A STUDY ON CONSUMER ADOPTION TOWARDS VIRTUAL FITTING ROOMS FOR MAKING PURCHASE DECISION DURING E – SHOPPING

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Abstract

This paper presents the design and evaluation of a virtual dressing room usability and user experience test. First, we motivate and present our recently developed virtual dressing room prototype. Next, we will present a research and testing proposal based on related usability and user experience studies. We present a description of the experimental setup and execution of the proposed usability and user experience test. To this end, we present interesting results and discuss the results with respect to the user-oriented design and development of a virtual dressing room.

CHAPTER 1

Introduction

Online shopping has become popular and today people are increasingly shopping online; most of them are satisfied with buying certain kinds of goods online like books, electronics, tickets etc. But when it comes to buying clothes online, they are not completely satisfied. Many people choose not to shop online due to privacy (eg sharing body measurements) and security concerns. The report shows that in Denmark alone there is a 25% return in the online clothing industry. Reasons for returns at this point can be speculated as the clothes don't fit the customers properly or the customers just don't like the clothes when they actually wear them. This results in increased costs for online retailers and consumer dissatisfaction. On the other hand, manufacturers and retailers are trying to develop a solution that is more satisfying for their consumers with less returns. Consumers are clearly looking for a more reliable solution for buying clothes online. The industry is beginning to realize that new technologies such as virtual reality and 3D camera-based systems have great potential to solve this problem. So a virtual wardrobe solves this problem by allowing customers to try on a virtual version of the clothes on their virtual 3D avatar/profile before buying the actual clothes.

1.1 What is virtual fitting room ?

A **virtual fitting room** allows shoppers to try on items without touching them. It works by overlaying an item on a live video feed of a customer via smartphones or mirrors. The shopper can see the size, style, and fit of an item before they buy it.

1.2 How virtual fitting room technology works

most virtual fitting rooms paintings the use of augmented truth . In this case, a webcam scans a person's frame to create a 360-diploma three-D model.

other digital fitting rooms are powered by way of artificial intelligence. just like augmented reality, AI uses algorithms and system learning to take body measurements and create complete-frame three-D fashions of the consumer status in front of the camera.

The 3-d model created via AI or AR is mixed with radio frequency identification that is some other era that scans the goods a shopper has taken to the virtual fitting room.

digital fact generation overlays the scanned products on the 3-d model of the shopper. That manner, they are able to see what they seem like carrying an item—while not having to physically strive it on. it's an smooth manner to build a attempt earlier than you purchase programme in reality.

various stores are growing their own software to do that. Apple's augmented reality platform may be used to create virtual fitting rooms for iOS applications. Amazon additionally reportedly patented its own which matches the use of augmented truth.

CHAPTER 2

Literature review

In this chapter, a review of the literature related to the purpose of the study is handed. First, an preface of the VFR technology is handed. Next, exploration on consumers ' comprehensions of VFRs are explored, videlicet perceived functional, existential, and social value. Following that, exploration on consumers ' nonsupervisory focus and its relationship with consumers ' comprehensions and relinquishment are presented. Incipiently, exploration on consumers ' shopping involvement are explored. Grounded on the literature and relative to the objects of the study, several testable suppositions are developed. Arising Virtual Fitting Room(VFR) Technology In the fashion shopping process, the befitting room is an important terrain for consumers ' buying conditioning, allowing them to see, touch, and sense the products(Ayalp, Yildirim, Bozdayi, & Cagatay, 2016).

The rapid-fire development of technology has changed the commerce between guests and retailers(Kaatz etal., 2019). Specifically, AR is an interactive tool that can modify the physical terrain using superimposed virtual rudiments. A virtual subcaste exists between the physical terrain and druggies, allowing them to add textbook, information, images, vids, and other virtual objects to the physical terrain. therefore, AR is a fashion of superimposing rudiments presented by computers in the real world.

Virtual reality(VR) can potentially be validly used in consumer exploration aimed at changing geste in the consumer terrain, as real- life findings have substantially been replicated in VR. Studies that have used VR as a geste change tool have generally been more effective in changing consumer geste in the asked directions than when original treatments were used. unborn exploration may concentrate on expanding behavioral exploration fabrics to include VR in their compass and using further interactive VR surroundings to completely exploit the eventuality of VR for consumerresearch.We developed a real- time virtual dressing room operation that doesn't bear any visual labels. We've tested our app under colorful conditions. Our trials have shown that the app

works well for regular postures. The operation can be further bettered towards creating more realistic models using 3D fabric models and a drugs machine.

To initiate conduct within the electronic business on behalf of the stoner, a system and system has been handed to grease body recognition grounded on gestures that represent commands to initiate conduct. similar that a model of the stoner's body is generated using the first set of spatial data. A alternate model is also generated by the action machine grounded on the entered alternate spatial data set. The difference between the first model and the alternate model is determined by the action machine represented by a gesture, where the gesture represents a stoner command

The purpose of this literature review is to lay a strong theoretical foundation for examining consumers' intention to borrow virtual befitting apartments from the perspective of the technology acceptance model. This section begins with a conflation of the current literature on virtual locker apartments. latterly, the Technology Acceptance Model(TAM) is reviewed, including perceived utility, perceived ease of use, and perceived enjoyment. also, other influential factors of consumer intention to borrow VFR, including fashion leadership and technology anxiety, are reviewed and anatomized. Eventually, a theoretical frame with applicable suppositions is presented.

