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VIRTUAL APPLICATIONS USAGE FOR PURCHASING OF PRODUCTS: CHANGING TRENDS IN NEW ENVIRONMENT

ABSTRACT: The global pandemic COVID-19 is found to have a profound impact on lives of consumers and due to its fear the consumers are uncomfortable about visiting public places, shops, malls etc. E-commerce or online shopping is changing its trends to get ahead in the market on a fast pace in competitive scenario. Many online retail companies, amidst of the COVID-19, have come up with applications that provides the customers with their ability to try their products virtually. The 3D imaging technologies are used by the companies for facial recognition to deliver a life-like immersive try-on experience for customers to discover a different range of designs of various products. This includes eyewear trials, jewellery and a number of apparel retailers are opting for virtual fitting rooms as well.

There are different tools and technology available now days which can provide consumers for purchasing purpose without going to the physical retail shops. For virtual face recognition, third party Desks or plugins are generally used. There are another few technologies like Virtual Reality (VR) technology along with its sister technology Augmented Reality (AR) technology. These are in the form of VR headset devices and AR smart glasses. Consumers have embraced this type of new environments for online purchasing of certain products. These changes are no doubt temporary according to the present situation. As the community has to move beyond the survival mode, the drive of digital adoption will carry forward to become permanent.

Key words: *Pandemic, Survival, Virtual, Online, Purchasing, Products, Adoption, Image, Technology*
JEL Codes: *D2, D7, H3, O3*

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INTRODUCTION

Virtual Stores are the new concept accepted everywhere now, even in most of the Asian countries due to various reasons. In the mid-1990s, the new phase of digital marketing started almost everywhere. The virtual concept was first implemented in South Korea by TESCO (Akbar Waqar, 2014). During 90s, online shopping was in initial stages via e- commerce. Most of the consumers are still unwilling to buy online because of certain reasons.

It was important for retailers to understand regarding online purchasing as to what motivates the consumer and the factors which acts as the barriers to make process smoother.

To encourage online purchase the process like tactics, messaging and incentives could be developed. The product which was ordered first time in 1995 online on Amazon was a book. Some of these digital changes will be temporary, others will be permanent. The momentum of digital adoption will move forward as the community moves beyond the survival mode, and may become permanent.

The retail market of India is categorized as organized and the unorganized retail sector. The organized sector where trading activities are undertaken by licensed retailers and registered for sales tax etc. It also includes the corporate-backed hypermarkets and retail chains along with online shopping sites (Halan, Dr. Deepak, 2020). Unorganized sector includes conventional family run neighborhood stores which are about 13.8 million in number. The organized retail sector is less than ten percent that is existing now. Some percentage of population still like to purchase from neighborhood stores as they are provided with touching and feeling of the products and negotiating discounts over-the-counter as well before buying it. As the B2C e-commerce sector in India is prospering, they have started offering bargains such as free delivery, discounts, buy-one-get-one-free and exchange offers etc. In India, a great majority of B2C ecommerce retailers now is attracting customers to shop online and the sales have picked up gradually. Indian shoppers are cost-conscious and conservative as a part of their value system, so they are not attracted towards promotions and advertisements easily. The online shoppers/consumers sometimes have faced problems related to product delivery timelines and from customer support services (Akbar Waqar,2014). The customers' perception of risk toward online web sites is due to the inferior IT set-up which have resulted in hacking of personal information.

There are various reason for using virtual application, no doubt, due to COVID-19, the use has been increased now as people are not allowed to

move out. People are busy in their daily life and are finding new ways of shopping which is quite diversified (Akbar Waqar,2014). People are not usually interested because of lack of time for shopping at stores rather they prefer someone to do this work for them. The virtual store can be a great help to the consumers who do not wish to visit superstores and can do their shopping online. The people are excited to have such stores in their countries. This technology has changed world round the globe. This technology has helped system of every sector in industry making things easier and faster by its utilization.

Due to the breakdown of coronavirus pandemic (Halan, Dr. Deepak, 2020), being highly infectious in nature, which led persons to stay at home and work from home. The people were introduced to live with new normal that changed people's shopping habits. The fear of causing infection avoided people to shop outdoors.

