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AR in Fashion Retail Industry

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Abstract: This study introduces the application and impact of AR technology in fashion retailing and discusses the role of data and technology by analyzing its mechanism and effect. This research adopts the literature research method, analyzes many authoritative kinds of literature, and concludes that AR is still a project worth studying in the fashion retail industry. Furthermore, AR technology can quickly obtain the consumer database to improve the products and marketing strategies further to achieve profit.

Keywords: retail, fashion, AR technology, virtual

1. Introduction and Statement of Problem

As recently developed technologies like virtual reality (VR) and augmented reality (AR) mature over time, corporations across various industries and markets start to adopt these forms of technologies into their system. These new technologies boost visual effects and give users surreal virtual experiences. The fashion industry, which relies on promoting its products through visual advertising, quickly builds VR and AR technologies into a part of its operation. For example, Sephora developed AR mirrors that simulate cosmetics on customers' faces in real-time in stores [1]. Gucci created an App with AR features, which allows customers to virtually and remotely try on its sneakers [2].

Although there are plenty of cases of the use of AR technologies by fashion retailers, there is not much research on how AR can be used sufficiently to help firms generate profits and benefits. This research paper will explore the various ways AR can be utilized by fashion retailers and analyze the effects AR can bring to each retailer; Then, further speculations will be made on the possible ways fashion retailers can improve their existing AR technologies to strengthen their operation. Finally, this research paper will investigate the specific role played by data and technologies by analyzing their mechanisms and effects, hoping to propose how fashion retailers can amplify the positive effects brought by AR technologies.

2. Research Methods

We adopt a literature research approach to address the question of how AR mobile apps can become

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more popular and suitable for consumers.

The literature research method surpasses the limitation of time and space and can study a wide range of social conditions by investigating ancient, modern, and foreign documents. It is a very convenient and accessible investigation method for those who are short of time and technology, and it saves time, money, and efficiency.

During the research, we collected electronic materials, purposes, plans, and systems related to consumer research objects' actual and historical conditions using AR products from relevant academic websites. Based on a survey of target consumer preferences, we also collected data on AR apps' feasibility, target audience, and application efficiency. Then according to the content of the literature, identify the classification. In terms of data collection, we use computer retrieval tools based on collecting and sorting relevant research field literature and in-depth research on the literature to form a new understanding of this topic. Given the status quo of AR application, a planned, thorough and systematic understanding is required. Here we use qualitative research, select some landmark articles, and comprehensively overview the evolution of our research purpose.

Not only that, but after collecting the relevant information, we analyzed, integrated, compared, and summarized a large amount of information collected. The literature review is formed through induction, sorting, analysis, and discrimination based on a comprehensive collection of relevant literature materials. This study uses comprehensive reviews to systematically and comprehensively describe and comment on the research results and progress of related disciplines, and topics collected in a certain period and converts qualitative data into quantitative data. For example, we cited augmented reality tools developed by fashion retailers in the UK, specific to the number of clothing types and sizes available and the percentage of consumers shopping on mobile devices. In addition, we carry on the rigorous analysis evaluation, and the primary trend forecast provides firm support and the demonstration for the new topic establishment, has played the summary past, the guidance puts forward the new topic and the promotion theory and the practice new development function.

3. Literature Review

This paper builds on the previous work of articles that talked about how the characteristics of augmented reality and virtual reality could influence a company or brand. Our research aims to discuss the profitability of AR in the fashion and retail industry and possible solutions.

For our literature review, most of the articles, such as Zeekit's introduction to see my fit [3] and AR technique example introduction from Meltwater web [4], etc. Usually, describe how realistic technology could attract customers' attention [3,4].

Articles from Jinder Kang introduced the typical AR-based developments in the fashion industry, from virtual try-on at home to in-store magical mirror services, and stated that they could encourage user-generated content and simplify purchasing experience – saving time in queues [2]. Besides illustrating the information from these categories, our paper demonstrates several potential risks behind the advantages, mainly focusing on the difficulties of saving time for customers with in-store AR techniques due to limits on technology and cost. An analysis article from David Stepaniuk, a senior innovation consultant, states that AR applications show great potential in reducing return rates and increasing online sales. Conversion rates in AR-engaged consumers reach approximately around 90% [5]. This article contains specific data to support the profit abilities of AR. Stepaniuk also questions whether AR technology fits into all business models in the end.

