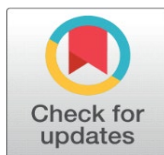


EXTENDED REALITY APPLICATIONS IN BUSINESS COMMUNICATION AND DEVELOPMENT: UNVEILING FUTURE HORIZONS

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ABSTRACT

Extended Reality (XR) is an interactive communication technology. It helps in providing a physical representation of a virtual environment or things that the user can interact with, within the real-world scenario. Extended Reality is an umbrella term which encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). The applications of XR helps the user to place virtual objects in the physical world to look for its suitability and opens doors for immersive interactions with the placed objects. It gives the user a sense of being a part of the digital world and immersive try-on experiences. In the context of business, integration of XR has completely changed various fields like customer engagement, product design, marketing, Global connection, and communication, etc. Through XR, it became easy for the business sectors to train their employees without risking cost or lives. Overall, XR as a cutting-edge technology has a great potential to bring enormous development in the field of business. In this paper, the researcher highlights the importance of implementing XR in business firms. Specifically, this paper emphasizes its role in business communication and commercials. It sheds light on the various benefits of using Extended Reality for the enhancement of businesses.

Keywords: Extended Reality (XR), Communication, Commercials, Marketing, and Development



1. INTRODUCTION

Business is an economic activity that involves a two-way process. It entails serving society, and it pays a way to improve one's quality of life by generating profit from the purchase, production, sale of goods and services. Business growth is determined by the rate at which manufactured goods are sold. Increasing product sales mostly depends on three crucial elements: skilled workforce, effective communication, and appealing presentation. Establishing a serene and supportive training environment is vital to create a skilled workforce, recognizing the pivotal role of human resources in fostering firm growth many companies adopted Extended Reality (XR) technology to train their employees.

Communication, being the second most important factor for business development, plays an important role. Communication is a process of transmitting, interpreting ideas or thoughts, which can either be verbal or non-verbal. Effective communication can be defined as the successful transmission of information without any miscommunication and misinterpretations. Business and management communication becomes a crucial and strategic partner in order for corporations to achieve their goals (Markaki et al., 2013). Constructive communication and appealing presentation of

the product to catch the attention of clients are vital to increase the sales rate of goods and promote new orders. These needs of business firms can be easily accomplished by incorporating Extended Reality (XR) in business.

This research work aims to analyse the effectiveness of using XR in business firms by providing detailed notes about its evolution in the world of business. It also examines its suitability in the current scenario. Through this paper, the researcher highlights the use of XR in business communication and delves into the pros and cons of employing XR within business environments.

1.1. OBJECTIVES

- This research study examines
- the effectiveness of implementing XR for the development of business
- the ways to enhance immersive interaction between the producers and clients
- the ways to promote sales through effective communication

2. LITERATURE REVIEW

Business is an organisation which meets the demands of the customers either by selling goods or by providing services. The standard of living of any country is measured by the output of goods and services people can buy with the money they have. (Lawrence et al., 2018, p.12). The standard of a country is shaped by the standard of living of its citizens. To elevate the national standard, it is essential to introduce new strategies and technological advancements that foster the development of business firms. Extended Reality (XR) stands out as a transformative technology capable of stimulating growth across various sectors of the economy.

Extended Reality (XR) immersive communicative technology through which the user can interact with the virtual objects in the real-world scenario. It mimics the physical presence of the real world and recreates the sensory experience of the actual product in virtual or digital mode for the user. It is a technology that gives the user the psychophysical experience of being surrounded by a virtual, that is, computer-generated, environment. This experience is elicited with a combination of hardware, software, and interaction devices (Andries van Dam, et al., 2000, p.26). Extended Reality (XR) is an umbrella term which encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). Virtual Reality is the beginning of immersive means of communication. (Alan Smithson et al., 2018) in their work, "Virtual & Augmented Reality for Business" states Virtual Reality as an immersive technology which gives users strong new tools for creating, utilising, and interacting with digital content and it takes media beyond standard screens.