In this period, there was much demand of online shopping for requirement of various things. The online shopping usage has increased globally. In India and in other countries, the first-time-e-commerce-users, i.e. FTUs, have suddenly increased, who were resisting shopping online before. Consumer behavior showing new trends may be due to changes in discretionary income, spare time, and reconsidered values and priorities.

For example, Amazon, leading e-commerce site has informed their experience that the customers are trusting on their services during COVID-19 period of social distancing and self-quarantine efforts. This is not all; many retail companies have come up with applications that provides the customers with ability to try their products virtually. The facial recognition technology and 3D imaging technologies are being used by the retailers. This will provide consumer a life-like immersive try-on experience for customers to discover a range of different designs. This includes eyewear trials, jewellery and a number of apparel retailers are opting for virtual fitting rooms as well. For virtual face recognition, third party Desks or plugins are generally used.

Families are welcoming the opportunity to find new ways of socializing by connecting virtually. New normal environments have been accepted by the employees and they will continue work from home concept in the future. They are now eager to purchase online via virtual shopping. The working class people normally don't have enough time to go for shop. For them, these super stores may become virtual shopping stores. The world has been moving ahead.

Though, the new technology is at its development stage, this new idea of introducing virtual model shopping center is relatively new and

imperative. These kind of superstores are introduced in many countries. These virtual stores provide customers smart phone friendly online shopping system, and goods will be provided to them at their door step.
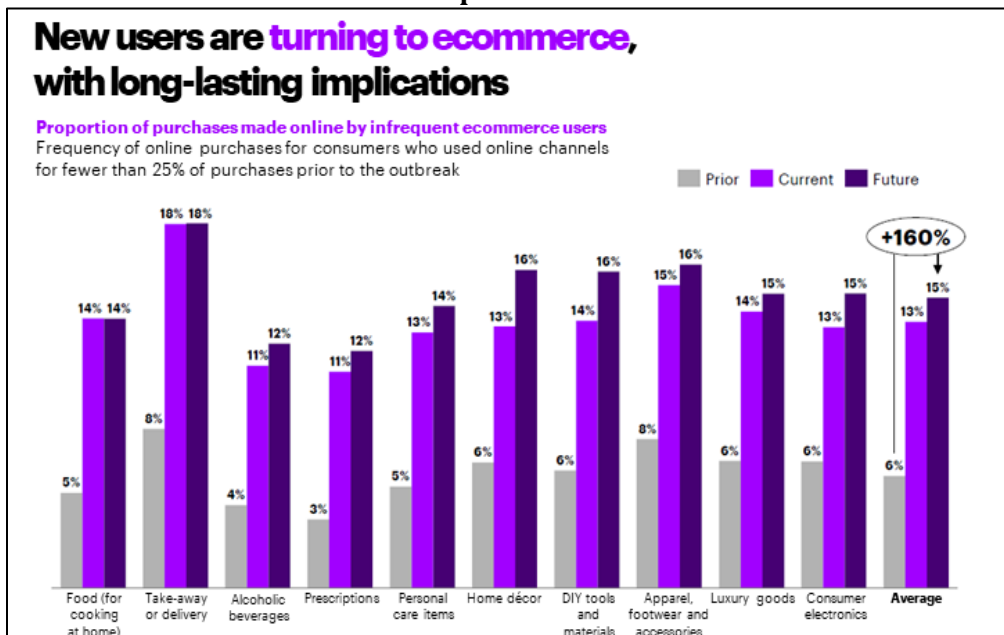
REASONS CONSUMERS SHOP ONLINE

