

**Independent Final Report**

**The Effect of Augmented Reality for Fashion Industry's Online Sales**

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## **Certification Page**

I, Kezia Stephanie Natania (Student ID 52116611) hereby declare that the contents of this Independent Final Report are original and true, and have not been submitted at any other university or educational institution for the award of degree or diploma.  
All the information derived from other published or unpublished sources has been cited and acknowledged appropriately.

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## **Summary**

Visual Technology such as image enlargement or rotational views has played a huge role for online shopping as it has becoming an important channel for fashion retailers. It's utilized to increase online shopping experience and imitate the offline store experience. These technologies allow consumers to experience and imagine the product's functionality virtually by imitating the visual, tactile, and behavioral experiences in brick and mortar stores. Even so, many customers are still reluctant to purchase fashion items online, due to the fear of purchasing unsatisfactory products. Sometimes customers that purchase products online become unsatisfied with their purchase, thus leading them to return their items. This is not only a terrible experience for the customers who have been inconvenienced by this situation, but also a costly burden for the retailers who cover the most of return cost.

This research explores customers' response to another technology called Augmented Reality especially in the fashion online shopping. Through devices, AR technology can enhance the real world by using graphics, audio and other that might support fashion retailers to portray the offline store experience, give better visualization, and therefore assure customers to purchase the items. Three types of exploratory field research were conducted to understand the subject of this paper. The first one is interview to online shoppers, the second one is attending seminar, and the third one is store visit.

After the research, it could be concluded that the interviewees have not yet been convinced with the current Augmented Reality System. The system is still in infancy state where it will need a lot of development before users can finally be satisfied and feel helped during online shopping. Especially for fashion segments, AR developer will need to update their tracking and inserting display accuracy, include fitting tools in the system, and also considers technology compatibility for the system.

## **1. Introduction**

E-commerce has gained enormous popularity as it has helped simplify the process shopping. However, online shopping has not completely replaced the in-store experience, especially for the products that need to be touched, felt, and seen before the purchase, such as with fashion items (Lu & Smith, 2007). A duty of retailers is to provide necessary and reliable information that will help customers with their purchasing decisions so the customers can make their purchase decisions more efficiently and effectively (Park & Kim, 2003). However, the traditional methods such as 2D pictures or written descriptions are often not enough to fully explain the products in detail. Moreover, simple pictures and descriptions lead the sellers to provide misleading information about the products to the customers.

Due to the fear of purchasing unsatisfactory products, many customers are hesitant to purchase fashion items online. In addition, sometimes customers that purchase products online become unsatisfied with their purchase, thus leading them to return their items. This is not only a terrible experience for the customers who have been inconvenienced by this situation, but also a costly burden for the retailers who cover the most of return cost (Boyajian, 2017). All of these problems need to be addressed by fashion online retailers to gain customers' trust, increase customers' satisfaction, and initiate customers' purchasing decisions.

In order to bridge the gap between online and offline store experiences, online retailers have utilized technology to assist customers in visualizing the products being sold. Fashion retailers' websites are generally equipped with image enlargement, mix and match technology and rotational views of the products (Lee, Kim, & Fiore, 2010). These technologies allow consumers to experience and imagine the product's functionality virtually by simulating the visual, tactile, and behavioral experiences in brick and mortar stores. Research shows that shoppers exposed to these virtual experiences may lead to the Hierarchy of Effects model, which consists of cognitive, affective, and conative responses (Park, Stoel, & Lennon, 2008). The cognitive dimension is the dimension that develops awareness and knowledge, the affective response relates to the development of feelings and attitudes, while conative is the development of intentions that lead to the actual behavior (Lavidge & Steiner, 1961).

Augmented Reality, henceforth AR, is one advanced technology that can help fashion online retailers provide the necessary information for their customers. AR is a technology that uses graphics, audio, and other virtual enhancements on a live view of the real world (Fenn & LeHong, 2011). Through smart devices, such as smartphones, AR combines the "real world" and "digital world" and by doing so integrates the virtual image into reality (Fenn & LeHong, 2011). By implementing this technology within the fashion industry, the customers can picture themselves wearing the fashion items through their smartphone's camera.



The main purpose of this research is to understand the effect of AR on customers' decision-making based on their behavioral response, especially within the fashion industry. The results will further explain how and whether AR can help increase customers' trust and satisfaction, thus resulting in increasing purchases and decreasing the rate of returns for these products. The paper will also discuss what is still missing on the current technology and how it can be improved.

## **2. Literature Review**

### **2.1 Perception of Shopping Fashion Items Online**

Fashion is a fast-growing business worldwide that has big influence in the world economy (McKinsey&Company, 2016). The term fashion industry are used to cover textile and footwear industries (Hines & Bruce, 2007); therefore, the research will focus in both of these industries. Many fashion companies have market their products internationally and online has become one of the most interesting channel for the retail distribution (Beck, 2004).

As online shopping has become one of the most important channel for shopping globally, it has grown from 7% in 2015 to 11% in 2018 worldwide (Statista, 2017). Online shopping has many benefits for customers as it provides convenience, product reviews, availability, and many others (William, 2016), which is why many consumers have shifted to online shopping. This is why many brands have decided to improve their website to reach more customers (Hines & Bruce, 2007). According to McGolderick et al. (1999), company's website is an important channel to communicate with customers. Unfortunately, there are many customers that still have bad perceptions towards online shopping as retailers have failed to interact with customers through their website (Siddiqui, O'Malley, McColl, & Birtwistle, 2003). Many customers were dissatisfied by their online shopping experience. Siddiqui et al's (2003) research finding suggest that customers are looking for a particular online experience that provide better interactivity. As bridging customers' perceptions and

expectations with what retailers provide is the key to reach their satisfaction (Chu & Lam, 2007), retailers need to identify the important aspects that will deliver the customers' need in their website.

