

**APPLICATION OF IMMERSIVE TECHNOLOGIES IN BUSINESS: THEORY,
METHODOLOGY AND PRACTICE**

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ABSTRACT. The article examines and analyzes the peculiarities of the application of immersive technologies in business to increase the effectiveness of marketing communication with the consumer and achieve a higher level of competitiveness and establish relations with potential partners. Businesses can benefit more by introducing new technologies into their operations. However, such technologies require investment. For Ukrainian enterprises, this can become a problem due to the lack of stable profits. The role of immersive technologies in the form of augmented reality (AR) and virtual reality (VR) is determined, which will be a significant incentive for Ukrainian companies in the context of post-war revival, as they can be used to form a new market for the company. The factors that inhibit the use of immersive technologies in marketing are analyzed: high cost, limited access for the audience, the need for training and education, physiological limitations, technical problems, limited parameters for some products, competition with other visual media. Emphasis is placed on the fact that in marketing and sales, efforts should be focused on the use of the following tools: augmented reality in advertising, virtual product fitting, AR assistant in the store, virtual rooms in the store, AR product presentations, VR virtual events and demonstrations. Immersive technologies can help establish communication between the brand and the consumer, as well as establish a partnership.

Keywords: business, marketing, immersive technologies, consumers, loyalty, innovation, virtual reality, augmented reality.

INTRODUCTION. Digitization of both economic and everyday activities of people encourages the search for innovative ideas necessary for the realization of the produced goods/services, establishing contacts with potential consumers and partners. Communication of

various business participants is extremely important for achieving effective enterprise activity, which constantly needs visual and technological innovations, which can keep the attention of customers, cause their loyalty. The modern consumer is an immersive consumer who wants to immerse in the product/service. It is important for the modern consumers to satisfy their needs with the help of immersive technologies. It is no longer enough for them to look at the product in the photo in the online store in order to make a final decision about the purchase, they want to try the product in real form and in real size by clicking with the mouse. It is important to choose such technologies that will be as effective as possible when implemented in a specific type of enterprise, under certain conditions and in a specific environment. This is facilitated by the use of immersive technologies. In the light of constant technological development, immersive technologies define new standards in the field of marketing. It is worth noting that, in addition to tools for promoting business and building loyalty, immersive technologies affect the level of competitiveness of an enterprise by reducing the cost of attracting a client; active hidden promotion through their use; transition of the enterprise to an innovative type of development and implementation of active digitization. Immersive technologies form new rules of the game in the business world. These innovations can raise the effectiveness of marketing communications to a new level and form a unique experience of new interactions with customers and partners. Digital transformation will contribute to obtaining additional competitive advantages in the domestic and international markets. The task of the research is to determine the theoretical, methodical and practical aspects of the application of immersive technologies in business in general and marketing activities in particular.

ANALYSIS OF LATEST RESEARCH AND PUBLICATIONS. The issue of integrating immersive technologies into various areas of business is extremely relevant and is being investigated by a large number of domestic and foreign scientists and practitioners.

The analysis of works on the research topic showed that such Ukrainian researchers as N. Morze, V. Vember et al [1], M. Hoda [2], O. Slobodanyk [3], M. Shmyhol & Yu. Yushkevych [4] and others have investigated the main technological possibilities of using immersive technologies in business as a result of the impact of digitalization on the economy.

O. Martyniuk and I. Korolyov analyzed trends in the influence of digital technologies on the formation of trends in business. Scientists are inclined to believe that in the conditions of an increase in the share of working time in the format of remote access, the demand for various groups of goods may change. Research has established that digital transformations are taking place in each of the spheres of activity. Remote cooperation between different parts of the same business, the introduction of new management methods and strategies improves control methods and the

attraction of new, leading specialists in order to strengthen the company's position on the domestic and international markets, as modern devices for cooperation in the virtual space make it possible to conduct dialogue in a portable mode, regardless of location and climate [5].

M. Dykha, T. Ustik et al described how digital technology has penetrated online business. They are being incorporated into marketing plans and daily life, digital marketing campaigns are becoming more prevalent and effective. The authors considered the main marketing tools for the development and effectiveness of e-commerce in the conditions of global digitalization [6].

V. Fostolovych, T. Botsyan, N. Bondar, L. Sharan note that the use of immersive technologies is a unique development that changes the approach to conducting economic activity. Along with the uniqueness of modern technologies, attention is drawn to the fact that they are designed to assist specialists, but by no means replace them [7, 8].

FORMULATION OF THE PURPOSES OF THE ARTICLE. The purpose of writing the article is to consider and analyze the features of the application of immersive technologies in business to increase the effectiveness of marketing communication with the consumer, achieve a higher level of competitiveness and establish relations with potential partners.