Figure 1. Variation in perception during shopping online
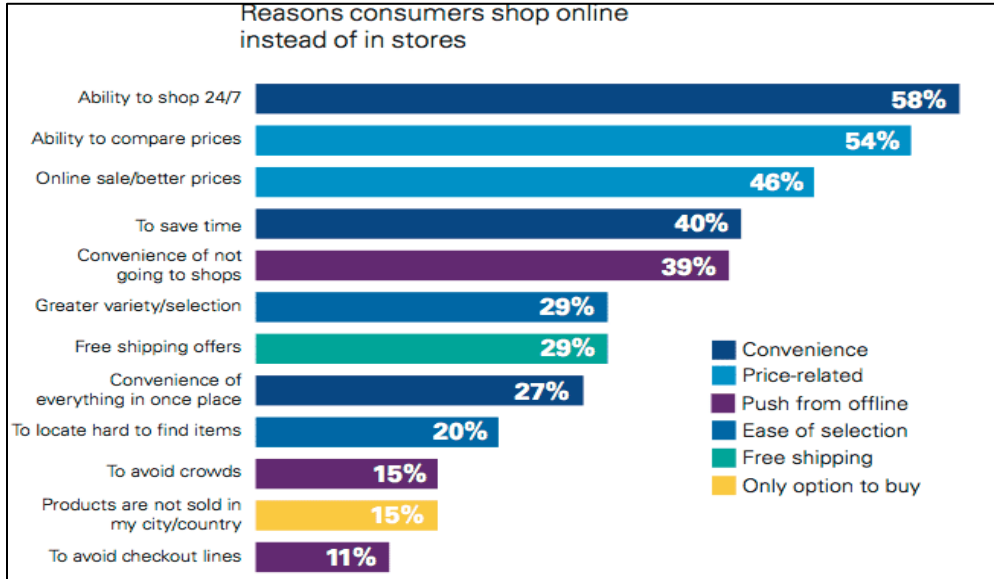
Source: Global Online Consumer, Report- KPMG International, 2017

Figure 2: New users are turning to e-commerce with long lasting implications

Source: Accenture COVID-19 Consumer Research, conducted 17-27 April 2020

Acceptance of online purchasing has made industry easier to reach people and showcase their product (Chaffey Dave, 2017). There are certain categories of purchase, where consumer is still reluctant to buy online. Retailers, who are operating online are still working to encourage consumers for online conversion. The figure 1 above shows the main reasons of consumers for online shopping.

A new report from KPMG describes the most detailed research evaluating the consumer psychology of purchase, broken down by different countries, to understand consumer behaviour and motivations. This pandemic due to COVID-19 further boosted the requirement of online purchasing. This was the major shift in customer behavior, i.e., the reluctance to mingle in crowded public places and higher propensity for digital adoption (Global Online Consumer, Report- KPMG International, 2017). This is shown in figure 2.

Following are the other reasons for online purchasing:

1. Ability to shop anytime throughout the year.
2. Ability to compare prices of me-too products.
3. Online sale/better prices of competitive websites.
4. To save time to see products.
5. Convenience of not going to shops.
6. Greater variety/selection from different sites.
7. Comparisons of free shipping offers provided by various companies.
8. Convenience of getting everything in one place.
9. To locate products & hard to find items are easily available on websites.
10. To avoid crowds so online preferred.
11. Products not sold in city but available online.
12. To avoid checkout lines during payment etc., this is really cumbersome physically, so online preferably used.
13. Research by New global consumer shows that consumers have accepted new normal and their lives have changed in this pandemic period (Accenture.com, 2018).
14. There is a change in income and leisure time with consumers and this is influencing attitudes and behaviours of consumers ((Reddy Aneesh, 2014).
15. Consumers preferring to shop with greater awareness of the environment, health and cost. They are favoring locally-sourced products and neighborhood stores.

16. Huge rise in digital commerce was seen amongst new or low-frequency consumers. It is likely to continue post-pandemic. Around the world, changing attitudes, behaviours and habits of consumers was monitored. The consumers adapted to a new reality of purchasing virtually.

17. Retail consumers frequently have embraced digital commerce and omnichannel due to lock-downs when many stores were shuttered. Earlier, it was used as a way of modernization and status symbol. But, now days E-commerce has surged suddenly. Consumers have increased use of omnichannel services like contactless payment, social commerce, virtual consultations and curbside pickup. New behavior is reflected as a new normal that they have planned to continue.

6Cs OF ONLINE COMMERCE

This research has been presented and developed by Dave Chaffey (Chaffey Dave, 2017). Following are the 6Cs of Online Shopping or for motivating Consumer which has been adapted theoretically:

1. Content about the product
2. Customization of product according to preference of consumers
3. Community as a consumer
4. Convenience for all
5. Cost Reduction overall
6. Choice of consumers

E-COMMERCE INDUSTRY: FUTURE OF ONLINE BUSINESS

The e-commerce industry has made 2 trillion US dollars in sales worldwide in last two decades and it's increasing day by day. E-commerce, no-doubt, has revolutionized the retail sector. E-commerce has progressed and meeting the needs of people. It is facilitating online shoppers. It has customer friendly characteristics, like, customization of products, policies of returning products, or improved integration, and virtual shopping, etc. have enhanced the world of e-commerce. And the year 2020 has further transformed the world of e-commerce. These e-commerce trends will prove that it is not only rapidly growing but it is here to stay. E-commerce developments ensure steady growth of online business store in future.

