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Ukrainian-American Concordia University

Department of International Economic Relations, Business & Management

Bachelor's Qualification Work

**Financial assistance for emerging countries in the digital
environment**

(on the basis of Arvi VR)

Bachelor's student of

Field of Study 29 – International Relations

Specialty 292 – International Economic Relations

Educ. program – International Economic Relations



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(signature)

Research supervisor



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ABSTRACT

Oleksandr Hetyk

FINANCIAL ASSISTANCE TO DEVELOPING COUNTRIES IN THE DIGITAL ENVIRONMENT ON THE EXAMPLE OF ARVI VR

The **goal** of this paper – comprehensively analyze and study financial assistance to developing countries in the digital environment on the example of Arvi VR. This is extremely important, because digital transformation is a global trend of our time, as almost all industries are in the process of transition. According to forecasts, digitalization will improve the socio-economic situation of people, give them access to new services and jobs, help build a better future. As well as solving problems identified as research goals: defining approaches to the definition of emerging markets, describing the conditions of investment activity in emerging markets, characterizing the financial development of emerging markets, identifying the state and trends of the virtual reality market where Arvi VR operates, conducts research on the state of business in international markets in the interests of the company, identifies the main problems facing the company and find solutions, comparative analysis of the impact of digitalization of the economy on the welfare of developed and developing countries and ways to improve the concept digital experimental environment.

The subject of the study is the company Arvi VR. The choice of platform for the study is based on the availability of financial statements of the public company.

The results of the study of the prospects of financial assistance to emerging markets in the context of modern technological transformation confirm the previous measurements of the effectiveness of digital projects by international organizations. The digital development strategy requires the following measures aimed at improving welfare: creating the necessary institutional conditions for business; investing in the development and provision of information technology in various industries that can be digitized; initiating educational programs to increase digital literacy of the population. It also served as a basis for substantiating recommendations to developing countries on the modernization of the criteria for access to the experiment in the CES, to consolidate positions on the prospects of financial assistance in the context of modern technological transformation.

***Key words:** emerging markets, digitalization, virtual reality, investment activity, financial aid.*

РЕФЕРАТ

Олександр Гетик

ФІНАНСОВА ДОПОМОГА КРАЇНАМ, ЩО РОЗВИВАЮТЬСЯ, В ЦИФРОВОМУ СЕРЕДОВИЩІ НА ПРИКЛАДІ КОМПАНІЇ ARVI VR

Мета даної роботи – усебічно проаналізувати та дослідити фінансову допомогу країнам, що розвиваються, в цифровому середовищі на прикладі компанії Arvi VR. Це є вкрай актуальним, адже цифрова трансформація – глобальна тенденція нашого часу, оскільки практично всі галузі перебувають у процесі відповідного переходу. Згідно з прогнозами, цифровізація покращить соціально-економічне становище людей, надасть їм доступ до нових послуг та робочі місця, допоможе побудувати краще майбутнє. Так само як і вирішення проблем, позначених як цілі дослідження: визначення підходів до дефініції ринків, що розвиваються, описання умови провадження інвестиційної діяльності на ринках, що розвиваються, характеристика фінансового розвитку країн з ринками, що формуються, визначення стану та тенденцій ринку віртуальної реальності де функціонує компанія Arvi VR, проведення дослідження стану бізнесу в міжнародних ринках в рамках інтересів підприємства, виявлення головних проблеми, з якими стикається компанія і знайти їх вирішення, здійснення порівняльного аналізу впливу цифровізації економіки на добробут розвинутих країн і країн, що розвиваються та формування шляхів вдосконаленої концепції цифрового експериментального середовища.

Предметом дослідження є компанія Arvi VR. Вибір платформи для дослідження базується на наявності фінансової звітності публічної компанії.

Результати дослідження перспектив фінансової допомоги ринкам, що розвиваються, в умовах сучасної технологічної трансформації підтверджують раніше проведені виміри ефективності цифрових проєктів міжнародними організаціями. У рамках стратегії розвитку цифровізації необхідні такі заходи, спрямовані на підвищення добробуту: створення необхідних інституційних умов для бізнесу; інвестування у розвиток та забезпечення інформаційними технологіями різних галузей, які можуть бути піддані цифровізації; ініціювання проведення освітніх програм для підвищення цифрової грамотності населення. Воно також стало основою для обґрунтування рекомендацій країнам, що розвиваються щодо модернізації критеріїв доступу до експерименту в ЦЕС, для закріплення позицій щодо перспектив фінансової допомоги в умовах сучасної технологічної трансформації.

***Ключові слова:** ринки що розвиваються, цифровізація, віртуальна реальність, інвестиційна діяльність, фінансова допомога.*

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“ _____ ” _____ 202__

**TASK
FOR BACHELOR’S QUALIFICATION WORK**

Olexander Hetyk

1. Topic of the work

Financial assistance for emerging countries in the digital environment

(on the basis of Arvi VR)

Supervisor of the work

Associate professor, Dr. Nataly Amalyan

Which approved by Order of University from “22” December 2022 №22-12/2022- 1c

2. Deadline for bachelor’s qualification work submission **“19” May 2022**

3. Data-out to the bachelor’s qualification work

Materials received during the internship and consultations with the representatives of the company Arvi VR

4. Contents of the explanatory note (list of issues to be developed)

There are three main topics for research:

- Fundamental characteristics of emerging markets,
- Analysis of the virtual reality company Arvi VR,
- Prospects for financial assistance to emerging markets in the context of modern technological transformation,

On the basis of which the student has to develop an advanced concept of the digital experimental environment.

5. List of graphic material (with exact indication of any mandatory drawings):
 organizational structure of ARVI VR, virtual reality market, market share of ArviVR in the virtual reality market, Scheme of management efficiency of ARVI VR, Problems of VR industry development in Ukraine, Areas of economic transformation, Structure of factors of development of the digital economy and Results of regression analysis of models.

6. Consultants for parts of the work

Part of the project	Surname, name, position	Signature, date	
		Given	Accepted
1	Nataly Amalyan		
2	Nataly Amalyan		
3	Nataly Amalyan		

7. Date of issue of the assignment

Time Schedule

№	The title of the parts of the bachelor's qualification work	Deadlines	Notes
1.	I chapter	14.02-13.03.2022	
2.	II chapter	14.03-10.04.2022	
3.	III chapter	11.04-24.04.2022	
4.	Introduction, conclusions, summary	25.04 – 01.05.2022	
5.	Pre-defense	08.06.2022	

Student _____



(signature)

Supervisor _____

(signature)

Conclusions: The bachelor qualification work was designed according to the requirements, it contains all the necessary parts of scientific research and the practical recommendations. The paper was written on the basis of thorough analysis of specific aspects of the operations of ARVI VR (the base of internship); this provided the student with the opportunity to single out main problems of the virtual reality market in Ukraine. The practical recommendations were formulated correctly; of special interest is substantiation of the need of creation of a regulatory and legal environment that contributes to the deployment of FinTech projects in the country, introduction of innovation testing in real environment with the access to the wide market, encouragement of innovations that increase the availability of financial services.

Supervisor _____



(signature)

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INTRODUCTION

Digital transformation is a global trend of our time, as virtually all industries are in the process of an appropriate transition. Information sharing contributes to economic growth, productivity, innovation, and employment.