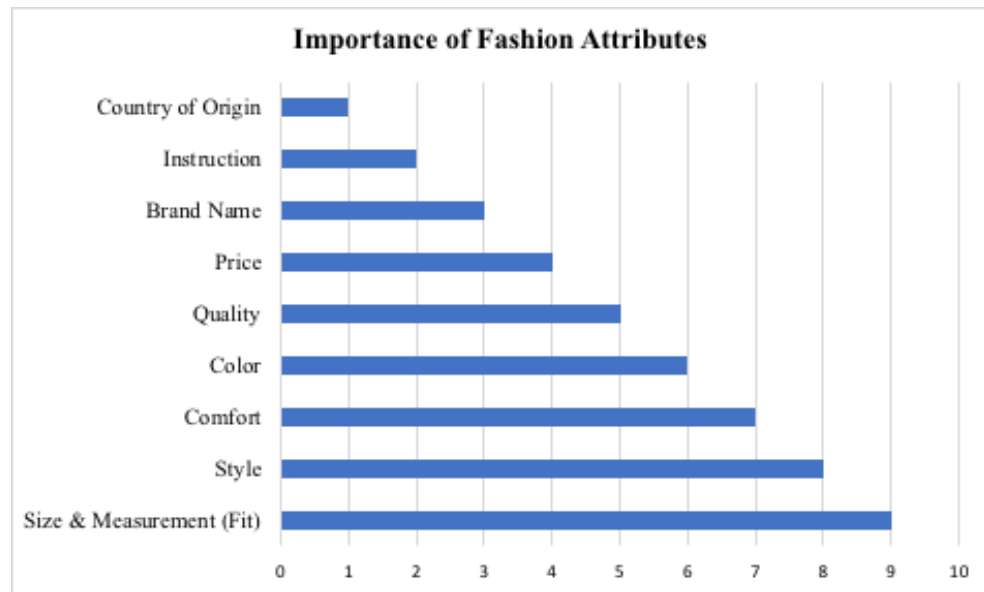
Research has found that fashion products influence an individual's body image (Cash & Cash, 1982), and therefore purchasing fashion items is a high involvement activity (Solomon, 1986). This means that customers take their time choosing their fashion items to fit their style and body. However, because of the inability to visualize or try on the products during online shopping, online fashion retailers have been utilizing mannequins or human models in many ways to help customers picture and imagine the products on their own bodies (Kim H. , 2008). Mannequins or human models that are used to display the products are usually ideal figures that have different body types from the majority of the customers (Tate & Shafer, 1982). These visual differences might cause misunderstanding from the customers' point of view about the fitting and the size of the products and lead to a purchasing risk.

In online fashion shopping, the risk associated with the customer's inability to see the fit of the product becomes a big deterrent in making purchasing decisions (Risa, Garbarino, & Malter, 2006). In fact, many consumers that make online purchases return their items due to the fact that products does not fit correctly or it don't match the appearance or description from what was represented on the website (Matthews, 2015). These reasons have built a perceived risk that customers associate with online fashion shopping and have been found to be affecting the purchase intention (Kim H. , 2008). The

level of perceived risk of online shopping is amplified because of the limited physical access to the sales product (Forsythe & Shi, 2003). Retailers need to be able to convert customers' perceptions that making purchases online is risky into purchasing confidence through their website. The availability of information and the products presentation on retailers' websites will assist customers to make their product purchasing decisions (Park & Stoel, 2002).

## **2.2 Form Fitting Importance for Fashion**

Customers are looking for as much product information as possible when they shop for fashion items. When making a purchase in a retail stores, consumers look for style, price, color, fabric material, garment care, fit, and brand name. From all of these features, consumers consider size, color, and fit to be the most important to decrease perceived risk in apparel purchases (Park & Stoel, 2002). Research done by Sproles and Burns (1994) has found that there are four factors in assessing apparel attributes and they are important in different phases of the purchasing process. During the 'interest phase', style, color, and fabric are the most important, while during the 'trial phase,' fit, styling, and appearance on the body were more important to determine purchasing decisions (Kim J. , 2005). Cotton Inc, a research company that studies customers' attitudes and behaviors, stated that 75% of their consumer respondents say fit is the most important to their clothing purchases (Cotton Inc, 2012). In a brick and mortar store, customers who try on clothes are more likely to make a purchase than those who do not (Elliot, 2012).



**Figure 1: Importance of Fashion Attributes**

Sources: Importance of Apparel Attributes (Kim J. , 2005); Factors for Consumers Purchasing Clothing (Cotton Inc, 2012)

According to Kim's research (2008), there are two important customer concerns in online shopping for fashion. The first is concerned about the inability to try-on the items while shopping online and the second concern is about the ability to imagine what the fit and size will actually look like. As the concept of size is different throughout brands, it has become a problem as customers have difficulties to imagine themselves in the clothes sold in online shopping websites. 88% of Rakuten Fits Me (2016) survey respondents were frustrated by sizing inconsistency across brands and they have problems to search the right fit. Some online retailers' responses to this problem is to offer free returns, however, this has created logistic and financial costs for the retailers and also causes disappointment to the customers that have to return their purchased products (Rakuten Fits Me, 2016).