Following are the advantage of emerging trends in the e-commerce industry through online (oberlo.com, blog, 2020):

1. Online Sales Growth is going to be persistent : E-commerce sales have been growing constantly since a decade. As the websites have been made more customer-friendly, online shopping has become popular online activities. The online sale is showing growth because it is providing comfort to the consumers.

2. The Future of E-commerce after COVID-19 period: Due to the pandemic-COVID 19, the governments worldwide implementing lockdowns to restrict social movement for months to combat the coronavirus. So, people are mostly dependent on online shopping to purchase items. It has now been assumed that this new normal will bring behavioral shift towards digital purchases permanently.

3. Mobile Shopping is growing continuously: There is a parallel growth in e-commerce by the increase in mobile devices usage. People while shopping online, are also browsing and doing a survey before making their purchase. Mutual trust between seller and consumer in online shopping is increasing. Consumers are comfortable while shopping on mobile devices than ever before.

4. Rise of Voice Commerce among Users: Voice shopping is a new growing trend among Internet users. Voice shopping is a type of non-visual experience. For example, thirteen percent of U.S. smart speaker owners made purchases by voice during 2017.Growth will multiply to 55% by 2022 (OC&C Strategy Consultants, 2018). In this case, verbal description of the product is selected by customers which they want to purchase. This process save their time as the scope of browsing is restricted for a product before actually selecting it.

5. E-commerce: Role of Social Media: The social shopper's number is increasing very rapidly. For example, for shopping purposes, the consumers are asked to press the 'Buy' button on Facebook, and Instagram Checkout. Social media is important in the e-commerce world.

6. Environmental related topics influence Online Buyers: Green consumerism is increasing worldwide. There is a growing concerns of environment amongst the digital consumers which impact their purchasing decisions. As, various resources are being saved while avoiding visiting the shops physically. E-commerce businesses are striving to create more sustainable practices for future. Online businesses practices must ensure that it is environmentally friendly.

7. Role of Artificial Intelligence in E-commerce: According to the report of Business Wire 2018, the expenditure on Artificial Intelligence (AI) will reach $7.3 billion per annum by 2022 from $2 billion in 2018 (BusinessWire,2018). This is the result of the opportunities targeted by retailers to increase personalization of the customer experience. For example: virtual purchasing with face recognition, VR and AR etc. Research and survey convey that retailers are investing heavily to gain competitive advantage by serving customers by introducing various tools.

8. Augmented Reality transforms ways of Shopping: It has been estimated that Augmented Reality (AR) technologies will be used by many stores and providing much richer buying experience to consumers (prnewswire.com/, 2018). This application AR will get a boost only after motivating the retail workforce and online shoppers. People had concerns while shopping online, i.e. AR technology will help consumer to see and judge the product online. They can easily see the product which they want to buy. AR experiences will bring change in the perception of online customers. AR will help customers to know about products that they had planned to meet their demands.

9. The rise of Visual Commerce: E-commerce store has to face a great challenge so this app gave a chance to see product physically. This is where the visual commerce grabbed the opportunity. Visual commerce facilitates not only using product photos to market business, but it also incorporates other tools. The other visual tools to bring wider choice for consumers are:

- consumer-generated media,
- interactive content,
- engaging videos, and
- augmented reality.

10. Personalization is the Future: According to the survey. the shoppers prefers to have personalized online experience (Bazaarvoice,2018). More than seventy four percent of marketers believe that enhancing relationships with customer has a great impact in concept of personalization (Evergage,2018).

It is one way of keeping customers satisfied. People value this experience and respect product modified according to their need. Industry should promote the best product and store recommendations online for shoppers.

NEED OF VIRTUAL APPLICATIONS:

Reasons for shopping in-store

The consumers get satisfaction when they physically see the product of their choice and try to feel it via touching, testing, etc. before purchasing. This process was replaced by online merchandising techniques like interactive product shots, VR and AR which helped with the need to see/touch/try the product. It is about maintaining trust factor to reassure the credibility of the supplier and to provide human-assisted options online (Chaffey Dave, 2017).