The World Bank states that digital development components are currently present in all sectors, including transport, education, healthcare, agriculture, and public administration, with activities in these sectors focused on five key elements: digital infrastructure, digital innovation, and entrepreneurship, digital financial services, digital platforms, digital literacy, and skills. Combining these five key elements primarily helps build a strong and inclusive digital economy, and ultimately leads to the success of digitalization.

While digitalization has made remarkable progress, developing countries have not yet reached the path of eradicating extreme poverty. Although the proportion of the population living on the poverty line has fallen from 16% in 2010 to 10% in 2015, the rate of poverty reduction is not slowing fast enough. Meanwhile, the UN estimates that by 2030, 6% of the world's population will not be able to overcome the state of extreme poverty. Poverty rates in South Asia have declined mainly due to active economic growth and relative macroeconomic stability, but it remains the region with the largest proportion of the poor. More than 35% of the population of Bangladesh and Pakistan, when calculated taking into account the national poverty trait, live in poverty. It is estimated that in East Asia and the Pacific, about half of the population is below the poverty line, or more than 100 million people live on \$1.90, \$3.20 or \$5.50 per day.

As people continue to live in poverty in all regions of the world, the UN-approved Sustainable Development Goals (SDGs) by 2030 are made up of a total eradication of poverty, which is a very multifaceted and complex issue and demands a thorough study. These factors form the relevance of our thesis.

The purpose of the thesis is to analyze and study financial assistance to developing countries in the digital environment on the example of Arvi VR. In accordance with the goal, the following tasks are set:

- identify approaches to determining emerging markets;
- describe the conditions for conducting investment activities in emerging markets;
- describe the financial development of emerging markets;
- determine the state and trends of the virtual reality market where Arvi VR operates;
- conduct a study of the state of business in international markets within the interests of the enterprise;
- identify the main problems faced by the company and find their solution;
- carry out a comparative analysis of the impact of digitalization of the economy on the well-being of developed and developing countries;
- form ways of a developed concept of the digital experimental environment.

The object of research is the mechanisms of financial assistance to developing countries.

The subject of the study is Arvi VR - one of the world's best AR&VR developer and producer of VR gaming products. ARVI is a leading Virtual Reality developer with over 5 years of experience in designing multiplayer Escape Rooms of the new generation. Arvi VR Escape Rooms is an experience based on the traditional Escape Room layout enhanced by the latest developments of the virtual reality technology. VR Escape rooms from ARVI allow several players to join forces to break free.

The methodological basis of the study. The methodological basis of the study is the work of well-known domestic and foreign scientists on political and consulting support, normative legal acts of Ukraine, and statistical data of official sites.

The scientific significance of this work lies in streamlining and optimizing existing scientific materials on financial assistance to developing countries in the digital environment.

Structure of work. Qualification work consists of an introduction, three sections, conclusions, and a list of the literature used (52 items of sources). The total number of pages is 69.

CHAPTER 1. FUNDAMENTAL CHARACTERISTICS OF EMERGING MARKETS

1.1 Approaches to identifying emerging markets

Although the term "emerging markets" (emerging markets) is often used in literature, to this day there is no single interpretation of this definition. Different scientists focus on different aspects of emerging markets. According to Jeffrey C. Hooke, emerging markets are poor countries with an average per capita income of less than \$9,000 per year. This definition covers 156 nations or 75% of states with 84% of the world's population (2001 2001).

Austin B. Fraser, after analyzing different definitions of emerging markets, recognized the lack of a single consensus on this definition and, instead of summarizing previous attempts to derive the definition and formation of its own, cited the general characteristics inherent in similar markets [25] – a rapidly growing economy, low per capita income, an immature capital market, weak protection of property rights, lack of commitment to the principles of capitalism, various political models and structures, underdeveloped institutions, restrictions for foreign investors, insufficient freedom of the national currency and significant currency control, high risk.

According to Miller R. [38], all emerging markets have the potential for future growth, which distinguishes the country's data from others; these markets are characterized by an active phase of economic stimulus in the form of attracting new technologies, and foreign investment, and expanding the commercial sector.

So, as part of the search for the most appropriate definition, we are faced with the problem that, firstly, in many definitions, there is a wide range of characteristics inherent in these countries, and secondly, the list of emerging markets, by many definitions, includes completely different in terms of the level of development of the country – for example, Pakistan with a GDP per capita equal to \$ 1,530 and China have a GDP per capita equal to \$9,630 [43]. Therefore, it was

decided to first disclose the issue of classification of countries by level of development, then determine the list of characteristics of emerging markets, and as a result, form a definition of such a market.

According to Galati G., the classification of countries by the level of their development is a complex and often subjective process [22, p.383]. There is no definite and unambiguous criterion (at least theoretically justified or based on an objective benchmark), which would be generally accepted. This issue has been controversial and has been actively discussed for many years since the 1960s when the emergence of international institutions necessitated the categorization of states, and the absence of a single criterion became a catalyst for the emergence of a huge number of classifications of countries on various grounds.

The problems of having a large number of classifications of countries are primarily due to different standards of living in different countries: for example, the level of average annual wages, level, etc. To understand such differences in social and economic indicators, countries are grouped on one basis or another. The most famous state groups are developed countries and developing countries. But no generally accepted criterion separates these two large groups.

In the absence of a unified methodology or agreement on how to classify countries by their level of development, many international organizations have used the membership factor in the Organization for Economic Cooperation and Development (OECD) as the main criterion for classifying a country as developed. Another example is the determination of the level of development of countries in the direction of transfers of real resources - from rich (developed) to poor (developing) [28].

For our study, we must distinguish between the category of developing countries and emerging market countries (developing countries, emerging markets, emerging economies, emerging markets – in this study, these concepts have the same meaning). But since the main focus of the study is to understand what developing countries are, we will only briefly touch on the issue of classifications

of countries by international organizations and then proceed to the definition of the object of this study and the description of its characteristics.

We looked at approaches to the classification of countries of three international organizations - the United Nations (UN) [34], the International Monetary Fund (IMF) [43], and the World Bank (WB) [35]. The approaches of these organizations are different. The explanation may be different postulates and goals of the activities of these organizations. However, it is worth noting that at the same time in the definition of countries as developed or developing there are certain common features.

All three organizations identify a relatively small number of developed countries (IMF - 22%, UN - 30%, WB - 37%); All countries considered by the IMF as developed are also classified by the UN, except for some.

The high-income WB Group includes a wide range of countries classified as developed and developing by the UN and IMF. Since institutions in the general sense equally classify developed countries, a consensus is reached on those that develop. All three organizations, since this group of countries, consists of a large number of representatives, are divided into subgroups of developing countries.

Today, some analytical financial institutions classify the list of countries that fall under the definition of "developing economies" in their way, tracking various indicators characterizing the level of development of the economy and markets of these countries. Let's turn to some of them.

Broad development was obtained by indices of analytical agencies that track indicators of the state of emerging markets and, accordingly, classify countries according to certain criteria. The most well-known and reputable agencies at the moment are Morgan Stanley Capital International World Index (MSCI), Standard & Poor's (S&P), and the Financial Times Stock Exchange (FTSE). In their work, they constantly carry out procedures for the classification of countries. According to the results of these agencies, it is clear that agencies almost equally classify the list of countries that fall under the concept of Emerging Markets (classifying 23 countries in this list), but the FTSE refers Poland to developed market, while

MSCI and S&P to developing one. MSCI attributes South Korea to emerging markets, while the FTSE and S&P to advanced economies; The FTSE at its last meeting moved with the rise of Kuwait to the emerging category, which has not yet been carried out by other agencies.