Research done by IHL Group (2015) shows that returns due to wrong sizing on products total of \$62.4B while online shopping in particular has costed retailers losses of \$8.4 Billion. As currently there are no internationalized standard sizing guidelines, retailers need to address this fitting problem and create a personalized online shopping experience to engage with customers, thereby increasing purchase conversions and reducing returns (Rakuten Fits Me, 2016).

## **2.3 Technology for Online Fashion Retailers**

As retailers build their online websites, technology plays a big role in building the relationship between the retailers and their customers. (McKinsey&Company, 2016). Unfortunately, many retailers face hurdles while trying to engage with their customers in their online platforms (William, 2016). The loss of interactivity leads to uncertain buyers and abandoned carts which leads to less purchases (William, 2016).

According to McKinsey's (2016) research, consumer behavior are shifting and will more likely to become more sophisticated and more technology driven. Furthermore, they will have distinguished qualities in their shopping character. As they are continuously online in their devices, they are always connected in the internet to other customers through their social media accounts, blogs, and websites to find more information such as reviews. They require better information and become more demanding as more choices are readily

available for them (McKinsey&Company, 2016). Customers are looking for online retailers that can help them to better understand the visual representations of the items and provide the best fitting information to reduce their perceived purchasing risk (Masoud, 2013). Retailers should be able to leverage consumers' engagement with technology to their advantage and to understand their customers' point of view (McKinsey&Company, 2016). The challenge for retailers is to deliver all the information online that will help customers in assessing their fashion purchases online.

In order to reduce the consumers' perceived risks caused by the limitation of not being able to try on clothing and other fashion accessories, online retailers have applied different kinds of innovative technologies that help customers to visualize the products (Kim H. , 2008). The ability to physically touch potential purchases in the online shopping is not possible; therefore, visual representations or text descriptions are needed to further explain details about the products (Peck & Childers, 2003). As technology has advanced, generally online retailers have tried to implement different visual technologies into their websites, such as the ability to zoom in on photos and the ability to move and rotate around the items to view the item from multiple angles (Varley, 2001).

Innovation in e-commerce is quickly advancing and some retailers' websites have now implemented 3D representations of their products to allow customers to experience products' functionality by simulating the visual, tactile and behavioral experiences that they usually experience in a brick and mortar store (Park, Stoel, & Lennon, 2008). 3D

technologies have the potential to reshape how the fashion industry do business and it can enhance the product development, accelerate speed to market, and improve the product fit (Alvanon, 2016).

## **2.4 Consumer Responses on Online Retailers' Website Technology**

Customers that experience visual stimulations show cognitive, affective, and conative responses (Li, Daugherty, & Biocca, 2002). According to the Hierarchy of Effects model by Lavidge and Steiner (1961), the Cognitive dimension will show the consumers' understanding and knowledge of the product through the visual representation. The Affective dimension will show the consumers' attitude regarding their feelings and emotions from the stimuli. Lastly, the Conative dimension will indicate consumers' intentions after the experience, such as whether or not the consumer decides to make a purchase after seeing the stimuli. These three dimensions will help to understand customers' perceptions that will lead to deciding behaviors.

Nowadays, consumer expectations of retailers have changed. Consumers have raised their expectations because of the technology availability (Iyoob, 2017). Customers expect online retailers to provide an interactive website that is easy to use, which is why online retailers have embraced the technologies such as community building or 3D virtual experiences (Fiore, Kim, & Lee, 2005). Fiore & Jin's (2003) research about 'Image Interactivity Influence for Retailers' explains that interactive images enrich customers information and help them to imagine the visual and perceptible qualities of the fashion items. 3D visual presentations will help customers in understanding the products better and



therefore, resulting in more positive brand attitude than if retailers only utilize 2D visual presentations (Li, Daugherty, & Biocca, 2002). Thus, it is shown that after seeing the visual representation, customers' cognitive and affective mindsets have increased.

The image interactivity study by Fiore & Jin (2003) found that image interactivity will not only contribute on online store sales, but also will affect customers' approach towards the retailers' brick and mortar stores. As image interactivity utilized by websites might not be completely satisfying for customers that requires sensory information, customers may visit the bricks and mortar store to acquire the missing information and find the assurance they need before making the final purchase (Fiore & Jin, 2003).

Using AR technology, fashion online customers may be able to simulate the experience of trying on fashion items, imitating their experiences in a brick and mortar store (Bourlakis & Papagiannidis, 2009). According to Huang and Liao (2014), AR technology, which is an interactive image technology, can help online consumers with cognitive innovativeness to imagine the appearance and also the functionality of products to create a better online shopping experience.

## **2.5 Augmented Reality for Fashion**

AR is a real-time physical world environment that is enhanced or augmented by adding virtual computer generated information (Carmigniani, et al., 2010). The well-known example of AR is a game made by Niantic and Nintendo - Pokemon Go (PokemonGo, n.d.).

However, there are more uses of AR other than just games. There are different types of AR, which are fixed systems and mobile systems (Kuo, Hsuan-Cheng Lin, & Jeng). The fixed system cannot be moved around and the user can only use it in one location. Some fashion retailers, such as UNIQLO, have installed magic mirrors that are available in several main stores where they use the system to simplify the try-on experience. Through this system, customers would not need to try on different colors of the same product as the mirror will project modified reflections that alter the color (Smith C. W., 2013). The other AR system is the mobile systems that are specifically made for mobile phone applications that allows users to interact with digital information overlapped on physical objects (Carmigniani, et al., 2010). This is the system that can potentially be helpful for online fashion retailers as it can be applied to users' devices through mobile phone applications and it will enhance and change the perceptions and interactions with the real world (Carmigniani, et al., 2010).