Figure 3: Graph showing reasons to shop in store instead of online
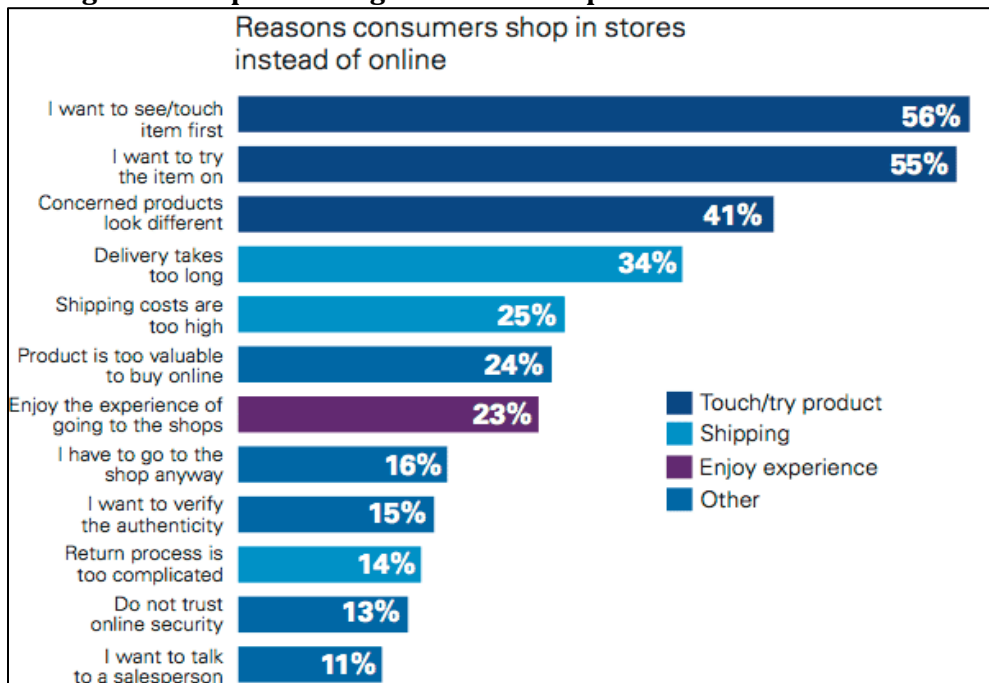
Source: Global online consumer, KPMG International, 2017

VIRTUAL APPLICATIONS: TECHNOLOGY

There is a rise in virtual applications where consumer would be able to purchase various products and can have a touch -feeling while sitting at home using 3 ways virtual reality which has transformed e-commerce. The retail industry will be creating a new field for itself with the introduction of mobile VR and AR technology (with head set). It is likely to be adapted by curious customers. To remain in competitive scenario of online commerce, the retailers as well as consumers has to learn and flourish at the same time.

In some of the case, Image processing is used. Image processing, the process where signal processing techniques is applied to the domain of Images i.e. two-dimensional signals such as photographs or video (ijesi.org, 2018). This application is widely used for processing digital images. The other meaning of this process- 'Analyzing and manipulating images with a computer'.

The image processing has the following important applications in the field of science and technology which include computer vision, feature extraction, remote sensing, face detection, forecasting, optical sorting, optical character recognition, finger-print detection, argument reality, microscope imaging, lane departure caution etc. In this process, three widely used spatial-domain image processing algorithms is implemented: a) linear convolution, b) median filter, and c) anisotropic diffusion.

After the introduction of method by Viola and Jones (2019) to accurately and rapidly detect faces within an image, the technique was soon adapted for the same purpose. The area of the image to be analyzed for a facial feature is regionalized. It is regionalized to the location with the highest probability of containing the feature. False positives are eliminated while regionalizing the detection area. The detection speed is increased due to the reduction of the area to be examined.

The human face detection plays a basic role in many applications of computer vision like video surveillance, face recognition, image retrieval, etc. (Horak Karel, 2012). Colour transformations methods are used as advanced techniques such as boosted cascade of simple features or face symmetry detection. All these presented techniques are based on completely different principles and each method is suitable for specific applications.