In order to answer this question, our paper gives more ideas about the pros and cons, recent feasibility, target audience, and efficiency. As we concluded these singular and approximate data from Stepaniuk and some other articles, we realized that these data about AR applications might not be strong enough to enable this technology to be widely applied. Therefore, our paper provides another idea to increase the profitability with databases collected by AR, which enables companies

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and brands to develop more customer-based strategies by analyzing customers' segments and features.

4. Main Discussion

Although virtual mirrors have been widely applied in physical stores of the fashion retail industry, fashion retailers should continue to make the virtual mirror effect more sophisticated for a better customer experience. The virtual mirror is an AR-based technology for virtual fitting and try-on. "When the user brings a piece of clothing in front of the mirror, it scans and stores the image of the same. The mirror then scans the user to create a virtual model wearing that scanned piece of clothing" [6]. Many well-known brands, including Topshop and Uniqlo, have adopted virtual mirror technology in their physical stores [7]. Moreover, the use of virtual mirrors in fashion retail is not limited to clothing. For example, Sephora developed virtual mirrors that simulate cosmetics on a person's face [1].

Many incentives drive fashion retailers to create innovative virtual mirrors in their physical stores. First, fashion retailers believe consumers are willing to use and accept this technology. According to the technology acceptance model, which "provides an insight into why consumers may accept or reject the use of a certain technology", "perceived ease of use", refers to the degree to which a person considers using the technology will be "free of effort", is an important factor [8]. Since consumers only need to pick the product they want to try on and stand in front of the mirror, they do not need time and specific skills to adapt to this new technology. As a result, they can readily accept this innovation. In addition, AR technology brings a customer an immersive experience, which elicits his/her emotions [9]. A novel and immersive experience can help form a positive impression on the product that the customer tries on and thus positively impact the customer's decision to purchase the product. Also, customers do not need to wait in line for fitting rooms, so the purchase process is sped up [8]. Compared to physically trying on the products, shoppers only need a few seconds to experience them virtually. Therefore, it will be incredibly convenient for individuals to shop in large department stores, where many different types of products, a large volume of shoppers, and limited fitting rooms. More people trying on the products implies more potential transactions. It reveals that practical reasons for adopting virtual mirrors are to avoid the loss of sales due to potential customers running out of patience waiting for fitting rooms and to increase operational efficiency.

However, the current virtual mirror development is not mature enough, which might lead to self-defeating consequences. Boardman et al. mention that most visualizations on the virtual mirrors superimpose the clothes artificially and superficially so that users cannot feel that they are wearing the real clothes [8]. Failure to bring users a seamless experience might worsen their impression of the products. Moreover, most types of clothing available to try on currently are clothes with simple and rigid structures, such as puffy jackets [10]. As limited products can be tried on, the effect of virtual mirrors in delivering immersive experiences to drive sales is limited. In addition, virtual mirrors are limited in-store availability since the existing virtual mirror technology is not well developed [8]. It becomes ironic that customers needed to wait in line for fitting rooms previously and need to wait in line for virtual mirrors now. These restrictions show that the interests that virtual mirrors can provide to fashion retailers are limited.

Nonetheless, the potentials and benefits of mature virtual mirror technology are abundant, as discussed before. However, it might need a long period and significant money to continue investing and fine-tuning this technology. Therefore, fashion retailers can consider spending their budget together on virtual mirror development to make this technology mature more quickly and maximize its benefits to customer satisfaction and sales.

Another common type of AR technology in the fashion retail industry is the AR filter. While fashion retailers develop AR filters on social media platforms to spread their brand, the filter content should be meaningful and product-oriented to generate profits for the firms. AR filters work with the

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camera of users' mobile devices to superimpose specific effects on their faces [9]. Luxury brands such as Prada and Versace designed their AR filters for Instagram Story [11]. In addition, Louis Vuitton released a filter in the League of Legends, a popular online game platform [9]. It is easy and normal for social media content to go viral, and going viral boosts brand recognition [9].

Meanwhile, the users on most social media platforms that enable AR filter features, such as Instagram and Snapchat, are between 18 and 34 years old [12]. These users are the main force of consumption nowadays. Hence, creating AR filters on social media platforms means that the brands can gain attention from many potential consumers.

The main question remains on how to turn brand recognition and social media user engagement into real profit. In other words, fashion retailers need to consider what kind of AR filters can be famous and generate sales. Social media users enjoy using filters as they consider filters the tools to express themselves and relate to others [9,13]. It implies that a popular filter should embody meaningful content to individuals. One way to make the filter popular is by connecting it to a social topic such as gender and race equality. People cannot help using and sharing the filter if they find it as a valuable medium to share their perspectives, form their identities, and communicate with others. The filter should also be product-oriented. For example, dior designed a fashion filter for users to try on its Spring/Summer 2020 Collection [11]. Displaying the product in the filter generates attention for the product, which is the first step to sales. In conclusion, fashion retailers should design their AR filters on a meaningful and product-oriented basis, which allows individuals to engage with the product interestingly and memorably and thus helps drive up sales.