During the 1950s, Morton Leonard Heilig, a pioneer in Virtual Reality technology, produced the Sensorama VR device. It could take the viewer into a virtual world through which the onlooker can engage in the displayed content and experience what they see. Ivan Sutherland, a computer scientist, published a paper in the 1960s which describes his idea for the "Ultimate Display, "which is so realistic that the viewer cannot differentiate from reality. This is frequently regarded as the model for contemporary VR. Virtual Reality (VR) refers to technologies that attempt to block out or hide reality and replace it with a virtually generated world, such as through digital graphics (Mann et al., 2018). It opened the door for the development of modified forms of VR called Augmented Reality (AR), Mixed Reality (MR) and Extended Reality (XR).

Initially, VR was used in various training programs such as military training, pilot training for aircraft services, and training Navy forces. Training the users on-site could result in physical damages or significant financial loss. In order to improve their safety and prevent loss, VR technology is being used in these industries. Later VR started to play its role in the world of business. It is implemented in business to attain major goals such as improving sales rate through immersive experiences and collaborations, knowledge retention and to decrease workplace accidents and losses. Business organisations utilised this technology to train their employees mainly to reduce cost from destroying expensive equipment and to ensure safety of the workers throughout the training session. (HazMat, 2023), a training organisation released an article titled "Immersive HazMat Virtual Reality Training", in which they state that Virtual Reality delivers a secure, affordable, and immersive training environment in which tasks can be repeated as needed. Performances may be recorded and analysed carefully, and a large range of scenarios can be simulated. It is ideal for training programs where real-life settings are impractical.

Workers are provided with a lot of training programs related to their contribution in the development of business and to equip themselves fit for the job. When a user is operating in a virtual environment, this technology provides them the freedom to make their own decisions by enhancing their critical thinking, decision making, and problem-solving skills. This technology also helps the employers to evaluate the work efficiency of their employees. It provides a way to recreate any setting in real time, providing employers with a new way to avoid expensive and highly dangerous training experiences with digital solutions. Companies like Strivr, Sweet Rush, Mursion, Talespin, and Foundry 45 use Virtual Reality technology to train their employees.

Many companies such as ExxonMobil and BP, two oil firms, use Virtual Reality (VR) to teach their staff in real-world workplace scenarios including startup and emergency exit procedure initiations. In a safe setting, workers can involve themselves in virtual surroundings and can learn by making mistakes without the fear that it could affect or cause any damage in the actual world. This method of training workers can decrease the probability of making mistakes during the actual world experiments and services.

Virtual Reality started to evolve in the real estate business during 2013. This technology helps traders to view the property or plot virtually and learn about its surroundings and other unique properties about the plot without physically visiting the location. VR can be used by real estate owners to provide virtual tours that project the infrastructure of the area, buildings, or house they are selling from their live location. It gives investors real-world experience without requiring them to spend time and effort in physically visiting various homes or properties. VR technology is also adopted by architects to convince their customers by showing the 3D models virtually. VR contributes significantly to the real estate industry during the time of pandemic.

Due to the outbreak of COVID-19 epidemic, people were banned from moving out of their residence. Many offline businesses turned to online business and many businesses suffered serious economic crisis, especially small businesses disabled, due to the lack of good client engagement, production, transportation, and other factors. Everything shifted from offline to online mode and digital components started to become more popular. AR and VR markets expanded significantly since they promote effective immersive communication without moving anywhere. Industries such as marketing, medicine, and media were highly dependent on VR to bridge the gap between consumers and businesses during shutdowns. This also accelerated the development of VR technology in the world of business, allowing it to meet the demands of customers for more realistic, creative, and interactive experiences.