For example, in Lenskart frame and lenses, the process used in virtual wearing and testing is called DITTO. It is a US based startup which provides 3D face mapping (Dow Jones, 2012). 'DITTO' is a company, sells software that aids eyewear companies. It sells products through online using virtual fitting. The company uses virtual fitting technology to let customers try on frames and order lenses too from a computer. The technology measures a user's face by homing in on pupils, ears, cheekbones, ears and other facial landmarks. And, then come back with images of dozens of different pairs of glasses that might be a good fit. Lenskart has also invested US $1 million in DITTO.

The technologies like VR (Virtual Reality) and AR (Augmented Reality) will certainly help to improve online sales (Toptal.com, 2019).There is a need

to understand these technologies which can be offered as a service with the product to enterprises and clients alike.

USAGE OF VIRTUAL APPLICATIONS IN PURCHASING VARIOUS PRODUCTS:

1. Experiencing try-on of 3D virtual jewellery by customers: The CaratLane retailer of online jewellery recently launched the CaratLane app that would deliver a 3D virtual jewellery try-on experience by customers. Now, this application will facilitate women to try out thousands of jewellery pieces with 3D virtual jewellery try-on app without visiting the store physically. Here, the application used will provide a life-like immersive try-on experience by facial recognition technology and 3D imaging technologies. In this manner, the customers were able to try –on and discover various jewelleries through CaratLane App and buy them (business-standard.com, 2020). This application has opened the door for other products too and would be shortly followed by try-on features soon. The CEO Mr. Sacheti said that this application will provide a life-like immersive try-on experience and will be an addictive experience for women especially for purchasing jewellery and garments.

2. Exploring virtual showrooms by consumers: Now, the retailers can explore more for building virtual showrooms or virtual stores to add a new level of online shopping experience for their customers. It provides the customers the same experience as they feel during physically getting into the stores and trying the products like jewellery etc. virtually from the comfort of their own home.

Lowe's Holoroom is performing in a major way in this emerging technology. Lowe's Innovation Labs can help its customers to visualize a home improvement project by using a virtual showroom to get a better result. This tool is leading and moving ahead in terms of virtual showrooms.

This application will enable the customers to view the first look or mocked-up version of their homes fitted with various items or products. The entire scene would be virtually generated version of a home, and will give the immersive experience as to how various products would work as one. Lowe's Innovation Labs technology has been available from 2014 and the VR product has steadily been growing since then in popularity.

3. Virtually visualization of product: This application will provide an opportunity for consumers for visualization of product before purchasing. It is like providing the facility of 'try before you buy' novelty to attract the customers which many companies are trying to tap into. The companies

are exploring more into the realities of AR (Augmented reality) than on VR which is a completely computer generated world technology.

4. Difference between Augmented Reality and Virtual Reality: There is a difference between these two applications i.e. Augmented reality and VR, Virtual reality. In AR application, the user see is a video of reality and few overlaid virtual elements. For example, a consumer can see the room where they were standing instantly after putting on a headset in case of AR. AR application then allows products to be overlaid on top of their view. The consumers would be able to see either a dress or any other product which they have thought of, to buy. AR provide better visualization than physical items in physical stores and consumer can choose everything that fits into their day to day life. The retail giants like Converse and Lego is trying to motivate customers by the use of AR technology.

A new level of interaction for customers has been provided through these forms of virtual visualization. VR is a step ahead of AR. In VR, instead of simply reading out the product description on packaging, it also facilitates that how the product will look on them physically, like trying on a jewellery or any fashionable garments etc. by just pressing a button.

5. Visual application : a reason to visit store: It has been noticed by the marketers that preference of shopping by many consumers still is from a physical store. But statistically, the e-Commerce market is showing an increasing growth than the past. This means, that the trend is more towards experiencing the convenience of shopping by the customers. Now, the responsibility is on the e-Commerce leaders to present online shopping in a way that can imitate more like being physically inside a store.

6. VR online stores market: The trend of virtual version of stores is being accepted slowly and gradually as it was seen frequently during pandemic by COVID-19 when no one was allowed to go out and shops were shut down for longer time. The traders learnt to create a virtual version of their stores for the VR market. This version can either be a replica of a store or a fabricated environment to have complete control on application. Traders could design the space and could update it in line with customer trends and product preferences.