Many fashion brands develop their applications with AR features. AR mobile applications can gather sufficient customer data for fashion retailers to perform business analytics if these applications can fulfill social engagement and connectivity. For example, Gucci implemented AR virtual try-on feature for its sneaker collection in its IOS APP in 2019 [14]. British online fashion and cosmetic retailer ASOS developed the "See My Fit" augmented reality tool on its APP, which allows shoppers to pick a dress from 800+ choices and see it on a range of models of 16 different sizes [3]. The potential of data analytics in these kinds of applications is enormous. First, mobile device is a popular method for AR [15].

Moreover, about 80% of internet users worldwide use mobile devices to shop [16]. As a result, mobile applications with AR features are much more efficient tools for gathering a large sample of data than other methods, such as questionnaires and interviews. More importantly, the analysis derived from the data can be crucial to the firm's operations. For example, ASOS can determine which dress is more popular and which height and weight range most of its customers belong to based on its customers' browser data in its AR tool. As ASOS learns more about its customer segments and shopping behaviors, it can better decide advertising focus, inventory level, and many other marketing strategies and operations decisions.

Nonetheless, it is worth noting that AR applications should offer mobility and sociability, which allows customers to stay engaged [15]. Customers will soon lose interest in an isolated AR environment, and the application can no longer gather enough data for analysis. Hence, fashion retailers can consider linking their applications to social media platforms or creating an online community within the applications, allowing users to share their experiences with AR technology and their opinions on the products.

Physical AR hoodie is a profit source for current fashion shows, street culture, and online we-media bloggers. However, the clothing material and the effect displayed from different angles still need a high degree of adaptation to better to conform to consumers' will to obtain profits. When the camera is aimed at the hoodie's pattern, the original hoodie's static pattern will rotate and jump to bring an exciting picture experience. The categories and designs of streetwear are relatively monotonous, but with the help of technology, it has added some playability for young consumers.

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Just imagine that when people take selfies and upload them to social networks, a moving dress will surely bring a wave of "curiosity" likes. For example, at Paris Fashion Week 2018, Vetements launched an avant-garde AR augmented reality hoodie with Punk as an extension [17].

However, the accuracy of dynamic sensing and display is inherently difficult to capture on moving objects, and the material of the hoodie itself is also essential for AR hoodies to have better effects under the camera. Therefore, the most crucial thing is universal fitness for this kind of AR technology for special occasions and for exceptional people to achieve low cost and high return. Therefore, the relevant technology needs to be further studied in the future.

5. Conclusion

This paper utilizes the literature research approach to investigate the prospects of increasingly sophisticated AR technology in fashion and retail. By reviewing a large amount of literature and articles comprehensively, this paper summarizes the following advantages and disadvantages of AR. It gives some directions for the future application of AR in the fashion and retail industry.

Augmented Reality enables live view for people to experience remotely with digital elements; therefore, many clothing brands and retail companies have started promoting it online and in-store.AR in-store applications such as fashion mirrors can quickly bring people an immersive experience and encourage customers to spend money. However, virtual mirror functions are currently not well-rounded and sophisticated [8].

Undoubtedly, the use of AR in the retail industry, such as magic mirrors and visual try-on, and fashion brands such as Gucci and CK, is still a new and exciting project for most people. Fashion brands can attract more potential customers by promoting product-related filters on the Internet.

In current markets, even though different brands and companies are trying to apply the use of mature AR technology as well as possible, promising applications of AR in the fashion and retail industry are still scarce, restricted by existing technology, and limits on company financial support. For instance, Gucci's relatively mature shoe-fitting function is still the leader in the market, and more AR applications are facing the problem - AR technology for virtual try-on is not ideal enough. Several companies have reported that the use of AR technology has reduced return rates, but as more consumers flock to the online AR fitting market, more and broader requirements on AR try-on techniques are needed to satisfy more consumers. With the limits on technology, return rates are expected to increase [18].

The temporarily limited technology sets a high bar for companies looking to use AR for profitability in the fashion and retail industries [8].