According to the experimenters, Chin Singh and Chan Singh Stated that there are three factors that impact the approach to new technology in three aspects" Perceived utility", which provides druggies with the necessary value of the system in order to ameliorate work performance and the effectiveness of performing tasks," Perceived Ease of Use", which means, that druggies perceive the difficulty or capability to learn and operate a particular information technology system, and" Perceived Fun", which emphasizes that value is reflected in the quantum of delightful druggies experience while using the system(Davis, 1989 Heijden, 2004).

Because an information technology system can help druggies with work performance and superintendent capacities, druggies develop a perception of the" utility" of the technology system in their hearts, and Davis(1989) refocused out that such a cerebral state would not only have a positive effect on the acceptance station of the technology system, but it would also have a more direct positive effect on intention to use. Bagozzi, Davis & Warsaw(1992) refocused out that" perceived utility" could impact druggies' station towards applicable technologies and their intention to use them. This suggests that the coffers and utility handed by an information system will enhance consumers' station and intention to use. thus, for druggies, whether the technological system can appreciatively help them in practice is a veritably important factor that affects the druggies' approach.

While fast- growing online merchandising provides consumers with further convenience, it also intensifies the competition among online retailers(Hu etal., 2016). therefore, how to give consumers with a better online service experience to increase their satisfaction has come a huge challenge for online retailers. Although online shopping is accessible for consumers(e.g., time, choice, and price), the range of services that online retailers give is limited and consumers can neither touch nor have a realistic anticipation of the goods, frequently performing in a poor online experience(Mooy and Robben, 2002). To address this challenge, online retailers are constantly exploring the use of technology to pretend the factual experience of a real product or terrain(Beck and Crie, 2018; Van Krevelen and Poelman, 2010).

AR is an interactive technology that overlays the virtual 3D model of a commodity into the real world to modify the physical terrain, where druggies can manipulate the 3D model by, for illustration, rotating, moving, and zooming in and out(Poushneh and Vasquez- Parraga, 2017). Using AR, consumers can stoutly interact with products. For illustration, they can test a new camo and try on spectacles in an AR virtual glass. druggies can also see a product placed in certain surroundings(e.g., placing a lounge in a room).

These relations can help online shopping consumers elect products that better meet their requirements. Hence, from an information processing perspective, AR provides a more intuitive, terrain- related interface harmonious with the way consumers process information, furnishing a more effective and affable online shopping experience(Huang and Liao, 2015). former studies of AR relinquishment in online merchandising have generally espoused the technology acceptance model(Huang and Liao, 2015; Pantano etal., 2017; Rese etal., 2017), but the impact of AR technology on the stoner experience remains unclear. Consumers suppose

that AR improves their service experience and reduces decision query(Dacko, 2017). likewise, scholars also punctuate the significance of effectively managing the client experience in service andmulti-channel marketing(Lemon and Verhoef, 2016). therefore, as a new interactive technology applied to the online shopping terrain, it's important to study the impact of AR relinquishment on the stoner experience in online merchandising.

Poushneh and Vasquez- Parraga(2017) showed that AR can reflect four product characteristics, videlicet aesthetic quality, realistic quality, hedonic quality by stimulation, and hedonic quality by identification. Hilken etal.(2017) classified AR characteristics into environmental embedding(EE) and dissembled physical control(SPC). nevertheless, findings from the positioned cognition perspective that explores the impact of AR relinquishment on consumers' value perception and decision confidence remain mixed. In addition, studies overlook how people cognize AR itself and its relinquishment in the online shopping terrain as well as the driving force of AR on druggies ' information processing.

Grounded on the foregoing, this study aims to answer the following question. How does the relinquishment of AR in online merchandising help consumers process product information and also elect products, and what are the driving forces? Drawing on cognitive cargo proposition, the cognitive proposition of multimedia literacy, positioned cognition proposition, and cognitive ignorance proposition, this study argues that AR, in discrepancy to traditional technological tools, can change the information donation of online products, ameliorate druggies' information processing, and ameliorate the stoner experience.

CHAPTER 3

Research Gap

The startup's technology enables customers to create 3D avatars of themselves to try on clothing. However, virtual fitting is not exclusively for online stores; it can also significantly improve the in-store shopping experience. Ralph Lauren, for instance, installed virtual mirrors in its in-store fitting rooms. Virtual Reality creates an artificial environment with software. The artificial environment gets presented to the audiences in a way which encourages them to accept and believe it as a real environment.

Research Objective

1) To analyse and compare socio-demographic profiles of customers for virtual fitting room.
Hypothesis:

H0: There is no significant relation between usage of virtual fitting room and socio-demographic profile.

H1: There is significant relation between usage of virtual fitting room and socio-demographic profile.

2) To analyse the factors affecting using towards virtual fitting room.
   Hypothesis:

H0: There is no significant relation between usefulness of VFR and usage of VFR.