7. Presence of AR in physical stores: AR devices can offer in-store engagement to make the experience appealing to consumers. The app allow companies to launch additional content and extra information in their stores. An example in steps:
- A customer can walk into any given store.
- He can pick up an AR headset and can start to wander around.

- While looking at different items, description boxes will pop-up to tell them about the product they are looking for in virtual store.
- A contest box may appear on their device screen asking them to enter an in-store promotional game.

These features enhances the shopping experience than simple reality. It will be a heightened version of reality and an immersive experience.

8. Connecting VR and AR: E-Commerce companies is trying to attract customers to their store. Due to massive competition and sometimes pandemic like situation, the companies are using both VR and AR technologies to achieve goal either in a physical or online sense. These app allow shoppers to engage into the commerce experience. This app making the customers feel as if visiting both online and physical stores. The retailers and e-Commerce companies are in a position to incorporate these technologies into everyday customer service offerings. The pace of trends of VR and AR technology sound futuristic and soon will be available to the wider consumer base.

Figure 4: Virtual Applications on Mobile, AR

Source: Augmented Reality, shopify.in, 2018

From the past few years, Augmented reality (AR) has shown its presence and given solutions in retail sector (Forsey Caroline , 2018). According to the survey, 75% of consumers now prefer to experience augmented reality version of retail store (Forsey Caroline, 2018). In long term, the customers will get satisfaction through AR and the brands may take advantage of augmented reality to reach to more number of people. Assumptions are being made that AR will do wonders in retail sector in the years to come in various ways.

Following are the ways of transforming retail and strategy of retail through incorporation of AR:

1. To Try on 3D Products Virtually: There is a situation when any person feels quite embarrassing and uncomfortable in trying a new jeans when store is crowded with customers. It can discourage customers to try and check new products, AR can really help in this case.

Brands have started using AR to come out of these challenges. LCST Lacoste, for example, uses Lacoste AR app by which customers can try on their shoes virtually. There was a response from 30,000 users who had used this app.

2. Visualizing 3D Products in Home: Many a time, visiting and visualizing in a store does not give the idea that how it look at their homes. So, this problem can be solved by application of AR to see products in home in virtual way before purchasing by the customers. For eg; Magnolia Market and Shopify AR team jointly created an app to see looks of products in their homes. Magnolia Market's specifically with help of Augmented reality helped customers to see their furniture fixed at their homes.

3. To Gather In-Store Information about Product: Nowadays, for gathering product information and prices in stores, nearly 60% of shoppers explore using mobile phones. Augmented reality app providing answers to the problems of shoppers in easier way. For eg, an American Apparel created an AR app where customers can scan signs in-store for all information of products, reviews of customer, pricing and choosing color altogether.

4. Using Fitting Rooms Virtually: During festival shopping seasons, the fitting rooms, is limited for shoppers. The customers avoid checking and trying new clothes in a crowded store. All stores wants to increase the foot fall of customers.

Figure 5: Virtual Fitting Room

Source: AR DOOR Moscow, 2011

To avoid all these hassle marketers using app. For eg; Topshop and AR Door jointly used Kinect motion sensing technology at Moscow to create a virtual fitting room for customers. Customers could see themselves by standing in front of the camera and check if the clothes fit on them without trying physically. The picture given below speaks all about the app.

5. Building Brand Awareness through AR concept: AR concepts used as an innovative and modern tool had given advantage to many retail stores during 2018. Augmented reality is becoming unique and surprising increasingly. For eg; geolocation and AR app was used by Airwalk, an "invisible" pop-up shop was created. Another objective was to promote the relaunch of the Airwalk Jim. Customers would get an entry using Airwalk's app and purchase the shoe virtually. Building brand awareness of Airwalk through AR was successful.

CHALLENGES IN VIRTUAL SHOPPING

According to CCS Insight, 77.24% of shoppers just left the products before making a purchase. These challenge were faced by the retailers for convincing customers to purchase online. To bring end to this problem, VR app was used by retailers. AR, its sister technology, has the potential to reshape the world of retail. Nearly, a third of customers believe more investment required in these technologies as they will play an important role in shopping.

Following are the challenges in virtual applications:

1. Performance and availability suffer due to depleted resources (f5.com, 2008): Performance issues is created by a move from physical hardware to virtual hardware and VM saturation. It causes depletion of application networking resources at a faster rate.