If the differences in the composition of the markets are insignificant, then the methodologies for determining the development of the agency's markets differ. The S&P agency uses a two-step country assessment process [36]. In the first stage, a series of quantitative indicators allows for an initial classification, which is included in the annual agenda of consultations on the classification of countries. The final decision on classification, or the second stage of the evaluation process, is a combination of quantitative and advisory criteria, which are evaluated by members of the classification committee, as well as investors. Consulting criteria allow us to incorporate the opinion of the main institutional investors about a particular country. The criteria cover a range of factors that reflect macroeconomic conditions, political stability, legal aspects, and even the conditions for the functioning of financial markets.

Initial criteria allowing the country to be included in the list of consideration of the following classification of the agency S&P:

- the total market capitalization of all securities that have passed the listing of the exchange of the country, is at a level exceeding \$ 2.5 billion.
- annual turnover of securities that is at a level exceeding \$ 1 billion, which allows us to talk about substantial liquidity.
- Market Development Ratio is more than 5%, which allows us to talk about significant coverage of the capital market of the domestic economy. This indicator is calculated as the ratio of the total market capitalization of all securities to the nominal GDP of the country.[22]

The next stage is the assessment of additional requirements, the compliance of which will allow the country to give the status of a developing economy. If three out of five requirements are met and the market capitalization is more than \$ 15

billion, the country falls under emerging markets status. The list of requirements is as follows:

- the mode of trading and conducting operations on the exchange should take place with the supply period T+3 or earlier. The timeliness of the supply of securities is essential for investors, so this criterion is important to assess the effectiveness of a particular market;
- compliance with the investment level of the main rating agencies of the country's sovereign debt. The country's ability to operate on debt directly depends on the financial situation. The country's rating must be at BB+ or higher on the S&P and Fitch scale, or Baa or higher on Moody's scale;
- no signs of hyperinflation in the country's economy. The level of hyperinflation according to the agency is an indicator exceeding 25% during the year of the country's assessment;
- absence of significant restrictions on the ownership of foreign investors' shares in local companies;
- free circulation of the national currency. Problems with the purchase or sale of the national currency or the repatriation of capital from the market complicate the investment process.

Full compliance with the eight emphasized above criteria, as well as finding the GDP indicator per capita above the mark of \$15 thousand allows you to assign the country the status of a country with a developed market

The main tool for assessing countries by the FTSE agency is the market quality matrix, which allows you to assign a particular rating to the country in the future, and within the framework of consulting procedures to decide on the status of the country and its classification [42]. Note the presence of similarities with the criteria of the agency S&P, but the FTSE considers in more detail the state and functioning of the country's financial markets, but at the same time the assessment of some indicators do not contain a quantitative dimension, which can lead to a more subjective classification result. This problem is solved through numerous additional procedures, for example, consultations with market participants, and

constant questioning of experts conducted by the FTSE within the framework of country classification procedures.

MSCI's classification activities are based on three main criteria, such as economic development, market size, and liquidity, as well as its availability. To obtain a particular status, the analyzed market must meet certain requirements. The indicator of economic development is used only for the classification of developed markets, while the differences in this indicator between developing markets and the so-called frontier are not relevant due to the strong spread of economic development of representatives of these groups of countries.

Indicators of the size and liquidity of markets are based on the minimum investment requirements inherent in market groups. The criteria for the availability of markets are aimed at reflecting the experience of international investors in these markets. This group of indicators is based on qualitative assessments reviewed annually as part of consultations on country classifications.

1.2 Conditions for investment activities in emerging markets

As we have already established previously, the term "developing economy" and, not a precisely defined concept and in a broad sense, the definition refers to countries that are in the stage of development and implementation of structural reforms of the economy. The degree of development of countries is not defined within any clear limits – even though China is one of the world powers with a strong economy, it falls under the definition of an economy developing alongside, for example, Egypt, which has several orders of magnitude weaker economies; both countries are developing, as they are at the stage of economic reforms and relatively recently began to open their markets as part of the processes of globalization so that their economies began to grow ahead of the global average growth rate.

Developing countries are sometimes characterized as transitional, which means they stay on track from a closed economy to an open market economy. The

mechanism of movement is the mentioned structural reforms that lead to higher economic development, as well as to the free movement of capital, along with increasing the transparency and efficiency of the country's financial markets.

Developing economies include countries that are not classified as developed but move towards developed ones, that is, reforms in potential should lead to comparable states of indicators, which determine the development of a country.

Mature economies (U.S., U.K., Japan, etc.) according to statistics [43] are growing by an average of 2.43% annually, while developing countries have higher potential economic growth rates of 4.52%, and the average growth rate in the world is 3.48%. One reason is the low base effect - the same absolute growth will be different for economies of different sizes: a mature economy undergoes little growth, while an emerging economy grows significantly.

One of the characteristic features of emerging economies in recent decades has been a significant increase in investment activity of both external investors concerning these economies and domestic investors. The growth of investments for countries means the possibility of stabilizing the economy and its maturation, since international capital flows add weight to the country's financial system through portfolio investments, as well as contribute to the implementation of long-term investment infrastructure projects through direct investment. In many ways, the high growth rates of these countries are ensured by the implementation of large-scale investment projects.

It is important to note that companies in emerging markets strive to maintain the pace of business growth. The interest of foreign investors in developing economies is fueled by the conditions for the implementation of investment programs - often an investor can easily expand the started business and open new areas of production, without worrying about the lack of cheap economic resources - for example, land, raw materials, labor - and expecting a high return on invested capital.

In turn, the recipient of this process is the emerging economy, receiving employment growth and a gradual transfer of technology, which in the long term

leads to significant economic growth - or a narrowing of the gap with developed countries.

High returns on invested capital are a factor determining the interest of foreign investors in emerging markets. However, the other side of the investment process is the risks inherent in such markets. High income mostly indicates the presence of comparable risks. For the emerging markets, they come in accordance with political instability, regulatory changes, infrastructure problems, national currency volatility, limited capital market and its low liquidity, the high share of the state in the economy, in general, the instability of the economic situation - the high probability of panic in the markets, speculative operations.

We describe the parameters of investment activity in detail, having considered the statistics on the following indicators: average annual income per invested capital, an indicator of monthly volatility of financial markets, as well as risk premium on capital, default spread, and indicator.

An important characteristic that determines the conditions of investment activity in emerging markets is the risk indicator of the capital premium, as well as the default spread [38]. The expected risk premium for mature markets is 5.08%; this indicator is calculated based on the S&P 500 index. The risk premium is calculated by multiplying the default spread by the relative market volatility of a given market (taking the average for developing countries, the result of the ratio of the standard deviation of the capital market to the standard deviation of the debt market, which is equal to 1.12). For developed countries, the risk premium is zero, as it is already included in the initial risk premium on capital (5.08%). In developing countries, this figure varies from 10% to 0.8%.