H1: There is significant relation between Usefulness of VFR and usage of VFR.

3) To analyse satisfaction and Loyalty of customers using virtual fitting room.
   Hypothesis:

H0: There is no significant relation between impact of using virtual fitting room towards satisfaction of customers.

H1: There is significant relation between impact of using virtual fitting room towards satisfaction of customers.

CHAPTER 4

Research Methodology

Research methodology is a manner of explaining how a researcher intends to carry out their research. it's a logical, systematic plan to resolve a research trouble. A method details a researcher's technique to the research to ensure dependable, legitimate consequences that address their goals and objectives. It encompasses what records they are going to acquire and in which from, as well as how it's being accrued and analysed.

A studies method offers research legitimacy and gives scientifically sound findings. It also offers a detailed plan that enables to maintain researchers on track, making the manner smooth, effective, and doable. A researcher's technique lets in the reader to recognize the technique and strategies used to reach conclusions.

Research Type

Qualitative Research:

Qualitative research includes gathering and reading written or spoken phrases and textual facts. it can additionally consciousness on frame language or visual factors and assist to create an in-depth description of a researcher's observations. Researchers usually collect qualitative information thru interviews, observation and attention agencies using some cautiously chosen participants.

Quantitative Research

Researchers usually use a quantitative technique while the goal of the studies is to verify something. It specializes in accumulating, checking out and measuring numerical statistics, generally from a massive sample of participants. They then examine the records the usage of statistical evaluation and comparisons. famous techniques used to gather quantitative facts are:

- Surveys
- Questionnaires
- Test
- Databases
- Organizational records

Keywords

Virtual Dressing Room, Augmented reality, Virtual Fitting Room

Data Collection Method

We have applied qualitative research type to study on "Consumer adoption of Virtual Fitting Room during the e-shopping". We have applied a Judgemental or Purposive samples to complete the study on this topic and sample size we have taken 364 user to study and understand the behaviour towards Virtual Fitting Room.

CHAPTER 5

Data Analysis

In this study, data analysis started by inspecting the collected questionnaires to ensure that they are correctly filled. We got more than 300 responses through questionnaire that were correctly filled were included in data analysis. To analyse the data, we have used M S Excel, SPSS software to study it.

Objective of the study

1. To analyse and compare socio-demographic profiles of customers for virtual fitting room.

To study and analyse the relationship between demographic profiles like Gender, Age, Income, and usage of Virtual Fitting Room, used MS Excel and SPSS software. Using this software applied bar chart, pie chart to know the usage of Virtual Fitting Room in regards of demographics

a. This is a graph showing that comparison between use of VFR age wise.
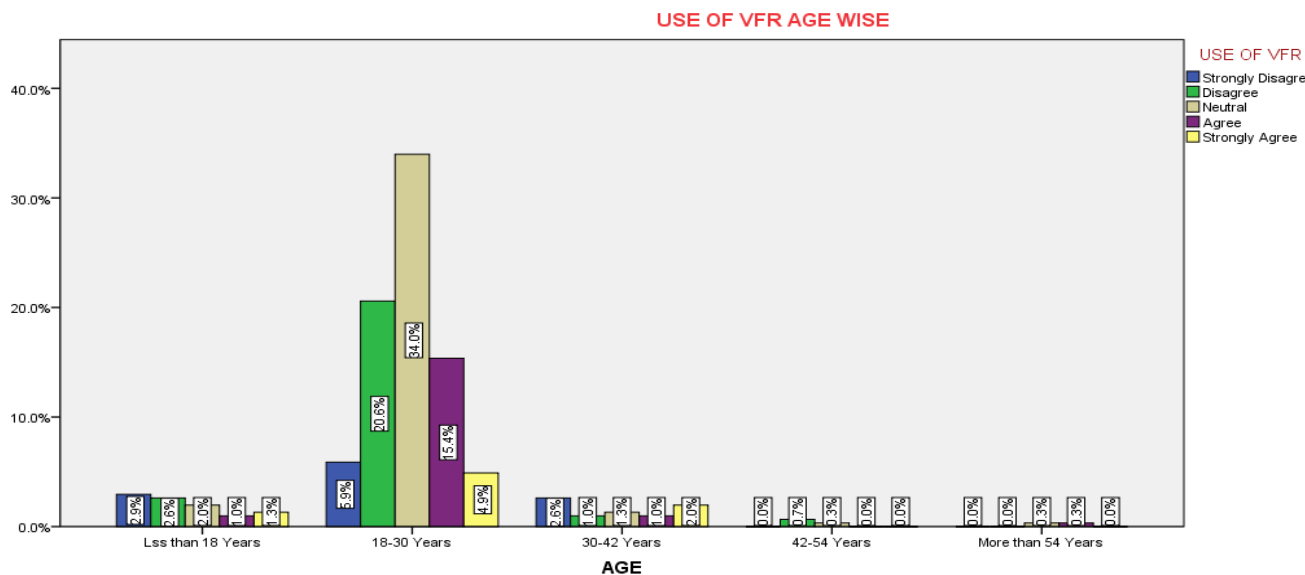
USE OF VFR AGE WISE

This bar chart is used to show that the use of VFR age wise using SPSS software. According to this chart data is showing that between 18-30 years people are responded more in the questionnaire and then between the 18-30 years age respondents are responded as neutral decision. More than 34% respondents of age between 18-30 years are neither agree nor disagree to the use of Virtual Fitting Room.

b. This graph shows usage of VFR gender wise.