AR technology has a potential to not only be a display technology, but can potentially also be applied to different senses such as augmenting smell, touch and hearing (Carmigniani, et al., 2010). However, as this technology has not yet been developed, this paper will focus on the visual based AR. A study done by Pachoulakis & Kapetanakis (2012) about AR Platforms assessed that users can utilize 3D models by using web cams to take pictures of themselves from multiple angles, which then creates a 3D representation of themselves. This 3D avatar can then be downloaded for use with a virtual fashion fitting room application. Customers can then have the impression that they are looking at a physical product where they can have a virtual try-on experience without being cut off from reality

(Carmigniani & Furht, 2011). Previous researchers agreed that interactive technologies such as the AR system can create a more persuasive online shopping experience (Huang & Liao, 2014). This can transform the way that fashion online retailers present their products by letting the customers try-on apparel without being physically present in the brick and mortar retail shops (Pachoulakis & Kaptanakis, 2012). According to Lu & Smith's research on AR usage in e-commerce (2007), 86% of participants that joined the research preferred AR enhanced e-commerce websites as they have more product information than traditional websites (Lu & Smith, 2007).

Guessing is inevitable when customers do online shopping as there are only limited information they can acquire from the online websites (William, 2016). This is why many retailers today are using AR to bring the digital experience to the physical world to create engagement with customers to drive sales and increase customer satisfaction (William, 2016). AR is the latest technology that has been utilized by retailers in various industries. AR technology that combines the "real world" and "digital world" and integrates the virtual image into reality (Fenn & LeHong, 2011), can be one technology that will be beneficial to fashion retailers and to shoppers. AR can provide consumer engagement that will result in conversion and reduced return rates (William, 2016).

Some shops such as Topshop, American Apparel, and Converse (Creative Guerilla Marketing, 2014) has already started to utilize the AR technology in their brick and mortar stores. In today's economy, consumer behavior has shifted from liking traditional products

and being susceptible to push marketing to preferring brands that create memories and long term relationships with customers. In regards to this, AR Marketing could create a different kind of experience for customers (Cehovin & Ruban, 2017). However, online retailers have yet to effectively utilize the AR technology in their websites. A study by Digi Capital shows that most millennial consumers would like Augmented Reality or Virtual Reality to be incorporated into their shopping apps (Obsess, n.d.).

AR can help to create a more realistic 3D representation that can help customers imagine the product that they are intending to purchase (William, 2016). The AR platform can not only become a fun experience in a brick and mortar store, but also a powerful tool in online shopping to influence customers' buying decisions when equipped with fitting measurement (Pachoulakis & Kaptanakis, 2012). The system can change the online fashion industry's way of marketing their products.

### **3. Research Methodology**

Due to the limited prior research that has been done on the topic, the data collection will be a qualitative study that is conducted using exploratory research. The exploratory research includes 35 interviews with international people with some form of higher education, seminars and webinars conducted by an AR developer and a Fashion Technology company, as well as first-hand experience visiting two brick and mortar fashion stores in Los Angeles that currently employ Augmented Reality within their stores.

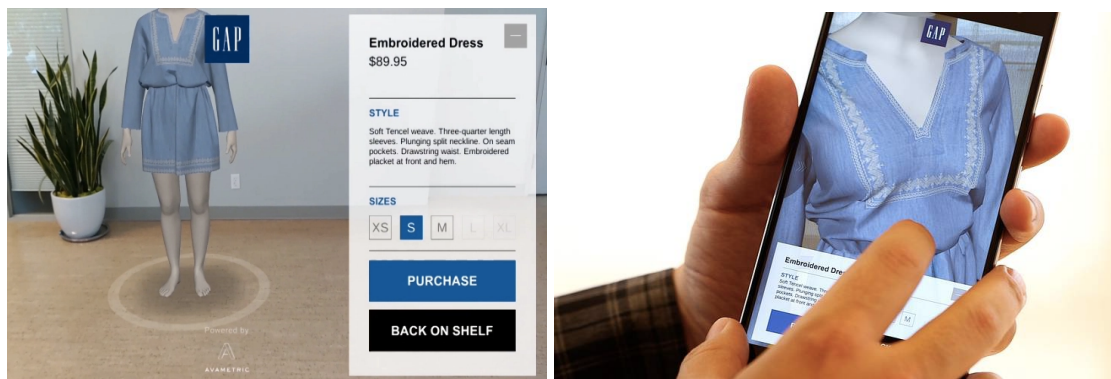
The sample for the interviews is composed of individuals between the age of 18 and 35. This age range was chosen because according to a report done by Business Insider, Millennials (consumers aged 18 to 34) are the main age demographic for online retailers as they spend more money online than any other age group (Smith C. , 2015). According to McKinsey report, 85% of Millennials live in emerging markets and have a huge spending power (2017). 33 of the interviewees have experienced online shopping, while the other two interviewees have only browsed around fashion website, but have yet to make purchases. 16 of the interviewees were male and 19 were female. To get an international perspective, the interviewees consisted of 10 Indonesians, six Thai, six Americans, two Taiwanese, two Koreans, two Japanese, two Nepalese, one El Salvadorian, one Norwegian, one Bangladeshi, one Somalian, and one Myanmar. The interviewees were asked a total of 12 questions of which eight questions were discussing their perceptions of online shopping and were continued by 4 more questions after the interviewees were shown AR videos from YouTube

and a mobile application utilizing AR technology and were then asked to elaborate on their comments regarding the technology.