Such results allow us to draw several important conclusions. First, we can argue that emerging markets are characterized by a greater risk premium on capital, which accordingly increases the cost of financing the investment activities of companies or investors. Secondly, the risk of a country is more inherent in developing countries than in developed economies. However, some developed countries have more importance of the risk component due to local problems in the

economy (debt crises in Spain, Portugal, problems with budget deficits and debt-to-GDP levels in Italy, etc.). [4, c.16].

It is also possible to assess the systematic level of risk by beta, which is characterized as a component of market risk and also reflects the propensity of this type of risk from enterprises. Thus, according to [39], for developing companies, the total beta is 1.14, for US companies - 1, for the European market - 1.07, for Japan - 0.86. This means that when calculating the cost of capital, the investor in emerging markets will have to assume the highest level of risk, characterized by greater market volatility [14].

Risk factors inherent in a particular country adversely affect the investments of national companies due to the fact that the risk increases the cost of capital, and it can be assumed that it negatively affects the intentions of companies to invest.

Investment decisions differ in the conditions of different states certain factors that have a direct or indirect impact on the results of investment activity. Macroeconomic indicators are taken into account in many investment decisions, so we consider it important to characterize some aspects of the macroeconomics of developing economies.

It was noted above that emerging markets are subject to greater volatility in economic indicators - the inflation rate, and the national currency. It was also noted that emerging markets are characterized by higher growth rates of the economy. In addition, an important aspect is the value of money in the economy or the level of interest rates in emerging markets. Let me describe the above indicators.

The high level of inflation and the degree of its variability, according to the data, are characteristics of emerging markets: over the past 20 years, for the period from 2002 to 2022, emerging markets were characterized by higher inflation and volatility than developed countries. Thus, the average value of the GDP deflator around the world during this period is 4.15%, in developed markets - 1.78%, and in emerging markets - 7.47% [43]. In addition, the standard deviation of this indicator is higher in developing economies - 4.22% against 0.66% in developed countries.

It is known that the emerging markets are most susceptible to the volatility of foreign exchange markets due to the different structures of the economy of developed countries. According to Disyatat P. and Galati G. [15], the factor of high volatility is the high cost of hedging, and sometimes the lack of such an opportunity in underdeveloped and imperfect capital markets.

Caballero R. and Krishnamurthy A. [10] believe that emerging markets are subject to high dependence on capital flows and a sharp change in their direction leads to significant fluctuations in the foreign exchange market. In our opinion, a significant factor in the high volatility of emerging markets is also the high level of export orientation of the economies of developing countries (statistics confirm a higher share of exports of goods and services in relation to the GDP of the emerging countries, which in turn is another important characteristic of this group). The inflow of foreign exchange earnings is often significant in relation to the size of the financial market of these countries, which creates risks of changing the exchange rate when buying national currency and selling foreign currency by exporting companies.

Statistics also confirm the great export orientation of developing economies. Another important characteristic of emerging markets is the higher value of money in the economy. Thus, the average real interest rate of developed countries from 2006 to 2021 was 2.57%, while in developing countries (excluding Brazil) - 3.63% (6.37% including Brazil) [41]. The difference is insignificant, but there is; In addition, the nominal level of interest rates is much higher in emerging markets, and unstable inflation allows to smooth interest rates only in the long term, while in the short term the differences can be significant.

1.3 Characteristics of financial development of emerging markets

The financial development of emerging markets plays a special role in the investment process of enterprises. Empirical studies confirm that the differences between the economies of countries are largely due to the level of their financial

development [23]. Studies also confirm that financial institutions and financial markets have a strong influence on economic development, the fight against poverty, and economic stability.

As part of assessing the degree of availability of funding sources for emerging market companies, we decided to focus on three sectors of the financial market – the stock market, the debt market, as well as the credit market or the banking system, since these sources of financing cover most of the needs of enterprises in finance [24].

We decided to evaluate the development of the financial system of countries following the Methodology of the World Bank, which is based on four groups of indicators – the size of financial institutions and markets (financial depth), the degree of development of financial services (access), the effectiveness of financial institutions and markets (efficiency) and the stability of the financial system and markets (stability). The source of data for assessing the presented indicators is the World Bank Database – Global Financial Development Database, which includes information on 206 economies for the period from 2001 to 2021 [29].

Thus, a group of indicators characterizing the availability of the financial sector included data on the development of banking network branches, the concentration of the banking sector, as well as the degree of presence of foreign banks in the banking market, found out that the degree of distribution of the banking sector by 2018 was much lower in developing economies, but since 2019, the indicator of bank branches per 100,000 people of the adult population has even exceeded the level of developed economies. Interestingly, the concentration of the banking sector has been higher in developed countries for the last decade – by an average of 10%, which may indicate a greater degree of competitiveness in the emerging banking sector. However, after analyzing the quantitative as well as qualitative (by assets) ratio of foreign financial institutions to domestic financial institutions, we found that these indicators are much higher in developing economies. In principle, this is obvious, since more developed financial institutions within the framework of globalization processes have actively penetrated the

market of developing countries in recent decades, which was a reaction to the growing demand for financial resources in countries with active investment processes and the local financial system could not fully meet the requirements, especially international investors.

The presence of a significant amount of capital of foreign banks also explains the lower concentration of the emerging banking sector of the emerging markets. Thus, the development of financial availability in emerging markets is less high compared to developed markets.

The depth of financial development is characterized by 8 indicators. This group of indicators most accurately reflects the level of development of the financial system in terms of financing the investment activities of companies, since it evaluates the credit market, debt, and stock markets – the most traditional forms of capital raising by companies. Thus, the indicator of domestic credit to the private sector in % of GDP (banking, investment, trade credit, and other forms of lending to the private sector) in developed countries is an average value above 110%, while the developing markets according to this indicator are much lower – an average of 60%.

The same can be said about bank liabilities in the form of deposits, which usually provide financing for investment and operational activities of enterprises - developed markets exceed those that develop almost 2 times, while it is worth noting the higher level of GDP of developed countries, which translated into absolute values indicates an even greater difference between countries.

The indicators of the development of the stock market are also much higher in developed countries - the capitalization of the market to GDP averaged about 87% for the analyzed period, in developing countries - 52%. The average number of companies per 1 million varied in developed countries in the range from 31 to 42, in developing countries averaged 8. We can conclude that the stock market as a way to attract financing is more traditional in developed countries than in developing countries.

For example, Tadesse S. [46] in his analytical studies, concluded that the emerging financial system of emerging markets is usually bank-oriented due to a weak institutional environment, a smaller extant, and the number of agency conflicts due to the predominance of medium and small companies than large corporations, as well as due to the structure of the emerging markets economy, the banking system is more efficient in traditional, standardized sectors, while a market-oriented system is more efficient in a complex, knowledge-intensive industry.

The debt market is part of the securities market, so conclusions about the development and degree of involvement of companies in the stock market can be extrapolated to the liability market, which is confirmed by statistics. Thus, the total volume of debt securities of both the private and public sectors issued on the domestic financial market, the per cent of GDP is much higher in developed countries - on average for the period from 2005 to 2021 amounted to 45% for corporate issues and 65% for state-owned ones (in emerging markets, 12% and 25%, respectively). We can also state that in recent years the situation has not changed – there is no growth of new issues of corporate bonds of the non-financial sector in both developed and emerging economies [51, p.81].