Augmented Reality (AR) is another field of Virtual Reality which helps the user to overlay virtual or augmented objects in the live location by tracking location using sensors, GPS data etc. van Sutherland's introduced head-mounted display at Harvard in 1968 marked the beginning of AR's revolution. It is first created for military and industrial simulations; commercial applications first surfaced in 2008 with BMW's interactive advertisements. It transforms the way consumers evaluate things before making a purchase by smoothly fusing virtual aspects into the real world. Apps such as Ikea's "Place" use Augmented Reality (AR) to showcase furniture at homes, doing away with the necessity for measurements. Many business firms have adopted Augmented Reality (AR) for consumer engagement, despite the associated costs. AR can be used in various fields like Remote assistance, Authored Instructions, Remote collaboration etc.

AR plays a vital role in automobile businesses, in cars AR applications are used in Heads up Display (HUD). HUD is an Augmented Reality navigation system which guides the drivers with locations, directions and helps them to detect obstacles in the road by sharing the live location through AI monitors. It promotes smooth and safe travel for the users. Lawrence Ulrich (2022) in his work "Inside the Augmented Reality car-mass market players will introduce HUD-enabled driving soon" describes about 2022 Mercedes-Benz EQS which possesses AR navigation system and colour head up display with many automated features helps the drivers to have a safe travel. Head up display is gaining more popularity in the field of automobile business in the current scenario.

Mixed Reality (MR) incorporates real-world elements with digital content, which aids in creating a more relatable and personalized experience. Mixed Reality (MR) is a powerful tool for guiding users through training modules by imposing information over real-world objects. It provides remote assistance which reduces the time required to improve workers' skills and helps them to learn better and faster. By providing step by step instruction, it gives an effective training space for the workers.

Extended Reality (XR) is an upgraded version of VR technology that allows real and virtual worlds to coexist and interact by combining Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR). XR incorporates all these three features and helps the observers to immerse themselves in a multisensory environment which is more interactive,

engaging, and effective. It aids in the creation of a new world of simulated experiences based on how businesses work and how people use products in the real world. XR technology started to gain popularity in 2010 and began to take off globally in 2014. By 2020, industries began to adopt this diverse technology in different areas like manufacturing, education, healthcare, construction, and even law enforcement.

Digitalization in the field of business is more common nowadays. The term digitalization can be defined as a connection between the physical and digital world. Technology which stimulates this bonding between these two worlds by providing an immersive and interactive interface for the user is Extended Reality (XR). Fischer et al., (2021) in his research article "Extended Reality in Business - to- Business Sales: An Exploration of Adoption Factors" provides a qualitative survey of interviews collected from the companies which use XR technology in their business firms in the stream of marketing and sales. The findings of this survey proved that XR is an effective tool in business since it promotes customer satisfaction by providing effective content transfer, offering immersive product display, it aids the management by its well-defined project documentation system, its advanced training programs especially in the production of machinery and its support towards the sales person to assist the customers with fitting and maintenance support after or before getting the product.

XR technology plays a multiple role in the field of business-like enhanced product display through innovative and immersive advertisements, promotes communication and connections between firms to firms by providing immersive presentations, virtual tours etc., interactive and hands on training programs etc. Especially during the time of pandemic business collaborations were shattered as it was impossible to fly to other countries and to have business collaborations. XR acts as a global connector when it comes to business collaborations. Johnson (2022) in his research work "10 applications of Extended Reality" states that XR acts as an aid in promoting workplace productivity, remote collaboration, and defense training. With the XR market projected to reach \$300 billion by 2024, organizations must collaborate with experienced partners to fully harness its potential for reshaping experiences across industries

Kanav Singla (2023) in his article "What is extended reality technology, and how is it evolving the industry in 2023?" predict that Extended Reality (XR) technology will enhance and alter several industries in 2023, including entertainment, education, healthcare, and retail. Affordability is considered as the major barrier when it comes to many firms' adaptability of this immersive technology. Based on price, VR can be split into two categories: three degrees of freedom (3DOF) and six degrees of freedom (6DOF). 3DOF only allows users to look up, down, and side to side, not forward and backward but through 6DOF VR, users can walk freely across the virtual environment just like they would in the actual world. It is not possible for all users to acquire this experience due to its cost, technician support is vital for its widespread adoption, etc. Despite all these challenges, XR technology has the potential to transform a variety of industries and integrate more deeply into our daily lives, providing huge prospects for growth.