There were 3 video examples used to portray the current Augmented Reality technology in fashion shopping. The videos used were:

1. TryLive Apparel by Total Immersion AR: <https://www.youtube.com/watch?v=F-3qC4q8toU>
2. Zugara's Augmented Reality & Motion Capture Shopping App by Zugara: <https://www.youtube.com/watch?v=NxQZuo6pFUw>
3. Future Shopping: AR Apps from Gap, Amazon and More by Wall Street Journal: <https://www.youtube.com/watch?v=toJFwFC5AeY>

The mobile application used for showing the AR technology was an app created by Amametric that is available in the Apple Store. The Avametric app is able to show 3D renderings of apparel and accessories on customizable digital body models for web, mobile and AR. In the application, users are able to visualize items and sizes on a mannequin like virtual body model that is able to be personalized (Avametric, n.d.).



**Image 1: Avametric Application Dressing Room by Gap**

Source: <http://wwd.com/business-news/technology/dressing-room-by-gap-augmented-reality-app-revealed-at-ces-10737610/>

Grounded Theory (Glaser & Strauss, 1967) was used as the framework method in the data collection and analysis as there is limited information regarding the subject (Charmaz, 2006). The data was analyzed jointly and continuously during the data gathering to examine the questions and evolve them into more focused questions which can guide future data collection (Lawrence & Tar, 2013).

## **4. Data Analysis**

### **4.1 Findings from Interviews**

#### **4.1.1 Perception of Online Shopping vs. Offline Shopping**

Among all of the important things that people consider to purchase fashion items, the interviewees put the most importance on style, fit, price, and brand. Out of 35 interviewees, 29 prefer to buy offline because they have had bad experiences when they bought fashion items online. Different qualities of the received products from the purchase expectations and fitting problems are the two main reasons for their dissatisfactions. The interviewees mentioned that they prefer brick and mortar stores because they like to have assurance before finally deciding to purchase the products because they can see and touch the products. 30 of the interviewees said that they try on their fashion items most of the times before buying because they wanted to see the fit and the comfortability of the products on their own body. Some of the interviewees also mentioned that they often would go to the stores to touch the materials of the merchandise and try them on before finally deciding to buy the products online. This shows that people seek for certain assurances before they decide to purchase items. A study by Nicholson et al. (2002), shows that currently, customers are using a combination of online and offline channels even though they are purchasing online to find the assurances they needed.

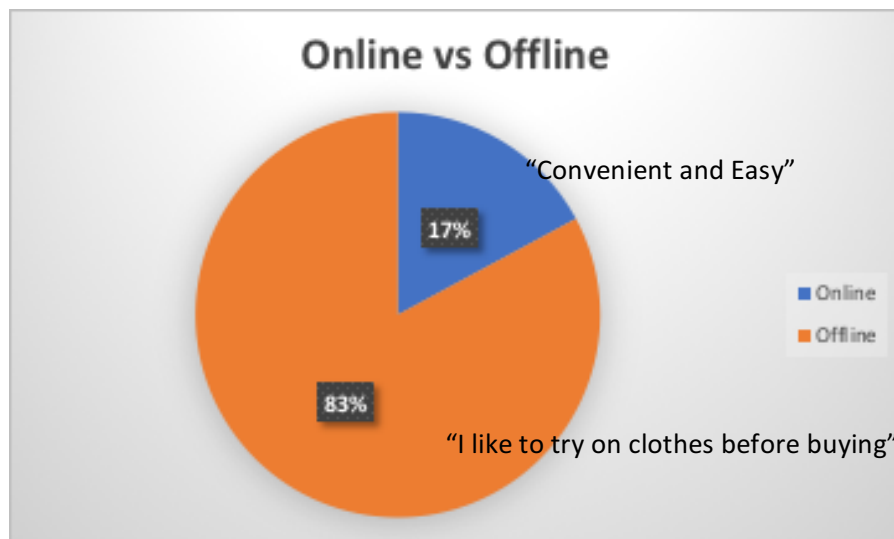
*“I prefer buying clothes offline even though I like to surf on the internet to see the trendy fashion. Shopping at the shop is better for me because I can see the quality,*



*color, size and even try it on. By just looking at the model photos, I will think that all the clothes look great, but trying new clothes on can help me to decide whether the clothes suit me or not.”*

*“I would say that buying online might feel more comfortable, but going to the store makes me feel more confident with what I am buying, as I can see and touch the real stuff. For me, I think trying the product on in reality is still better than not.”*

*“I prefer to buy clothes offline in order to make sure they fit and to see the way they look in real life.”*



**Figure 2: Online vs Offline Shopping Interviewees Preference**

Despite the interviewees’ answers that shopping offline is preferable, many of the interviewees were saying shopping online has its own benefits. It is easier, more convenient, has more availability and is also cheaper. Some of the interviewees said that the time they

could take before deciding what to buy also plays a big role in the convenience. When shopping in stores, a store staff will usually follow the customer around and ask a couple of times whether they need help. To some customers this interaction in offline shopping is inconvenient and bothersome, therefore, online shopping is a better choice for these particular customers.