USE OF VFR GENDER WISE
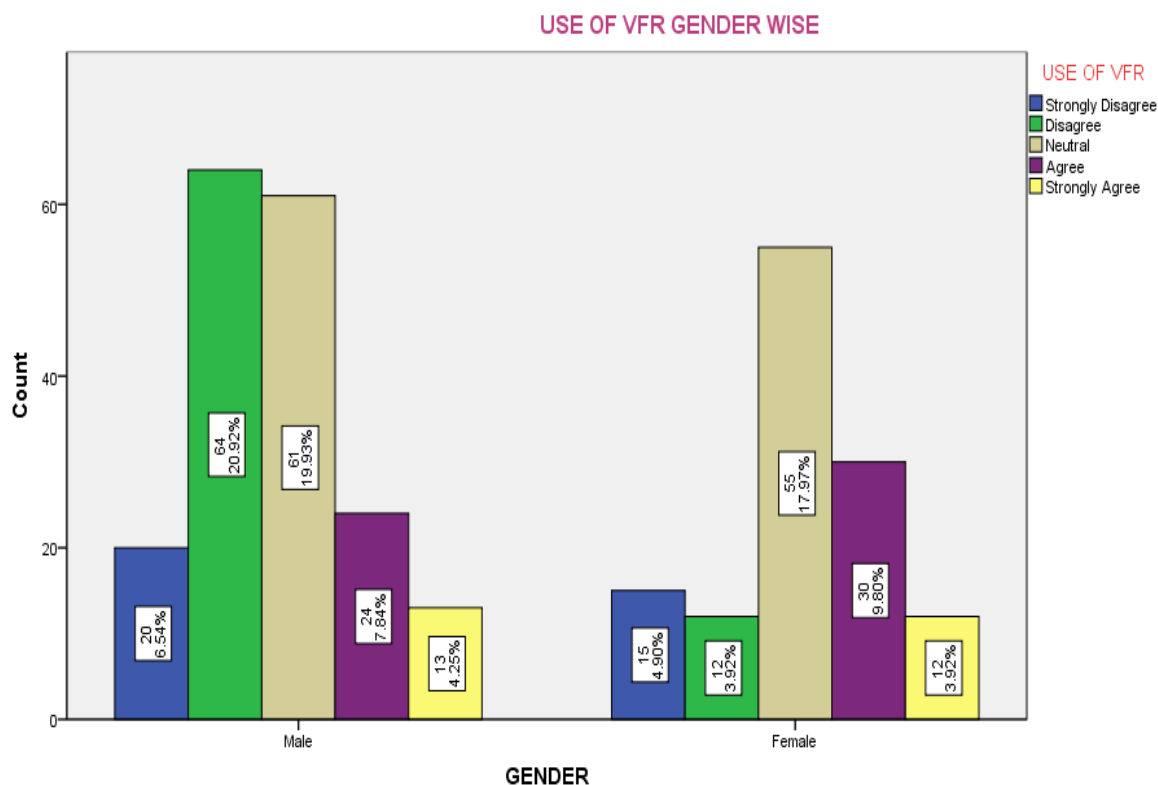
This bar graph shows that the use of Virtual Fitting Room gender wise. This graph is prepared using SPSS software and after analysing this graph it shows that more respondents are from male and then female within that from male category 20% respondents are disagree and only 7% are agree while from the category of above female 17% neither agree nor disagree and only 9% are agree who is using the VFR. This graph tells that how many percentages of people are using the Virtual Fitting Room according to the sample we collected through research.

2. To analyse the factors affecting using towards virtual fitting room.

To study the factor which affects the usage of Virtual Fitting Room, we have surveyed some questions using questionnaire surveys and we got more than 300 responses and after that we have used Excel and SPSS software to analyse the factors that affects the use of Virtual Fitting Room. We have applied factor analysis using SPSS software to know the factors of collected responds. Factor analysis is used to know the factors that explains the pattern of correlations within a set of observed variables. We have applied factor analysis using 10 statements to know the use of Virtual Fitting Room. Following are the results of factor analysis which we have done through SPSS software.

A. KMO Test

KMO is a test conducted to examine the strength of the partial correlation (how the factors explain each other) between the variables. KMO values closer to 1.0 are consider ideal while values less than 0.5 are unacceptable. Recently,most scholars argue that a KMO of at least 0.80 are good enough for factor analysis to commence. Below is a tabular chart of KMO test.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.969
	Approx. Chi-Square	7483.174
Bartlett's Test of Sphericity	Df	253
	Sig.	.000

From our result, we had a KMO value of .969. This indicates that the degree of information among the variables overlap greatly/the presence of a strong partial correlation. Hence, it is plausible to conduct factor analysis. P value which measures the significant which is also lower than 0.05 it means that there is relationship between the variable which we have taken in test to study the factor to the usage of Virtual Fitting Room within the range of sample size.