3. XR IN COMMERCIALS

John Wanamaker, founder of the first American departmental store sowed seed for innovative approaches for marketing and advertising, one such innovation is modern price tags in the 1800s. As years progressed many business firms started to use modern approaches to gain the attention of the customers. Technological advancement signifies a shift from traditional marketing methods to innovative strategies that blend the digital and physical realms, offering consumers unique and immersive product interactions. Extended Reality (XR) is one such technology which transforms marketing and advertising by allowing brands to develop immersive and hands-on experiences. Many firms from different parts of the world started to use immersive technology from the early twenties. Some of the innovative and immersive XR applications in the world of commercials are gamification, visual product experiences, virtual showrooms, virtual try-ons, Instore navigation, virtual layout planning, finding the right fit, etc., Instore scavenger hunt is one such strategy to turn the customers attention towards the business firms.

Many enterprises especially, department stores, used this immersive technology to get the attention of the customers. "Tilly" is a famous retailer in clothing, footwear, and accessories stores in California, uses many innovative strategies to improve their marketing range each year, one such approach they took in 2017 is "Tilly's 2017 Holiday Augmented Reality Game". The focus of this strategy to gain the attention of the consumers towards their store. It was fourteen days of AR gaming challenge, customers who are playing this game will be awarded with offer coupons based on the level of passing. If a customer fails in their first try, they will be given an opportunity to play and win the coupon

for fourteen days. This is one such exciting advertising strategy using Augmented Reality (AR) to get the attention of the customers.

Wagner and Cozmiuc (2022) investigate the revolutionary capacity of Extended Reality (XR) technologies, Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR), in altering marketing strategies and customer relationship management. The study highlights AR's ability to create immersive consumer experiences, such as virtual product visualization and interaction, which boost purchase confidence and satisfaction. XR technology fosters strong consumers resulting in increased sales of the products. Kitkat company has used hologram technique to provide their customers an immersive shopping experience. These commercials proved that the use of visual techniques such as 3D, holograms, spatial mapping, Virtual sensors will provide an immersive experience for the user, which will increase the sales rate rapidly. Overall, XR transforms digital marketing, and redefines customer interactions through engaging and immersive marketing techniques.

4. XR IN BUSINESS COMMUNICATION

Extended Reality applications are not only useful for advertising or showcasing the made products but also to enhance the development of firms through effective communications. Corporate or business communication includes written formats such as resumes, cover letters, proposals, reports, formal performance evaluations, and electronic communications like emails and online postings. It also encompasses oral communication, which includes interpersonal interactions, small group or team discussions, and public presentations, with effective communication skills. In real-world settings, business and professional communication involves aspects of leadership and followership, the processes of group decision-making, international cooperation, and the provision of feedback. Constructivism, expectancy violation theory, and social presence theory are three frameworks that help explain and predict communication within business and professional contexts. These types of communications are made easier through the application of Extended Reality technology in business firms.

Extended Reality (XR) applications in business can be categorised into two, customer service application and business collaborations. XR is gaining popularity in a wide range of industries due to its ability to seamlessly integrate realistic-looking 3D content with the user's physical environment. (Bekele & Champion, 2019). An XR collaboration tool promotes employees to collaborate in real-time in a simulated virtual environment. Headsets, VR compatible PCs, and smartphones are all essential devices for XR collaborations. Through collaborative XR, users can collaborate in virtual platforms from afar using XR collaboration tools. They can meet in the same virtual location and can converse using both speech and text. Collaborators can conduct virtual presentations, update and visualize designs, communicate and socialise on any team project via virtual meetups. XR technology enables the integration of the physical and virtual worlds, creating a seamless and engaging user experience that was once unimaginable (Nasr & El-Deeb, 2023b). Though it seems to be a type of human and computer interaction, it is an effective way of interacting business affairs especially during the time of pandemic. During the time of Covid pandemic people were restricted to move out of their homes and many business firms and small-scale businesses were shut due to lack of stock exchange, collaboration, and sales. XR technology emerged as a helping hand for the firms to promote their growth through digital collaborations and marketing.