*“I don’t like human interaction in general, therefore, I prefer to buy everything online.”*

*“You know what I don’t like the most going to stores? The staff is following you everywhere and keep on asking questions. Sometimes I just want to take my time and online shopping offers me that.”*

Most of the interviewees mentioned that they are okay buying socks or t-shirts online, but for pants, jackets or dresses, they prefer to buy offline. The reason is because these fashion items are more expensive and it is really hard to know the sizing when purchasing them online. As discussed earlier in the section about the form fitting importance in the literature review; size, measurement and fitting is one of the most important attributes in online shopping. Unfortunately, online shopping websites rarely offer the assurance of sizing. Earlier research has shown that customers prefer to purchase loose fitting clothing which sizing is not an important factor for when they purchase products from an online retailers’ website (Then & DeLong, 1999). Online shopping customers often have to guess

their size as there is no standardized sizing across the world and in addition the information stated in the website are not always clear. This has caused many of the interviewees to be dissatisfied with their online purchases.

*“I bought shirts a lot online, but if it is an expensive jacket, I would buy it in store because I can’t feel the materials. Many times when I bought pants or coats, it is too short or too small because each website has different sizing. It is hard to tell if it’s American size or European size and some website does not state that.”*

*“The biggest problem for me shopping online is that size changes from region to region. I once bought jacket in one online retailer in Japan and it was too small.”*

One of the reasons why the interviewees are more reluctant to buy expensive items online is because of the hassle to return the products. Most of the interviewees mentioned that they usually do not return the products that they were unsatisfied with and instead just give these items away or throw them out. This is an interesting fact, because many retailers have tried to bridge the current situation of unsatisfied customers with good return policies (CNBC, 2016). Although the unreturned items might seem good for retailers as there are fewer returned products or immediate return costs, this has created major disappointments and loss of trust from the customers to the fashion retailers’ brand that will affect the retailers’ business in the long term.

*“Once I shopped for a jacket online and it didn’t fit me even though it said it was my size. The website offered return policy, but it is such a hassle, so I just give it to a friend of mine. I hope there is international size that is the same all over the world.”*

*“Because I do not usually purchase expensive clothes online, I do not return my unsatisfied purchase because it’s so much work. If the quality is super horrible, I would just throw them away, if the clothes does not fit, I gave it to somebody else. I simply just will not shop in the same website again.”*

When shopping online, customers have to depend on the details of the products from the available information on the retailers’ website, which many times does not provide enough explanations of the products. Most of the images provided on the websites are portrayed with a “perfect, model body,” that gives different impressions for customers. It gives customers uncertainty whether the particular product would look good on their own bodies. Even though some websites have now provided reviews from real customers that can include their photos, as it is not their own body, many people still think it is risky to trust other customers’ reviews. 18 of the interviewees stated that the limited detailed information and visualization on online shopping has also become a hindrance to trust online retailers. 15 people had mentioned the word “assurance” when asked what is lacking on online shopping. They feel that there are still high risks to buy online and there is no assurance of the fit and the quality of the products.

*“I feel that when I buy online, there will always be this feeling of uncertainty whether or not it would fit you as expected even though I have seen reviews or photos that were available in the shopping website.”*

*“I would say that buying online might feel more comfortable, but going to the store make me feel more confident with what I am buying, as I can see and touch the real stuff.”*

*“The photo samples of the product usually don’t accurately show how it looks in an everyday setting. Also, most of the time the clothing is only shown on thin, tall models which is very different from my own body type. This makes me unsure to purchase the items.”*

#### **4.1.2 AR Technology Responses**

After the questions about online shopping vs. offline shopping were asked, the AR videos from YouTube and the Avametric application were shown to the interviewees. Most of the interviewees did not know about AR yet and therefore, were quite surprised with the new technological ability to connect the virtual and physical world. The AR technology was a new experience for most of the interviewees and most of them said that it will make their decision making better. When asked to compare the experience with an offline shopping,

most of them agreed that it almost imitates the experience in the store, but it will not replace the brick and mortar store experience.

*“It’s getting closer to feel like you are shopping offline definitely, but I still prefer to go and buy clothes in the brick and mortar store”*

*“This looks like when you are shopping in a store, before you decide to try on the clothes, you just put the clothes in front of you and look in the mirror. But at the end you still want to try it on.”*

22 out of 35 people who were interviewed believe that the AR Technology will help them to make better purchasing decisions. These individuals think integrating AR is the future of online shopping because it will give them better information about the products. However, all of the interviewees agreed that there are a lot of developments necessary to be added onto the technology for them to feel really satisfied and able to change the experience of online shopping. 20 of the interviewees stated that they hope they can see the fit of the product. The current technology does not provide the ability to move seamlessly when the person moves and it does not really place the clothes in the exact fitted place on the participant’s body.

*“I can’t really say because I would have to try the real system first, but this AR technology seems so cool and I think it will help me making a good purchase*

*decision. If compared with shopping for clothes in a store, the perfect size may still be an issue, so hopefully they can come up with a technology that can portray that”*

*“I would like to try the technology. If you see carefully in the video, the clothes do not cover all parts of the body, so I don’t know if I really care about that technology. But, I like the Avametric one as it can put in my body shape, so I can imagine how it would look at my body. I would be able to make better purchase decision because it feels like I see the mannequin in the mall, but this is in my own home.”*

*“Wow! This is definitely the future of online clothes shopping, and I think it will be very helpful for me, but I think they need to improve the fitting as not all people look the same.”*

However, 13 of the interviewees think that the AR technology will not be useful for them. The inability to touch and feel the material and also the inability see the fit makes them believe that the AR technology is not helpful to them compared to the current online shopping experience where only the picture of the items can be seen hence, it is an unnecessary addition to online shopping.