PRESENTING MAIN MATERIAL. Companies can benefit more from incorporating new and trending technologies into their manufacturing and marketing strategies.

Immersive technologies are a visual, audio and partially tactile immersion in a 3D world, which is an alternative space that the consumer can interact with using 3D graphics, which they see through special virtual reality glasses or activates using a smartphone in augmented reality. AR/VR technologies have a number of benefits for businesses, including engaging a brand audience, building brand or product knowledge, simplifying the product creation process, reducing manufacturing and shipping costs, minimizing negative impact on the environment, increasing conversion rates, facilitating the purchase process, facilitating loyalty and trust in the brand (Fig. 1).

On one hand, companies can benefit more by integrating new and trendy technologies into their production and marketing strategies. On the other hand, technologies are usually associated with investments, the payback of which takes a certain period of time. Thus, Ukrainian enterprises face the problem of limited investment capacity due to the lack of stable profits, as well as the need to implement modern marketing and production innovations, therefore it is necessary to find a balance between investment costs and the effectiveness of implemented technologies, as the role of immersive technologies in the form of augmented reality (AR), virtual reality (VR) can become a major incentive for companies in the context of the post-war revival of production and marketing strategies.

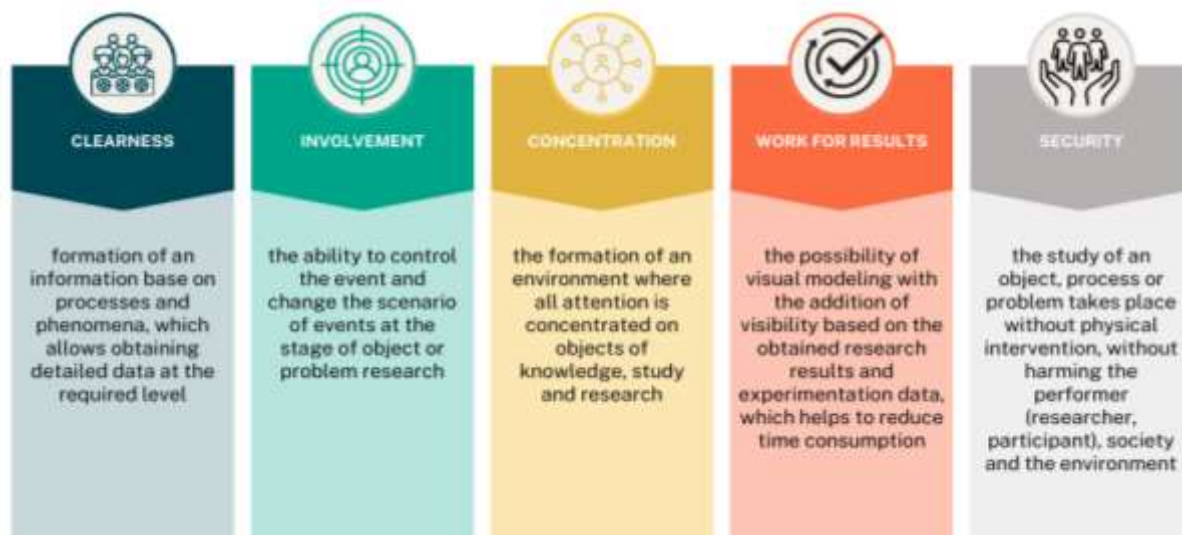


Fig. 1. Advantages of using immersive technologies in business

Source: created by the authors.

Immersive technologies involve the use of a number of key components [9; 10; 11]:

1. Virtual Reality (VR) is a technology that creates a fully immersive experience by immersing the consumer in a virtual environment using special equipment such as VR glasses and motion controllers.

2. Augmented reality (AR) is a technology, which adds virtual objects or information to the consumer's real environment, usually using smartphones, tablets or AR glasses.

3. Motion sensors and tracking:

- gyroscopes and accelerometers, which allow to determine the movements and position of the device or the user;

- cameras and sensors used to track movement and interact with the real environment.

4. Interaction technologies:

- gestures and controllers that allow users to interact with immersive content using movements or special controllers;

- voice commands that allow you to control the system and interact with the interface using voice instructions.

5. Artificial intelligence (AI) used to create personalized and realistic immersive experiences, as well as to analyze consumer behavior.

6. Optical and acoustic systems:

- optical systems that include high-quality displays and graphics processing to create a realistic visual impression in VR systems;

- acoustic systems that provide spatial sound that enhances the immersiveness of the experience.