B. Communalities table

Next table is Communalities table which shows how much of the variance in the variable has been accounted for by the extracted factors. More than 0.5 value is considered for factor analysis and our value is more than 0.5.

	Initial	Extraction
SHOPPING FREQUENTLY	1.000	.567
SHOPPING OCCAISONALLY	1.000	.799
RETURN CLOTHES OFTEN	1.000	.695
ONLINE SHOPPING SATISFACTION	1.000	.655
WILL VFR CHANGE THE SHOPPING EXPERIENCE	1.000	.719
VFR AWARENESS	1.000	.607
EVER USED VFR	1.000	.644
CONCERN ABOUT TIME DURING SHOPPING	1.000	.703
DIFFERENCE BETWEEN EXPECTATION & REALITY USING VFR	1.000	.473
CONCERN ABOUT CLOTHES SIZE	1.000	.713
RETURN CLOTHES WHEN ISSUE WITH SIZE FITTING	1.000	.713
EASILY PRODUCT RETURN	1.000	.780
REPURCHASE WHEN DIFFERENCE IN RESULT USING VFR	1.000	.446
REPURCHASE WHEN VFR RESULT IS SATISFIED	1.000	.729
VFR SAVES TIMES	1.000	.758
VFR DATA SAFETY	1.000	.710
VFR EASY TO USE	1.000	.791
VFR USEFULNESS DURING E-SHOPPING	1.000	.774
VFR ENHANCE THE SHOPPING EXPERIENCE	1.000	.764
VFR REDUCES THE RETURN %	1.000	.823
SATISFACTION WITH E-SHOPPING	1.000	.765
VFR IS USEFUL	1.000	.834
RECOMMENDATION OF VFR	1.000	.787

Extraction Method: Principal Component Analysis.

C. Total Variance Explained

Eigenvalue reflects the number of extracted factors whose sum should be equal to the number of items that are subjected to factor analysis. The next item shows all the factors extractable from the analysis along with their eigenvalues.

The Eigenvalue table has been divided into three sub-sections:

Initial Eigen Values

Extracted Sums of Squared Loadings

Rotation of Sums of Squared Loadings.

For analysis and interpretation purposes we are concerned only with Initial Eigenvalues and Extracted Sums of Squared Loadings. The requirement for identifying the number of components or factors stated by selected variables is the presence of eigenvalues of more than 1. In following table shows that for 1st component the value is 15.099 > 1, 2nd component is 1.148 > 1. Thus, the stated set of 23 variables represents 2 components. Further, the extracted sum of squared holding % of variance depicts that the first factor accounts for 65% of the

variance features from the stated observations, the second 4.990%. Thus, 2 components are effective enough in representing all the characteristics or components highlighted by the stated variables.

Component: As can be seen in the Communalities table, there 23 components shown in column 1 under table.

Initial Eigenvalues Total: Total variance.

Initial Eigenvalues % of the variance: The percent of variance attributable to each factor.

Initial Eigenvalues Cumulative %: Cumulative variance of the factor when added to the previous factors.

Extraction sums of Squared Loadings Total: Total variance after extraction.

Extraction Sums of Squared Loadings % of the variance: The percent of variance attributable to each factor after extraction. This value is of significance to us and therefore we determine in this step that they are three factors which contribute to why would someone buy a particular product.

Extraction Sums of Squared Cumulative %: Cumulative variance of the factor when added to the previous factors after extraction.

Rotation of Sums of Squared Loadings Totals: Total variance after rotation.

Rotation of Sums of Squared Loadings % of the variance: The percent of variance attributable to each factor after rotation.

Rotation of Sums of Squared Loadings Cumulative %: Cumulative variance of the factor when added to the previous factors.

D. Scree Plot

The scree plot is a graph of the eigenvalues against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. It can be seen that the curve begins to flatten between factors. Note also that factor 3 onwards has an eigenvalue of less than 1, so only two factors have been retained.