*“It will improve information availability, but it would not really help me to feel assured, because it still won’t be able to make me feel the comfortability of the*

*product. It will help me to see products online, but it makes no difference, I still prefer to purchase offline.”*

*“It’s just the same with what is available on online shopping now. And the feeling with buying from offline store is not the same. I guess I can’t trust the online sellers enough.”*

*“I think this feature is unnecessary because no matter how realistic it looks, it is still virtual and you won’t be able to see the real color, fabric, and quality from this feature”*

*“I think it will be useful for other online shopping, such as household products or furniture, but not for clothes because I can’t see the fit or the detail of the products. I would rather go to see the actual thing if it’s for clothes.”*

Despite the negativity, there are a few things that were pointed out by the interviewees in regards to how this AR system can be useful for their future online shopping. First is the ability to mix and match the pieces together. Second is the ability to imagine the products on their body shape. Third is the ability to share the clothes and ask for people’s opinions on social media. This relates to McKinsey’s research that customers now are always online and always stay connected through the internet (McKinsey&Company, 2016).



*“It might help with matching pieces together to form an outfit. So it may encourage the purchase of extra accessories to go with clothing.”*

*“The Avametric application can be very useful for me. It is because I can choose my body shape on the mannequin, so I can imagine how it would look at me. While the YouTube video one, I can share it on my social media and ask my friends opinions on the products that I want to buy.”*

#### **4.2 Findings from Shops with Augmented Reality Technology**

As some companies have offered the AR experience called virtual fitting rooms within their brick and mortar stores, the researcher decided to visit these stores to observe and experience the technology. On the trip visiting the companies utilizing innovative technologies, it was found that gradually, fashion retailers are combining the offline and online experience to give customers new and innovative services. The two stores visited had huge digital walls in their lobbies that asked customers to fill in their information and then lets customers choose their products online. When the customer became ready to try on their chosen products, the store staff already has the fitting room setup with the products which were chosen. The mirrors in the fitting rooms were embedded with interactive displays that let customers browse more clothes, order different styles or sizes, and change the lighting system within the room. The last technology that was offered was self-checkout payment systems.

Although the 2 stores have new interactive technologies, these are not AR technologies. The current virtual fitting room technology is the combination of both offline and online channels to create a futuristic environmental experience for customers. These technologies cut down on human interaction with the staff of the store, which might be intriguing to some people. From the previous interviews, 3 people said that one of the perks of buying clothes online is the privacy and the ability to take as much time as they would like before deciding to purchase the clothes. Unfortunately, these systems used by the stores often run into technical malfunctions and instead of increasing customer satisfaction, have created frustration for the staff and the customers.

#### **4.3 Findings from AR Company's Seminar**

Augmented Reality has been utilized by many companies to create hype on certain occasions, such as introducing new uniform lines. Some fashion retailers have also tried to implement AR in brick and mortar stores to enhance customers' experiences in the store. However, mobile AR systems for online retailers are harder to be implemented as it really depends on the customers' own devices. In the case of Avametrix, the application that was used in the interviews, the app can only be used on iPhone 6S or newer generation iPhones, and will only work on these phones which have iOS11 software or newer installed (Avametric, n.d.). Other AR technology is also limited to certain brands of phones equipped with certain versions of their operating systems. Many of the current gadgets are still incompatible with AR technologies and therefore, the technologies won't be able to be utilized effectively.

Additionally, the AR company that held the seminar mentioned that for online fashion, their technology was not adequate yet to cater to customers' needs as they could not provide 3D rendering for each customer. This finding has shown that the AR developer has understood that customers require a better fitting mechanism from the AR systems that can provide the try on experience which mimics the experience in store.

## **5. Conclusion**

As mentioned earlier, the main purpose of this research is to understand how implementing AR on retailers' websites can make a difference on the customers' decision making process. Augmented reality is still in its infancy. Research done by Huang and Liao (2014) suggest that the current AR system acts as an interactive catalog and it should be considered as a form of persuasive technology that will increase playfulness and the convenience of online shopping rather than as a functional technology. Relating it back to the literature review, the current AR system has a similar feature of image interactivity that will eventually bring customers back to the brick and mortar stores if their sensory requirement is not fulfilled (Fiore & Jin, 2003).

All of the interviewees agree that the system will not be able to replace the experience of shopping in a retail brick and mortar store. From the interview data, customers have yet to accept the technology as it has not been able to surpass their expectations to assist them in their shopping experiences. As most of them said that they still prefer to shop

in a brick and mortar store, it shows that the current technology has not been able to add and change customers' cognitive, conative, and affective behavior effectively.

Most of the interviewees said that they were able retrieve more information regarding the product through the AR technology therefore, the consumer's understanding and knowledge of the product was increased through the technology. This means that the cognitive dimension from the visual representation was enhanced. However, consumers' affective dimension that shows the consumers' attitude regarding their feelings and emotions was not completely changed. Although most of the interviewees mentioned that AR will help them to make better purchasing decision, most of them still mentioned that there is still a lot of development that needs to be done before they can be satisfied with the technology. Consequently, the conative dimension has not been changed. Most of the consumers said that they would still prefer to shop in brick and mortar stores after seeing the videos and the applications. Some of these interviewees even mentioned that it makes no difference from the current online shopping experience. Based on the research results, it shows that although AR can help to increase customers' understanding, trust and satisfaction were not really affected as their feelings and emotions were not established further. This shows that AR, with the current technology, would not substantially change the amount of customers' purchases or decrease the rate of returns. The AR technology will need a lot of improvement before finally being able to reach users' satisfaction.