7. Tactile feedback and sensations:

- tactile feedback means - vibration, moving elements and other technologies for conveying the feeling of touch or interaction with objects;

- temperature sensing - technologies that can simulate heat or cold in a virtual environment.

8. Modern graphic technologies:

- Real-Time Rendering (rendering in real time), which provides fast and realistic graphics for virtual environments;

- Ray Tracing (tracing (tracking) rays), which increases the quality of the visual impression due to realistic modeling of light and shadows.

The above components transform the consumer's interaction with the digital world, captivate and impress him. Using the above-mentioned components of immersive technologies, business has the opportunity to reach a qualitatively new level:

1. Create visual 3D tools that allow the consumer to try on the product in its actual size and shape, regardless of where it is.

2. Generate revenue through the digitization of products and services and enter new markets (in the form of digital content and digital assets).

3. Use 3D content to create loyalty programs and facilitate consumer interaction with products to increase contact time and repeat purchases.

4. Create virtual digital content and attract consumers to it.

5. To train employees in an interactive and exciting way.

It is a completely new form of communication to attract and retain customers who need an immersive way to satisfy their needs, so more and more businesses are implementing or planning to implement virtual and augmented reality technologies in their business.

The impact of immersive technologies can be measured using a number of indicators, in particular [2, 3, 11]:

1. Increasing the level of brand recognition, which reflects the degree of consumer awareness of the brand and is determined by evaluating the level of attention of the target audience and recognition among consumers, namely: interest in the advertising campaign, consumer awareness of the brand, positive associations with the brand, preferences and intentions to purchase goods and brand services. An increase in the level of brand recognition indicates the effectiveness of marketing efforts and an increase in the competitiveness of the brand in the market.

The metric can be quantified as the difference between the number of views/interactions with immersive technology and the number of views/interactions without immersive technology.

2. Increase in audience engagement, which reflects the degree of success of marketing activities that attract the attention of the target audience. The indicator is evaluated by measuring the level of audience interaction with the company's marketing content and include indicators such as the number of video views, the number of interactions with social media posts, time spent on websites, the number of mobile app downloads, likes and comments on social networks, and the number of reposts etc. The growth of the indicator indicates the success of marketing activities that attract the attention of consumers and increase the level of interaction with the brand or product.

The indicator can be quantified as the ratio of the number of interactions per hour with immersive content to the number of interactions per hour without immersive content.

3. The conversion rate used to measure the effectiveness of marketing and advertising campaigns and evaluates how successfully they convert the target audience into real customers, for example, how many potential consumers made a purchase of a product or service, subscribed to a newsletter.

The conversion rate is calculated as the ratio of the number of transitions from immersive content to the total number of interactions with immersive content.

4. Increase in time spent interacting with enterprise content, reflecting changes in the amount of time consumers spend interacting with the brand, its products and services. The indicator determines the level of interest and engagement of the target audience in the content offered by the brand and is measured using the analytics of websites, applications or other platforms. Includes analysis of metrics such as average time spent on a website or app, time spent watching video or listening to audio, and time spent performing specific actions such as filling out forms or viewing products. An increase in the indicator indicates an improvement in the quality and functionality of the content, an increase in the audience's interest and involvement in the brand, which leads to better results and increased customer loyalty.

It can be quantified as the ratio of the average time spent on immersive content to the average time spent on regular content.

5. Profitability of immersive campaigns, which reflects the degree of profitability of marketing campaigns using immersive technologies, that is, how effectively immersive technologies help brands achieve marketing goals and how they affect the company's financial indicators. A number of indicators can be used to measure the profitability of immersive campaigns, including the cost of developing and implementing immersive content, revenue from sales of goods and services after the launch of the campaign, increase in sales, decrease in bounces and increase in average check.

The profitability of an immersive campaign can be defined as the difference between the costs of running the campaign and the profit generated as a result of the campaign. Successful immersive campaigns should generate more revenue than they cost and have a positive impact on the business.

6. Increased loyalty, reflecting changes in customer commitment and engagement with a brand, product or service. The metric measures how successful a brand or company has been in increasing customer satisfaction and building long-term relationships. Loyalty can be measured using various indicators, including the frequency of repeat purchases, the number of customers who recommend a product or service to a friend, the frequency of abandoning a product or service, surveys and customer reviews.

Increased loyalty indicates that marketing efforts are successfully meeting customer needs and expectations and can lead to increased customer loyalty, increased participation in loyalty programs, reduced customer churn, and other positive business outcomes.

The indicator can be quantified as the difference between the level of loyalty after interacting with immersive content and the level of loyalty without using immersive content.

These indicators highlight the general approach, however specific indicators and definitions of impact may differ depending on the specific case and purpose of using immersive technologies in business and marketing. The list of reasons why the level of VR application in marketing and product promotion is low is shown in Table 1.