However, the increasing popularity of AR means AR is not only a simple marketing tool but also a quick way to have databases of consumers. Through its powerful online communication capabilities, companies and brands can access a large amount of customer data in a short period, including customer style and size preferences, price ranges, etc. By building a solid database, the company can understand its customers' characteristics and needs to further improve its products and marketing strategies.

AR's breakthrough in technology requires enormous capital investment, but companies can also profit significantly by leveraging the data it provides to support brands and companies.

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References

[1] *Bonetti, Francesca, et al. "Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda." Augmented Reality and Virtual Reality, edited by Timothy Jung and Claudia Dieck, 2018, pp. 119-132, https://link.springer.com/chapter/10.1007/978-3-319-64027-3_9.*

[2] *Kang, Jinder. "5 Examples of Augmented Reality in Fashion Retail." Netguru, 27 Sept. 2021, https://www.netguru.com/blog/augmented-reality-fashion-retail-examples.*

[3] *"ASOS Trials 'See My Fit' Augmented Reality Tool." ASOS, 14 Jan. 2019, https://www.asosplc.com/news/asos-trials-see-my-fit-augmented-reality-tool/.*

[4] *Arthur, Rachel. "10 Fashion Brands Nailing Their Snapchat Content Strategy." Meltwater, 06 Apr. 2017, https://www.meltwater.com/en/blog/10-fashion-brands-nailing-their-snapchat-content-strategy .*

[5] *Stepaniuk, David. "Why You Need More Than a Virtual Try-on for Successful Sales.", Netguru, 15 Sept. 2021, https://www.netguru.com/blog/virtual-try-ons-sales.*

[6] *Sharma, Vaibhav. "How Virtual Mirror Technology Will Change the Way You Shop." Quytech, 6 Jul. 2018, https://www.quytech.com/blog/how-virtual-mirror-technology-will-change-the-way-you-shop/.*

[7] *Banks, Alec. "5 of the Best Instances of Augmented Reality in Fashion & Retail." Highsnobiety, 2016, https://www.highsnobiety.com/p/augmented-reality-examples/.*

[8] *Boardman, Rosy, et al. "Augmented Reality and Virtual Reality: New Drivers for Fashion Retail?" Technology-Driven Sustainability, 2019, pp. 155–172, https://link.springer.com/chapter/10.1007/978-3-030-15483-7_9.*

[9] *Johnson, Pat. "Augmented Reality in Fashion." Rock Paper Reality, 31 Oct. 2021, https://rockpaperreality.com/ar-use-cases/augmented-reality-in-fashion/.*

[10] *McDowell, Maghan. "Why AR Clothing Try-on is Nearly Here." Vogue Business, 26 Jul. 2021, https://www.voguebusiness.com/technology/why-ar-clothing-try-on-is-nearly-here.*

[11] *Boey, Stephanie. "12 Instagram Filters by Fashion Brands to Try at Home." Buro, 20 Mar. 2019, https://www.buro247.my/fashion/buro-loves/instagram-fashion-filters-to-try-at-home.html.*

[12] *Bretous, Martina. "Social Media Demographics for Marketers in 2022." Hubspot, 6 Dec. 2021, https://blog.hubspot.com/marketing/state-of-social-media-demographics.*

[13] *Mosley, Tate. "Beauty Filters are Changing the Way Young Girls See Themselves." MIT Technology Review, 2 Apr. 2021, https://www.technologyreview.com/2021/04/02/1021635/beauty-filters-young-girls-augmented-reality-social-media/.*

[14] *Nguyen, Han. "Augmented Reality Can Be Real Gucci." Medium, 3 Dec. 2021, https://medium.com/marketing-in-the-age-of-digital/augmented-reality-can-be-real-gucci-304dc41e8551.*

[15] *Moorhouse, Natasha, et al. "Technological Innovations Transforming the Consumer Retail Experience: A Review of Literature." Augmented Reality and Virtual Reality, 2018, pp. 133-143, https://link.springer.com/chapter/10.1007/978-3-319-64027-3_10.*

[16] *Chaffey, Dave. "The State of Mobile Marketing 2016." Smart Insights: Actionable Marketing Advice, 28 Apr. 2016, https://www.smartinsights.com/mobile-marketing/mobile-marketing-strategy/the-state-of-mobile-marketing-2015-infographic/.*

[17] *Libero, "How will AR Transform the Fashion Industry?" Zhihu, 02 May. 2020, https://zhuanlan.zhihu.com/p/137790157.*

[18] *"Augmented Reality and Fashion: The Perfect Fit?" 3DLOOK, 30 Jun. 2022, https://3dlook.me/content-hub/how-to-impelement-ar-in-fashion/.*