Despite some previous research that was done that shows that millennial consumers would like the technology to be incorporated into their shopping apps (Obsess, n.d.), there are still many improvements that are needed of AR technology before it can satisfy customers' expectations. AR has huge potential for retailers, however, getting people used to using AR while online shopping seems to be more challenging than expected. Depending on the region and the familiarity of the AR technology, customers would need to be well-informed before accepting the new technology for fashion online shopping. Regardless of that fact, many retailers plan to utilize technology such as Artificial Intelligence, Augmented Reality and Virtual Reality to increase their customer's experience (BRP Consulting, 2017). As these retailers step up the game, customers may slowly change their attitudes towards the technology.

In order to provide a satisfying AR user experience, AR applications need to offer a high level of accuracy in tracking and inserting a better augmented data on the display (Cehovin & Ruban, 2017). This was confirmed from the research as most of the interviewees were not completely satisfied when the clothes being displayed were not moving in sync with the person and did not cover the whole body of the person. Therefore, it is important for the AR applications to utilize better tracking software and motion sensors that will support a better AR user experience.

Fitting is a huge factor that holds importance for customers. Realizing this problem, an additional feature of AR applications need to be created to address these concerns of

customers, but as of yet has not been added. AR by itself is not enough as customers cannot see the fit of the clothes, therefore, additional tools need to be implemented. Although customers were able to visually imagine how the product looks like, they do not know whether the product that fits well on a model or a mannequin will fit their body (Kaur, 2014). Fitting tools can provide an interactive fitting solution that can help customers to find their exact size by virtually displaying how the garments fit (Thomas, 2015). When visual and fitting size guide technologies are combined, customers would be able to digitally try out the products before purchasing them online and it would also give customers the in-store experience on the retailers' websites. An additional feature of fitting tools would bring personalized shopping experiences to the customers that can assist them to find the fashion items that are a perfect fit for their bodies. Retailers that have utilized this fitting tool have reported lower returns as customers can confidently match their size (Elder, 2012). The fitting tool will allow customers to find their exact size by virtually displaying how the garment fits on the customers' body (Thomas, 2015). Equipped with a size guide that allow customers to compare sizes from one country to another (Rouke, 2013), or other types of fitting tools, AR application would be able to achieve a new level of customer experience.

Another thing that AR developers need to work on is the technology compatibility with different devices. The software need to be compatible not to only certain brands of gadget but need to be universal to be able to easily adapted and accepted by customers.

Aside from the AR technology, consumerism has shifted from Offline to Online only to Omni channel (Lipow, 2015). Omni channel, or multichannel in fashion shopping, cannot be disregarded as people do not shop through only one channel exclusively (Nicholson, Clarke, & Blakemore, 2002). The field research has shown that many retailers have heard customers and are making an effort to connect the online and offline shopping to give the best customer service and experience to their customers as they can. This is a new way of marketing and with the ever-growing development of technology, fashion retailers will be able to provide a much improved customer experience. With this technology, fashion retailers can cater the customers' shifting behavior that always stay online (McKinsey&Company, 2016) and engage with the customers through the internet. However, retailers need to address the current concern that the system often has technical malfunctions which frustrates both the workers and customers.

One limitation of this paper is the limited media available to show the interviewees how AR can be used. Therefore, it is hard for the interviewees to imagine how the AR can potentially be utilized. Further research should be conducted when there is a better application or media which is available.

Another limitation is that the interviews were done mostly in Asia with the majority of the interviewees being South East Asian, therefore, this demographic cannot be a true representation of the world as a whole. Additionally, it is seen that people from South East Asia regions are cautious when buying online and prefer to buy things offline. Research

done by DBS has stated that there is a lack of trust of online retailers' product reliability and payment systems in the South East Asia region (DBS Group Research, 2015). Compared to Chinese customers that have accepted e-commerce as a shopping channel (DBS Group Research, 2015), South East Asian customers still have a lot of suspicions in regards to online retailers. The rapid increase of the population of internet users within South East Asia shows that there huge potential for e-commerce in the region (ASEANup, 2018). Although the market is still in its early stages, it is important to tap the market in these countries as it has a large population and rising economies (ASEANup, 2018). Therefore, educating the market will be a big benefit to retailers. However, this paper does not cover this topic and a further research would be useful to further investigate and recommend upon these ideas.



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## Appendix

### Interview Questions

1. What are the important things that you consider when buying clothes?
2. Have you ever bought fashion items online?
  - a. If so, what did you buy?
3. Were you satisfied with your purchase?
  - a. If not, why?
4. Tell me about your experience when you purchase products online.
  - a. Was there any difference from what was expected from the purchase when it arrived?
5. Do you prefer to buy your clothes online or offline?
  - a. Why?
6. Do you usually try on your clothes before buying?
7. What do you feel is the difference between buying clothes online and in the brick and mortar store?
8. What do you feel is lacking with clothes shopping online?

### Show Videos

- a. <https://www.youtube.com/watch?v=F-3qC4q8toU>
  - b. <https://www.youtube.com/watch?v=toJFwFC5AeY> (0:40 onwards)
9. What do you think of this feature?
  10. Would the augmented reality change your decision making?
  11. How does this compare to shopping for clothes in a store?
  12. Do you think this app will help you to decide better on the product purchase?