Table 1. Factors inhibiting the use of immersive technologies in marketing

Indicator	Characteristic
High cost	Developing VR content can be expensive. The cost of creating a high-quality virtual experience includes not only software development, but also hardware, testing, production of virtual models, and more
Limited audience access	Not all users have access to VR equipment. This can limit the reach of the target audience and reduce the effectiveness of campaigns
Need for education and training	Using VR can take time and effort to learn how to interact with the technology. This can discourage those who do not want to spend time studying
Physiological limitations	Some people may experience discomfort when using a virtual reality headset, such as movement disorders, blurred vision, or dizziness
Technical problems	VR equipment may be subject to malfunctions, interruptions or technical issues that may impair the user experience and create a negative experience
Limited options for some products	Some products can be difficult to visualize in VR, especially if they don't have a large visual aspect or require interactions that are difficult to implement in a virtual environment
Competition with other visual media	Traditional marketing tools such as photos, videos, and infographics also remain powerful tools for engaging audiences, so VR must compete with these tools

Source: [12].

The practices of using immersive technologies can be conditionally divided into general practices and practices in marketing and sales. In the context of general practices, it is worth paying attention to [9]:

1. Virtual tours:
 - scope of application: tourism, real estate;
 - example: using VR to create virtual tours of hotels, cities or properties, allowing users to experience the atmosphere and benefits of a place without actually visiting.
2. Training in virtual reality for medical professionals:
 - field of application: medicine;
 - example: simulation of operations or other medical procedures in virtual reality to improve skills and reduce risks during real practical cases.
3. Gaming immersive experiences:
 - scope of application: gaming;
 - example: using virtual reality to create game worlds where players can interact and explore entirely new dimensions of play.
4. Virtual educational programs:
 - scope of application: education;
 - example: using VR or AR to create immersive learning programs where learners can interact with virtual objects and scenarios to better learn the material.
5. Immersiveness in the cultural sphere.
 - scope of application: museum affairs and theaters;
 - example: use of virtual exhibitions of works of art or museum exhibits, virtual visits to museums, etc. Immersive theatrical performances where the audience tries to be "immersed" in the events unfolding on the stage during the performance. Immersive theater differs from traditional theater in that it removes the stage and immerses the audience directly in the performance of the actors.

These examples illustrate the variety of immersive approaches in different fields that allow for improved experience and effectiveness in different contexts.

In the context of practices in marketing and sales, it is advisable to focus efforts on the use of the following tools [11]:

1. Augmented reality in advertising - the use of AR technologies to create interactive advertising campaigns that can add virtual objects or information to the user's real environment.
2. Virtual product try-on - the use of virtual reality to allow potential buyers to view and try a product or service in an immersive virtual environment before purchasing.

3. AR assistant in the store - development of augmented reality applications for smartphones, which allow customers to get additional information about products, for example, ratings, reviews or additional functions, using the device's camera.

4. Virtual store premises - creation of virtual stores or trading platforms where users can view products and make purchases in a virtual environment convenient for them.

5. AR product presentations - using augmented reality to create interactive product presentations where customers can see products on a real scale and get detailed information about their characteristics.

6. VR-virtual events and shows - organization of virtual events, which may include virtual conferences, exhibitions or fashion shows, where brands can interact with the audience through immersive content.

These examples demonstrate how immersive approaches can create new opportunities to engage and impress customers.

CONCLUSIONS FROM THIS RESEARCH AND PROSPECTS FOR FURTHER EXPLORATION IN THIS DIRECTION. The use of immersive technologies in business is a necessary tool for both company management and marketing. Considering the potential of using immersive technologies for Ukrainian enterprises that have production facilities in Ukraine and work with foreign clients and partners, it should be noted that even if a Ukrainian company is located in a completely safe zone and fulfills its obligations, a foreign firm is in no hurry to cooperate with it through hostilities. Immersive technologies can help establish communication between the brand and the consumer, as well as establish a partnership. This is a very important issue for Ukrainian companies, both on the domestic and international markets. Partners must see with their own eyes that the company is safe, that employees are working, that products are being made despite the war. Of course, not all international partners and clients are ready to visit Ukraine to see for themselves. That is why Ukrainian companies need to use virtual reality technology in order to bring potential customers and partners to the company's territory and convince them that everything is fine. For this, 360 videos for virtual reality are shot directly at the company, integrated into VR headsets and sent to partners abroad. Thus, the use of immersive technologies by Ukrainian companies has a double effect that is worth using.

Prospective areas of research in the context of the application of immersive technologies are primarily the expansion of the boundaries of their application in various business areas.

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