Scree Plot
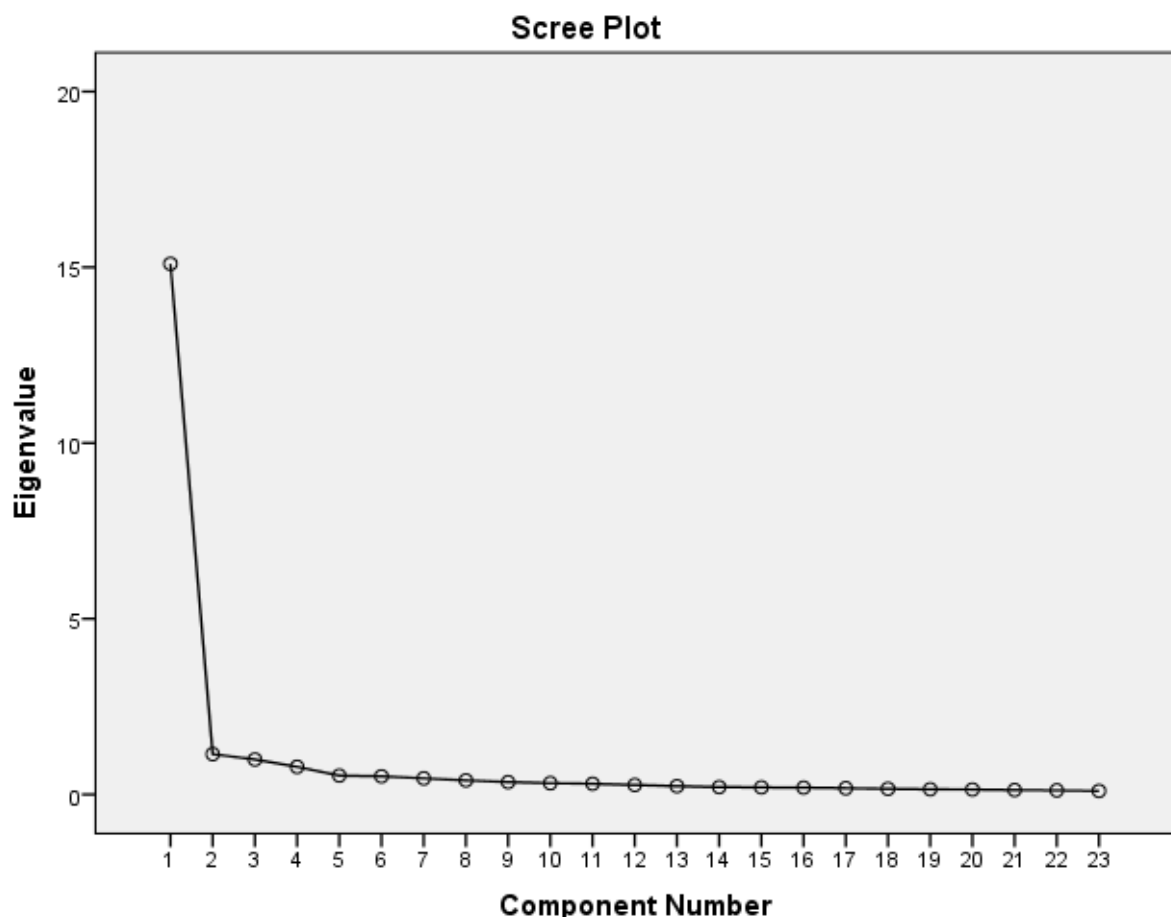
E. Rotated Component Matrix

The idea of rotation is to reduce the number of factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier. Looking at the table below, we can see that use of VFR, and relation with different factor which affects which was designed in questionnaire. In contrast, experience with the VFR, the use of the VFR, and the usefulness of the VFR are substantially loaded.

If the value is lower than the required value of 0.5 or the set limit (which could be 0.6 too as per the researcher's need of including the desired factor loading) for one of the components, then that variable could be considered for further analysis.

Rotated Component Matrix[a]

	Component	
	1	2
SHOPPING FREQUENTLY	.628	.415
SHOPPING OCCAISONALLY	.047	.893
RETURN CLOTHES OFTEN	.403	.729
ONLINE SHOPPING SATISFACTION	.658	.471
WILL VFR CHANGE THE SHOPPING EXPERIENCE	.697	.483
VFR AWARENESS	.717	.305
EVER USED VFR	.731	.331
CONCERN ABOUT TIME DURING SHOPPING	.787	.291
DIFFERENCE BETWEEN EXPECTATION & REALITY USING VFR	.533	.435
CONCERN ABOUT CLOTHES SIZE	.781	.320
RETURN CLOTHES WHEN ISSUE WITH SIZE FITTING	.757	.374
EASILY PRODUCT RETURN	.793	.389
REPURCHASE WHEN DIFFERENCE IN RESULT USING VFR	.471	.474
REPURCHASE WHEN VFR RESULT IS SATISFIED	.806	.280
VFR SAVES TIMES	.828	.269
VFR DATA SAFETY	.764	.356
VFR EASY TO USE	.851	.258
VFR USEFULNESS DURING E-SHOPPING	.851	.222
VFR ENHANCE THE SHOPPING EXPERIENCE	.831	.271
VFR REDUCES THE RETURN %	.877	.233
SATISFACTION WITH E-SHOPPING	.831	.274
VFR IS USEFUL	.877	.255
RECOMMENDATION OF VFR	.849	.256

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

After analysing the result of above table, the value which is more than that is acceptable to categories to know the factor which affects the usage of VFR. We have created two factor first factor is Increasing the use of VFR and in this factor variable is added whose value is more than 0.5 and second factor is Decreasing the usage of VFR that is whose value is less than 0.5.

**3. To analyse satisfaction and Loyalty of customers using virtual fitting room.**

To study the satisfaction and loyalty of customers using Virtual Fitting Room, we have survey through the questionnaire and analysed the result using MS Excel and SPSS software. We have shown the data through graphs using SPSS software. We have taken some variable which can define the satisfaction level of customer to the usage of Virtual Fitting Room.

