple Support. (2018). Use Continuity to connect your Mac, iPhone, iPad, iPod touch, and Apple Watch. [online]


8 APPENDIX A

8.1 Survey Questions

- How old are you?
  - Options were within a range of numbers rather than exact age.
- What is your gender
  - Male
  - Female
  - Prefer not to say
- Level of Education
  - Under diploma
  - Diploma
  - Undergraduate
  - Graduate
- What is your current employment status?
  - Employed
  - Freelancer
  - Student
  - Unemployed
  - Other
- Where are you from?
- If you have encountered your desired clothe but did not find the right size or color, how likely would you buy the clothe if you could find the appropriate one online?
  - Between 1 to 5, 1 being the least likely and 5 being the highly likely
- Could you please prioritize challenges based on your experience with online clothes shopping?
  - Visual (seeing clothes from different angles, trying it on)
  - Cost
  - Smell (smell of the material)
  - Touch (ability to touch the material)
- Could you please prioritize challenges based on your experience with in-store clothes shopping?
  - Availability
  - Information on clothes
  - Cost
- How much online reviews impact your purchasing decision when shopping clothes online?
  - Between 1 to 5, 1 being the very unlikely and 5 being the very highly
- Could you prioritize your purchasing decision made while shopping online?
  - Quality
  - Price
  - Delivery time
  - Manufacturer
  - Production location
  - Design
- If you have experienced any differences in regard to clothe shopping in your country you are from vs others, if you share it with us, it would be a huge help.