2. Lack of application awareness at most places: Operating system, OS, virtualization does not virtualize the application. There is software included with Virtual infrastructure platforms that migrates running VM instances from one physical device but causes delay in app availability.

3. There is an additional and unanticipated cost of Virtual application, the cost of virtual solution is more than the physical problem.

4. The virtualization features almost remains unused, as the network limits implementation.

5. Overrun of storage network when growth exceeds the planning.

6. Congestion of storage network is a great challenge, as data pipes unable to handle the volume.

7. Management complexity: The management tool does not work together.

CONCLUSION

As the lifestyle and the trend is changing, people are becoming very busy in their day to day life specially earning for their livelihood. So, there is a change in various ways of shopping which is diversified. They have no interest in spending their time for shopping at stores and instead they would like this work to be done by someone else. This trend, in one way, brought the concept of virtual store. People can easily visit superstores online and can do their shopping through the app, VR and AR without any hassle. There is a vast change in the business IT market. The COVID-19 outbreak has further enhanced the use of virtual shopping online. We may finally see changes here and the current competition will undoubtedly force every solution to strive for the best possible use experience. We are very much optimistic about the future of usage of virtual application by the customers.

REFERENCES:

Akbar Waqar,(2014).Shifting Towards Virtual Stores: Evidence from the Customers of Supermarkets in Pakistan , Developing Country Studies, www.iiste.org ISSN 2224-607X (Paper) ISSN 2225- 0565 (Online) Vol.4, No.14, 2014

Chaffey Dave (2017) The reasons why consumers shop online instead of in stores by 19 Oct, 2017, https://www.smartinsights.com/ecommerce/ecommerce-strategy/the-reasons-why-consumers-shop-online-instead-of-in-stores/

Dow Jones VentureWire, 26 April 2012. Retrieved on 20 December 2012

Forsey Caroline ,(2018)5 Ways Augmented Reality (AR) Is Transforming Retail https://blog.hubspot.com/marketing/augmented-reality-retail

Halan,Dr. Deepak. (2020)Impact of COVID-19 on online shopping in India, Mar 25, 2020, 01.08 PM

Horak karel, 2012,Face Detection Techniques - Theory and Applications, May 2012, DOI: ,10.13140/RG.2.1.3360.7288, Conference: International Conference on Soft Computing MENDEL

Reddy Aneesh, (2014) , COVID-19 – consumers moves towards digital Updated on April 14, 2020 Published on April 14, 2020

Weblinks:
https://www.oberlo.com/blog/ecommerce-trends,(https://www.oberlo.com/blog/ecommerce- trends)
https://blog.hubspot.com/marketing/augmented-reality-retail
https://www.accenture.com/lu-en/insights/retail/coronavirus-consumer-behavior-research

https://www.business-standard.com/article/news-ians/caratlane-launches-virtual-jewellery-try-   on-app-115082000799_1.html

https://www.toptal.com/insights/innovation/3-ways-virtual-reality-transforms-ecommerce

Digital Image Processing Real Time Applications – IJESI,www.ijesi.org › papers › NCIOT- 2018 › Volume-1

https://www.thehindubusinessline.com/opinion/COVID-19-impact-consumers-move-more-towards-digital/article31337127.ece#

COVID 19: Consumers change how they shop, work and live, May 28,2020, https://www.accenture.com/lu-en/insights/retail/coronavirus consumer-behavior-research

https://www.f5.com/services/resources/white-papers/7-virtualization-challenges,7 Virtualization Challenges, UPDATED SEPTEMBER 09, 2008

https://retail.economictimes.indiatimes.com/re-tales/impact-of-COVID-19-on-online-shopping-in-india/4115

https://media.bazaarvoice.com/personalization-ebook.pdf

https://www.evergage.com/blog/key-trends-in-personalization-2018-survey-results/

https://www.researchgate.net/publication/289916232_Shifting_Towards_Virtual_Stores_Evidence_from_the_Customers_of_Supermarkets_in_Pakistan [accessed Jun 29 2020]

https://towardsdatascience.com/the-intuition-behind-facial-detection-the-viola-jones-algorithm- 29d9106b6999

https://www.prnewswire.com/