   **a.** This graph shows the easiness to use VFR.
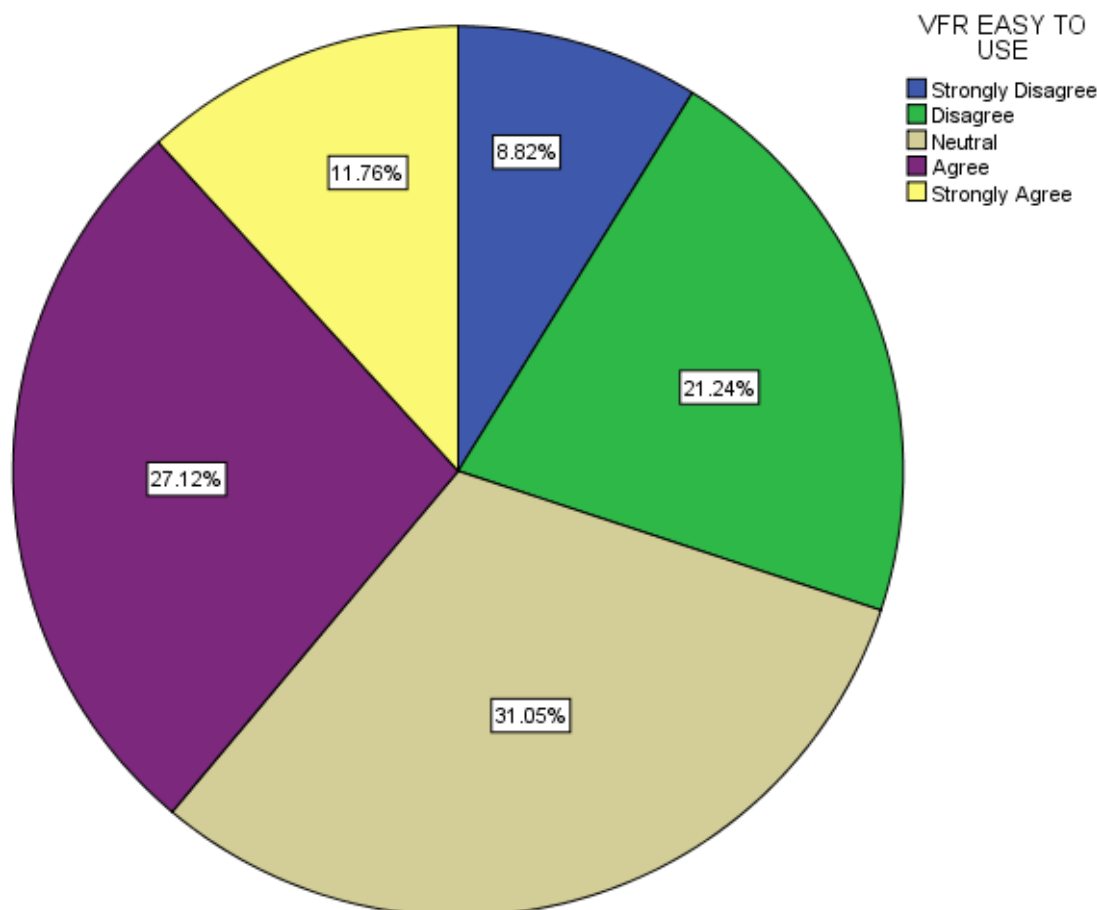
This pie graph shows that how easy or difficult the VFR is to use. After analysing the graph it shows that 27% of the user are agree that it is easy to use and 31% are not sure they are neither agree nor disagree and 21% of the user of disagree that it is easy to use.