We note a significant increase in the volume of state obligations in developed countries since 2008, which can be explained by the growing budget deficit of some European states, as well as the active process of "quantitative easing" carried out by the American regulator in the post-crisis time.

The next group of indicators assessing the effectiveness of the financial system confirms the previously cited characteristics of emerging economies relative to the higher value of money in the economy and the real interest rate. The low spread correlation between the rate on credit and deposit operations of banks characterizes both the efficiency of the system and the degree of its availability and flexibility. According to the emerging statistics of the emerging economy, they are characterized by a significantly large spread of rates, which, although it has a positive effect on the traditional performance indicators of banks – ROA, ROE

(they are higher than the indicators of developed countries) – still symbolizes the underdevelopment of the system and its instability [25].

The turnover ratio of shares confirms the conclusion about the market orientation of developed countries and the weak position of the capital market as a source of financing from emerging economies. At the same time, this indicator is a good proxy variable that characterizes market liquidity.

According to the World Bank, emerging markets lag far behind in this indicator – turnover averaged 60% for the analyzed period (from 2001 to 2021), and developed markets provide much higher rates of stock turnover in the market – 94%. The last group of indicators allows us to make some conclusions regarding the stability of the financial system of countries. As we noted earlier, emerging markets are prone to greater volatility in financial assets; It should be noted that volatility was significant between 2001 and 2008, from 2008 to 2016, the level decreased, but still was higher than the average level of volatility of developed countries.

The probability of bankruptcies in the banking sector of emerging markets is higher; the explanation of this may be higher rates of capital and revenue earned and at the same time lower rates of deviation of income data from the average value in developed countries compared to developing countries.

In addition, statistics on bank loans to deposits indicate the presence of other sources of financing for credit operations of banks in developed countries.

Thus, the analysis allows us to conclude that the overall level of financial development of developing economies is generally lower than the level of developed countries. In addition, emerging capital markets are characterized by low efficiency due to weak information transparency, which leads to the fact that the valuation of many assets is distorted, because there is no discounting of all available information in asset prices.

In conclusion, the characteristics of the financial development of countries will give some interesting conclusions made by Cihak Metal [11] in the framework of a study on the analysis of indicators of the development of the financial system.

Thus, the authors found that the financial system has changed significantly since 2000, as well as during the global financial crisis; The most significant change is the decline in its stability, which reflects the growing volatility of most markets and incomes of financial institutions. In addition, the authors note the strong impact of the crisis on the effectiveness of financial markets declines.

Importantly, less impact of the crisis and liquidity shocks have been felt by underdeveloped markets, and the recovery of markets has been more difficult than the recovery of financial institutions, which have shown an increase in performance indicators. The authors also concluded that the securities market is relatively important for countries with a high level of development.

Demirgüç-Kunt Aetal [13] tested this assumption empirically and found that in the process of "maturation", the economy of using financial markets' services is growing relative to the use of banking services. In other words, with income growth, the margin increase in economic activity associated with banking activity decreases, while the margin increase in economic activity associated with the growth of the capital market increases.

CHAPTER 2. ANALYSIS OF THE VIRTUAL REALITY COMPANY ARVI VR IN THE CONDITIONS OF EMERGING MARKETS

2.1 Determining the state and trends of the virtual reality market where Arvi VR operates

Before determining the state and trends of the virtual reality market where Arvi VR operates, we will give a brief description of the company itself. So, ArviVR was created in 2016 by a group of enthusiasts who sought to develop modern VR and AR technologies. ArviVR sought to change the usual perception of ordinary single arcades and physical escape rooms. All creative potential, experience, and love for modern technologies have been combined to create quality content for every taste. ArviVR provides quality services for modern virtual reality technologies because they can diversify leisure and change business as a whole. ArviVR currently offers the widest library of multiplayer VR Escape Rooms on the market.

ARVI VR - the quest to show how VR can push the boundaries

Achievements of ArviVR:

1. The widest VR library on the market.
2. Effective development process and monthly releases.
3. Our own VR platform and admin launcher, allow you to manage all activities and records in one place.
4. More than 150 partner companies with 250+ locations around the world.
5. The list of key partners includes such companies as HTC, Zero Latency, Hologate, CAHEM, PlayVR, and others.

The team of the company includes the main experts in the field of development of virtual games consisting of 9 people and subordinates who participate in the development of games for 42 people. If we take into account all the franchises sold and provided, then the company employs more than 300

thousand people. which in different partner countries lead and promote projects from ARVI VR. We can consider the structure of ARVI VR in Fig.2.1. It is necessary to note the work in the company is based on various teams, not departments as in ordinary companies, but teams that perform and create a particular virtual project.

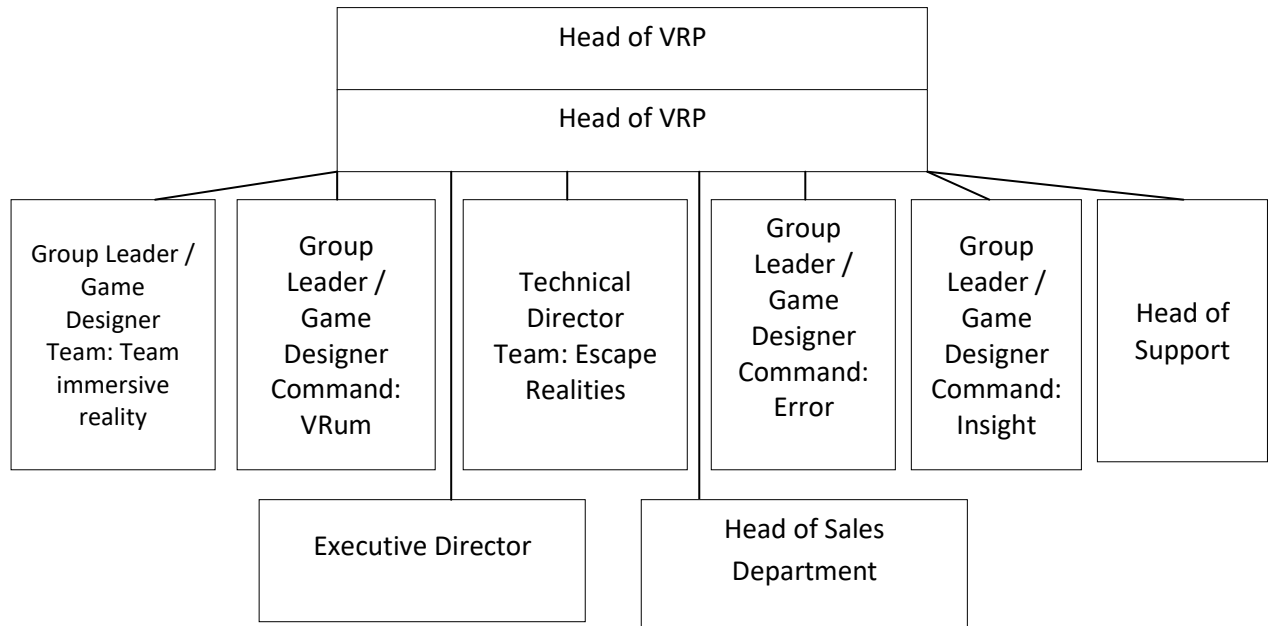


Fig.2.1. The organizational structure of ARVI VR [27]

ARVI VR is a Ukrainian innovative company that creates a game for virtual reality. Personnel management of the company is brotherly to take into account the need to form an innovative system based on information and communication technologies. This management system includes:

1. Model of virtual record keeping. The implementation of organizational and administrative methods of personnel management requires constant access to regulations and other documents of the company. In remote work mode, this function allows you to perform a digital database created within the enterprise by the own efforts of document management specialists, or external software purchased on the market under license.