Arthur is a virtual office space platform that allows producers and clients to connect, collaborate, and manage their projects from a distance. The producer can host meetings with their clients in any area of the world at a specific time using VR meets up. Meeting clients from various locations is necessary for business development. It serves as a platform for gathering new information about the various aspects of business. Receiving customer feedback empowers business growth; answering customer questions using Telecommunication via XR platforms provides live interaction between the customer and the producer. It is easy for the consumer to express their opinion about the product they have purchased. To attract the attention of clients HD Virtual Reality, LED walls or screens and enhanced virtual scenes were used for advertisements by the business firms wherein XR plays an ultimate role.

The advantages of using XR in business are

- XR technology is user friendly
- availability of these technologies are rapidly increasing
- user can see the output of wearing the product through spatial presence

- investments in these technologies are often expected to enhance both work efficiency and productivity
- producers can easily present made products to customers in 360 degrees in a short period of time using XR
- it helps the workers to do experiments in the artificial environment
- utilizing XR in business will raise the product's manufacturing and sales rates
- it enables the instructors to train their staff in a safe setting without resulting in any serious damage
- XR in training programs makes it easier for employees to understand the work assigned to them
- XR makes the training period easier and more comfortable

The disadvantages of using XR in business are

- huge possibilities for addiction
- high hardware prices
- the lack of more immersive content, and privacy concerns
- to implement digital technology, business administration must be technically sound
- the high cost of XR equipment makes it difficult for small business owners to adopt this technology
- Extended Reality can be a lonely, private experience. It lacks human-to-human interaction
- through XR the enhancement of emotional quotient level of users is limited
- if individuals become completely accustomed to this technology, it will make them lazy
- this technology is quite challenging to apply in rural locations

5. RESULTS AND DISCUSSION

Extended Reality is an intense, immersive and interactive technology, which possesses high potential to upgrade the firms, if it is incorporated effectively. For effective implementation, proper training should be given to the employees as well as the consumers about its usage and proper education should be provided about how to handle the headset for better results. Training sales personnels holds an important role because effective XR presentation skill of the sales person about the made product will provide an effective outcome from the customers. XR technology is also known for its cost effectiveness and accessibility, when comparing with real life training programs. Therefore, both the role of customer and sales person holds an irreplaceable place for the upliftment of sales and marketing using XR.

Age and accessibility of the customers are two important factors which should be taken into consideration for the effective outreach of showcased products using XR technology. Technical and software issues, lack of proper internet connections and accessibility are considered as an effective drawback while implementing XR in the world of business. Especially adopting XR technology for small - scale enterprises will be quite challenging due to its expensiveness. Overall, to upgrade the level of firms and to improve global connections for its betterment XR acts as an effective tool. Due to the advancement of digitalization XR as a cutting-edge technology will change the future of the business world.

6. CONCLUSION

In this technology driven world Extended Reality plays a significant role, especially in terms of business. Virtual platform helps the user to be fully immersed in the multisensory environment and experience the exhibited content as if in the real world without any physical effort or monetary loss. The results of the study indicate that XR not only makes customers more interested, but it also changes business models by making sure that customers value the digital models being projected, with real time experiences. This paper offers some recommendations for using XR for the enhancement of business and highlights the importance of using XR in business. The benefits and existing problems of implementing XR in business are clearly listed in this research work. Hence, this study proved that the implementation of XR in business is essential and beneficial for the progress of business since in the current technologically upgrading world XR is no longer just for entertainment and games but also takes various forms depending on the need and development of society.

CONFLICT OF INTERESTS

None.

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