b. This below graph shows that VFR is useful or not. After analysing the below graph it shows that 23% user are agree that VFR is useful while 32% user are not sure either is useful or not and 22% user are not agree that it is useful so the below graph is bar chart which shows the percentage of usefulness of Virtual Fitting Room using the collected data through questionnaire using SPSS software.
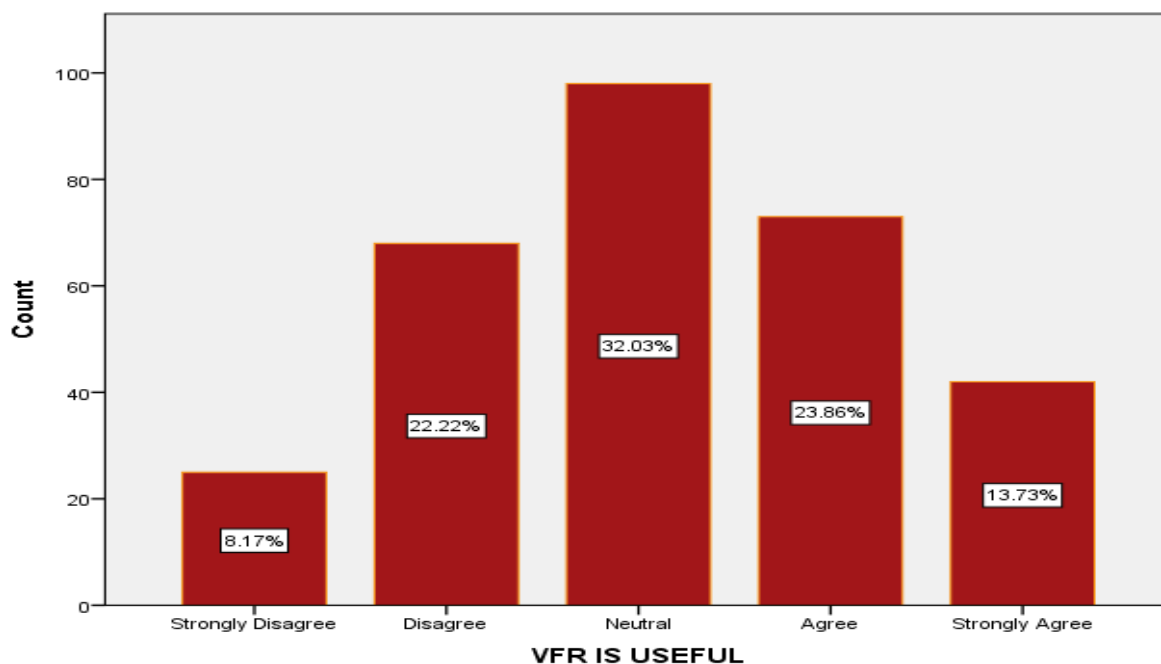
c. This below graph shows the how many user are satisfied with the VFR.
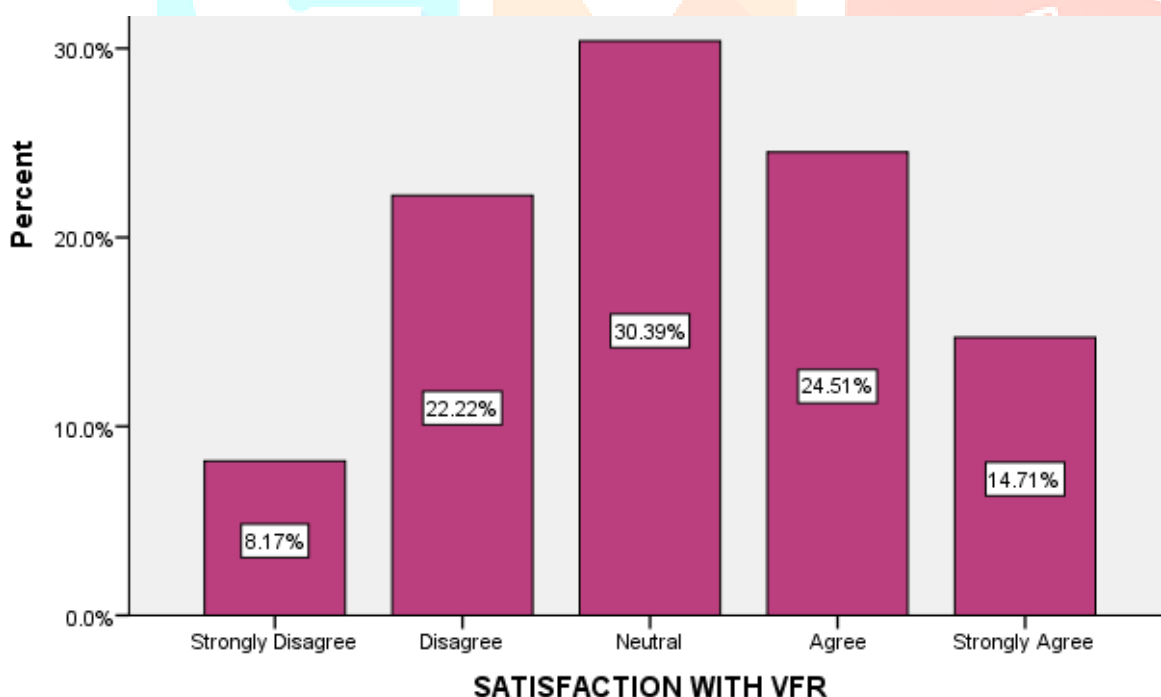
On the above bar chart, graph is showing that only 24% user are satisfied with the Virtual fitting room and 22% user are not satisfied with VFR while 31% are not sure about their decision either they are satisfied with the Virtual Fitting Room are not.

CHAPTER 6

Conclusion

In conclusion, the literature review reveals that within behaviour change research in consumer domains, findings in VR environments generally mimic the findings from equivalent studies in real-life settings. Therefore, VR can potentially be used as a more efficient, more controllable environment to test interventions in. It is important to keep in mind though that these types of studies are still relatively scarce in consumer domains, have mostly used small student samples and have so far been mostly conducted in the food domain. Furthermore, VR has already proven to be an effective tool to support behaviour change in a variety of consumer domains, such as food, clothing, and tourism. The more immersive the VR context is, the more effective interventions typically become in the extent to which behaviour change is realized.

Technological developments are following each other rapidly. At the moment, the full potential of VR is not yet used often in consumer research, for instance in terms of its interactive capabilities, but that is also likely a result of the novelty of this technology in this type of research. The current review shows that although there are many research gaps and critical notes, the use of VR for consumer research seems highly relevant to further advance the field of consumer studies that aim to promote behaviour change. The reduction in returns of unwanted fashion products reported in this study are impressive, but they are based on anecdotes. Retailers and the academic community will benefit from a comprehensive study that compares the change in returns and sales following the adoption of VDR technologies. We encourage empirical research that documents the adoption of the VDR technologies in the fashion industry and other online categories in which the ability to try on items is important.

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