2. Company portal (or intranet). Being, in fact, a private network of the company, the Internet is built on the protocol of sharing and exchange of internally

organized information. Data typically includes categorized employee lists, partner and customer contacts, and a customer base. Also, in the conditions of management of a modern enterprise, the internal website of an organization with free access for potential consumers and special services that can be used only by employees is of particular importance.

3. Customer relationship management system. This technology is designed to establish effective interaction with customers, by collecting and analyzing customer data and creating an automated customer service model.

4. Enterprise Resource Planning System (ERP). To date, the introduction of the ERP system has become a prerequisite for the stable functioning of a commercial organization. The model is based on a corporate strategy focused on optimizing the resources of the enterprise with the help of an integrated package of application software. The product, in turn, forms a common model of data and processes for all areas of the company's activities.

As for the virtual reality market, the global virtual reality market was estimated at USD 15.81 billion in 2020 and is expected to grow by 18.0% from 2021 to 2028 (Fig. 2.2).

Virtual reality (VR) is a digital experience where a three-dimensional environment is modeled on the real world. Technology offers viewers an immersive experience with VR devices such as headsets or glasses, gloves, and bodysuits. stimulates market growth.

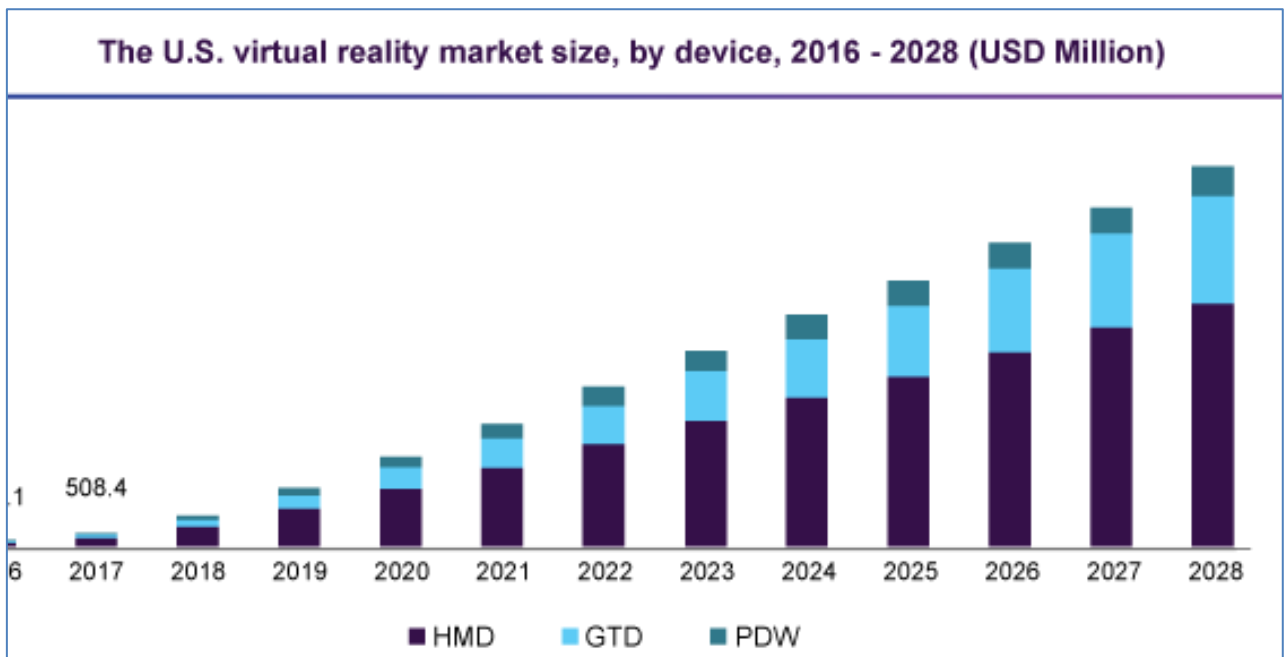


Fig.2.2 Results and forecasts of the virtual reality market, billion. USD [23]

In addition to providing training and fulfilling educational goals, this technology is widely accepted in various industries for various other purposes. In the automotive industry, for example, this allows engineers to experiment with the design and structure of a vehicle at the concept creation stage before starting expensive car prototypes. The technology is also used to treat patients with mental health problems through VR therapy. In addition, the tourism industry allows potential customers to take a virtual tour of attractions, famous locations, restaurants, and hotels using VR technology. Thus, the growing introduction of VR in several industries for different applications stimulates market growth.

The Covid-19 outbreak has affected the operation of various enterprises due to temporary shutdowns of several industries and blockages imposed in different regions. However, during the pandemic, the demand for virtual reality technology increased due to the need for companies to continue their business operation virtually. Companies have switched to virtual meeting-attending platforms to formulate different policies and strategies for their current business. It has also become a very promising technology for virtual events, as it helps to plan events.

In addition, the growing rollout of virtual reality applications in the architecture and planning sector, as it assists in decision-making and visualization of the results of proposed architectural plans and urban projects, is expected to have a positive impact on the market. The use of VR technology in architecture allows you to detect and correct errors in the early stages of design and therefore saves time and money. In addition, a lot of real estates. In 2018, ThyssenKrupp Elevator, a supplier of passenger transportation systems, launched VR showrooms in the Middle East and Asia, which allowed customers to test the company's new transport solutions. uses Microsoft HoloLens to transform delivery and measurement into steps.

Asia Pacific accounted for the largest share of revenue, up from 40.0% in 2020 due to the growth of events in VR technology. In the region, China took the largest market share, as the country is the main distributor of HMD. Technological development in Southeast Asia further stimulates market growth. In 2019, Japan launched commercial 5G services, leading to the strategic ingenuities of telecommunications companies to offer VR/Augmented Reality (AR) viewing platforms using 5G connectivity.

The U.S. topped the North American regional market in 2020 as it represents the most attractive and largest technology market with extensive VR research activities. This region has a high perception of this technology and is a hub for key companies such as Microsoft Corp., Apple, Inc., Google LLC, and Magic Leap. The U.S. government is also encouraging market growth by conducting virtual training on veterinary medicine. South America is expected to witness steady growth due to rapid internet penetration and the development of immersion technologies.

Europe is projected to be the fastest-growing regional market from 2021 to 2028. This is due to the significant introduction of virtual reality technology in various applications in various industrial verticals, primarily in the automotive and gaming industries. There is a broader base of gamers in Europe that is driving the introduction of innovative VR headsets in the region. The region is becoming

known for its rapid development and launch of advanced VR equipment focused mainly on the gaming community in European countries. The Middle East and Africa region are likely to witness slow growth due to the slow adoption of virtual reality technology.

The ongoing trend of tech giants getting commercial products into the industry has guided startup collaboration to integrate and absorb virtual reality technologies that drive the industry's growth. Key players in the market are involved in mergers and acquisitions, as well as in partnership with tech start-ups, to gain a competitive advantage. For example, in June 2020, Facebook Technologies, LLC acquired Ready at Dawn, a virtual reality video game company, under a deal to create games with immersive VR-based content for Oculus Studios. In May 2020, Apple Inc. acquired NextVR Inc. to increase Apple's ingenuity in VR for entertainment and sports. With increasing competition in the market,

Key companies are investing heavily in R&D to incorporate state-of-the-art technology with a variety of features into their offerings. The launch of Sony's PlayStation 5 and Microsoft's Xbox Series X and Series S is expected to give VR industry players new opportunities to move quickly into the VR consumer space. Industrial players realize that there is great potential in the enterprise sector, and quickly fled into a profitable space. Big companies like Microsoft and Samsung are looking to introduce innovative virtual reality headsets with immersive experiences in an attempt to incorporate VR into the mainstream. Outstanding players in the global virtual reality market are:

- Barco;
- CyberGlove Systems, Inc.;
- Facebook Technologies LLC;
- HTC Corporation;
- Microsoft;
- Samsung Electronics Co., Ltd.;
- Sensics, Inc.;

- Sixsense Enterprises, Inc.;
- LLC "Ultralip".

Table 2.1

Virtual Reality Market

Report Attribute	Details
Market value in 2021	\$21.83 billion
Revenue forecast for 2028	\$69.60 billion
Growth rate	CAGR 18.0% from 2021 to 2028
The base year for evaluation	The 2020 year
Historical data	2016-2019
Forecast period	2021 - 2028
Quantitative units	Revenue of millions of US\$/billion and CAGR from 2021 to 2028
Report Lighting	Revenue forecast, company rating, competitive situation, growth factors, and trends
Covered segments	Device, technology, component, application, region
Regional-scale	North America; Europe; Asia-Pacific; South America; MEA
Scope of the country	US; Canada; Mexico; United Kingdom; Germany; France; China; Japan; India; Brazil
Profiled key companies	Barco; CyberGlove Systems, Inc .; Facebook Technologies, LLC; HTC Corp .; Microsoft; Samsung Electronics Co., Ltd.; Sensics, Inc.; Sixsense Enterprises, Inc .; LLC "Ultralip"
Customization area	Free reporting setup (equivalent to 8 analysts' working days) with purchase. Add or change a country, region, and segment.
Pricing and purchase options	Use customized purchase options to meet your

	exact research needs.
--	-----------------------

Source: [28;30]

VR technology has opened up significant opportunities in the entertainment and sports industry. Games, location-based entertainment, theaters, and music are expected to witness the benefits of VR technology. For example, an amusement park in Germany called Europa-Park has deployed a virtual reality roller coaster, Eurostat Coastality, attracting riders to explore the world based on the film *Valerian and the City of a Thousand Planets*.

As you can see, today the competition in the company is not high enough, because there are not enough developers of this experience yet. ARVI VR is in the TOP 10 and occupies the 3rd place in it as the best developer of virtual games and in the number of franchises sold in different countries of the world.

2.2 Research of the state of business in international markets within the interests of the enterprise

Considering the virtual reality market, first of all, the three main markets are taken into account: the United States, The United Kingdom, and Europe.

Both VR and AR have been around for some time. VR provides an immersive user experience in a virtual 3D environment, while AR allows users to overlay digital content, such as drawings or instructions, on real-world objects and get visual, sound, or tactile (touch) sensations from wearable technologies.

In 2016, Goldman Sachs predicted that by 2025, the AR/VR market will generate revenue of \$80 billion a year, also they predict that half of the smartphone users could replace their phones with augmented reality technology. [30]

XR technology is already widely used in gaming, education, and healthcare. Now the financial services industry plans to use this technology to offer its customers an impressive experience. Organizations have already begun providing self-service options using robots, chatbots, and multimodal interactive kiosks to deliver information about products and services. Whatever the firms offering new

services to customers choose, digital transformations, including XR technology, will be needed to compete in this huge new market.

The global augmented reality (AR) and virtual reality (VR) market is projected to deliver revenues of \$1.274.4 billion in 2030 in 37.0, increasing from \$2019 billion at 42.9 years, with a steady average annual growth rate of 2,020% during the forecast period (2030-20NUMX). [39]

The growing penetration of smartphones and tablet computers, the growth of technology adoption in enterprises, and the growing attention of suppliers to lower prices are key factors leading to market growth. Between AR and VR, the VR division accounted for the main market share in 2019.

The use of virtual reality is growing in several industries, mainly in games, and virtual reality prices are declining, leading to a wider spread of this technology. VR has provided consumers with an immersive experience, so gaming industry companies incorporate these features into their services and products. According to forecasts, the AR category will grow at a faster pace during the forecast period due to the various advantages offered by this technology.

Depending on the scope, the AR and VR market is divided into corporate, commercial, and consumer, of which the consumer division is expected to occupy the main market share in 2030. Growing awareness of AR and VR is the main reason for the growth of this division. The number of players around the world is expected to grow in the coming years, which is projected to drive demand for immersive and interactive games.

Geographically, the AR and VR market during the historical period (2014-2019) was dominated by North America and is projected to also take the main market share during the forecast period. In the U.S. region, they lead in the field of domains due to the presence of large companies in the country. In addition, the growing use of VR and AR in the healthcare and e-commerce sectors is also driving the growth of the regional domain. [20]

The rapid spread of these technologies among enterprises is a key factor in the development of the AR and VR market. The corporate sector is one of the main

goals for players in this field. The potential of AR and VR technologies in enterprises is huge, as all key device manufacturers, solution providers, and application developers are targeting this sector. In addition, many Fortune 500 companies have begun experimenting with VR and AR technologies, and some have already initiated pilot projects.

The growing penetration of tablet computers and smartphones is also a key factor in the development of the AR and VR market. Smartphones are considered the main hardware interface for VR and AR applications, in addition, it is projected that by 3.5 years the number of smartphones will reach 2020 billion, which is 9.3% more than in 2019. As a result, AR and VR businesses are focusing on these devices to expand their presence in the industry. [11, c.207]

In conclusion, it should be noted that the market is expanding due to the increasing introduction of AR and VR technologies in enterprises and the growing penetration of smartphones.

Sales of games in the United States reached a new scale in 2020. Their total volume amounted to 56.9 billion. dollars, which is 27% more than in 2019.

86% (\$48.9 billion) comes from gaming content - titles, DLC, console, cloud, and mobile subscriptions, as well as portable, PC, and VR platforms. In total, sales of software increased by 26% compared to 2019.

Call of Duty: Black Ops Cold War was the best-selling game of 2020. In second place was last year's part of this franchise, Modern Warfare. For 12 years in a row, the Call of Duty line has been leading in the US gaming rankings. But Animal Crossing: New Horizons, another extremely popular game, is located on the third line of the rating.

The Last of Us: Part 2 was the best-selling game for PlayStation in the US and the third best-selling Sony game in the region of all time, behind only Marvel's Spider-Man and God of War, which came out in 2018.

However, the sharpest jump occurred not in the software segment, but the "iron" segment. Revenues from sales of consoles reached 5.3 billion. dollars last year, which is 35% more than in 2019 (3.9 billion). One of the best-selling was the

Nintendo Switch, ahead of only the PlayStation 5 (in rating) and the PlayStation 4 (in circulation).

Spending on gaming accessories increased by 21% to 2.6 billion. PlayStation 5 gamepad, DualSense Wireless Controller, is the top-selling device in 2020, and Turtle Beach Ear Force Recon 70 Gaming Headset Black for Xbox is the best-selling gaming headset.

Consumer spending on "iron" and PC accessories in the United States reached 4.5 billion. dollars in 2020. This is 62% higher than in 2019 and twice as much as in 2017. [30;39;40]

Online sales of computer games also increased by 19% to 7.5 billion. Dollars. Sales of PC accessories increased by 81% compared to sales in the same period of the previous year, and the volume of sales of components for PC - by 57%.

Sales of all types of computer components and accessories have doubled. Headsets, monitors, and keyboards lead by the largest margin - most likely due to the transition to remote work.

40% of Americans played games on PC in 2020 – this is 4% more than in 2019 Users who played PC games before, in 2020 began to spend 14% more time in them.

If we talk about the research company ArviVR, the company's market share is constantly growing. This can be seen in Fig.2.3

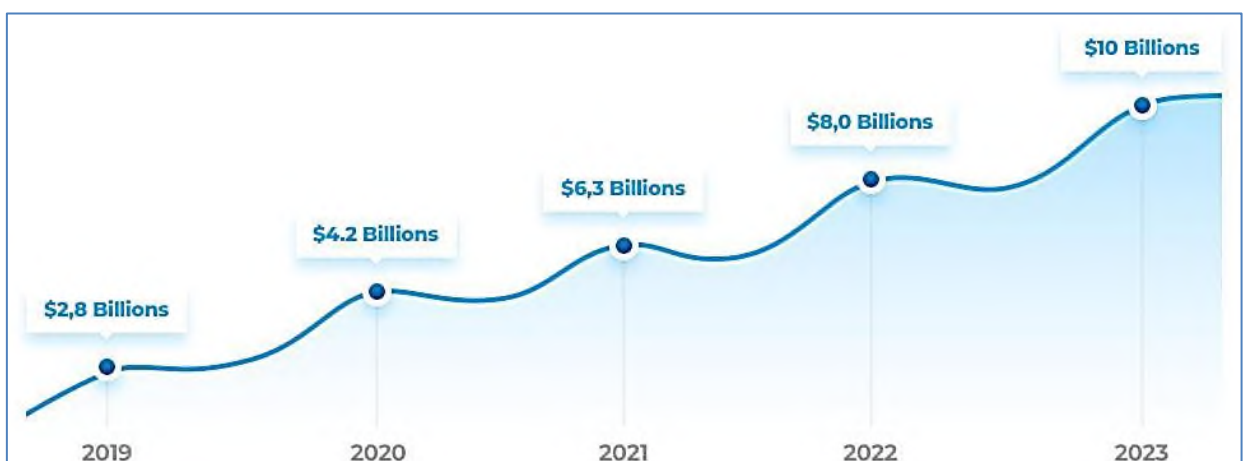


Fig.2.3. Market share of ArviVR in the virtual reality market [40]

The average growth rate of ArviVR's share in the virtual reality market (international market) year-on-year was 34.5%. According to the company's forecasts, the estimated market share of the VR industry by 2024 will be \$ 11,600,000,000.

Almost 35% of the market for ArviVR is quite a significant indicator. Constant cooperation with partners from different countries and the sale of franchises gives the company greater recognition in international markets and makes it possible to compete with other competitors in this field of activity.

Almost 43 million have been sold in the UK in the past year. Games, \$3 million consoles, and about 10 million accessories for PC.

Retail sales and online reached 42.7 million. games - this is 34% more than in 2019. Most of them (24.5 million) were sold online - 74% more than in 2019. [25]

FIFA 21 was the best-selling game of the year, with a total circulation of nearly 2.2 million copies. This result exceeds the figures of Call of Duty: Black Ops Cold War - 1.42 million copies.

Copies of Call of Duty: Black Ops Cold War 2020 sold fewer than copies of its predecessor - Call of Duty: Modern Warfare 2019. However, gamers have acquired more games of this line in 2020. As a result, 2020 was 13% more profitable for the series than the previous year. Call of Duty: Modern Warfare ranked fifth in the top games of 2020 with a total sales of 897,000 copies in 12 months. [25]

The "number" is obviously popular. Two-thirds of the games sold in the UK last year (67%) were bought from Xbox Live, PSN, Nintendo eShop, and Steam. In 2019, this figure was 52%. [16]

Despite restrictive measures and self-isolation, the retail video game market remains extremely profitable. Moreover, it has grown over the past year. 18.2 million games were sold retail, which is 2% higher than in 2019. And if you add to

this the sale of consoles and accessories for PC, the total revenue will be 2.2 billion dollars - 28% more than in 2019.

The most successful publisher of physical copies of games was Nintendo. In 2020, it sold 20.5% of the total, followed by EA with 12.4%. The largest publisher in the "figure" is Ubisoft, its share of sales in the market in 2020 was 18%. In second place - again EA with 15% of the market.

In Europe, 123.7 million were sold copies of games, which is 19% higher than in 2019. 58.7 million was purchased in the "figure", and this is 47% more than a year earlier. Despite the restrictions caused by the COVID-19 pandemic and the closure of retail stores, 65 million copies of games were sold in continental European markets. This exceeds the result of 2019 by 0.8%. [45]

Given the popularity of football in Europe, it is not surprising that FIFA 21 took first place in the list of the best-selling games and overtook Grand Theft Auto V, which took second place. In the list of best-selling games, there are also projects that were released before 2020 - in the top 10 FIFA 20, Red Dead Redemption 2, Mario Kart 8 Deluxe, and Call of Duty: Modern Warfare. [10]

Next on the list after FIFA 21 was Animal Crossing: New Horizons, which took third place. Nintendo does not provide sales data for digital versions of its games, so it is possible that it could take a higher position in the list.

In almost all countries where data on sales of games on physical media and their digital versions are available, FIFA 21 took the first place: this situation is observed in Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, and Switzerland. The only exception was Finland, where the first line of the ranking took NHL 21. [16]

The largest publisher of games on physical media in Europe was Nintendo with a market share of more than 28%. This is more than twice the figures of EA, which is located in second place. In the first place in sales of digital versions of games was the company Ubisoft, which won almost 18% of the market.

2.3 The main problems faced by the company and their solutions

To identify the main problems and ways to solve them for this company, it is necessary to first assess the competitiveness of the enterprise. ARVI VR is a Ukrainian innovative company. ARVI VR is a leader in its VR Escape Rooms segment.

Let's highlight the list of competitors in this segment of creating projects and providing virtual reality services. The list of competitors and their characteristic features will be considered in Table 2.2

Table 2.2

Possible competitors of ARVI VR in the virtual reality market

Company competitor	Characteristic signs
Oculus VR	Facebook acquired the company for a whopping \$2 billion in 2016. The team even included the famous game visionary ID Software and Doom John Carmack. Carmack eventually left Oculus due to a legal dispute with Zenimax, but Oculus did not allow this to prevent their creative engines from working overtime.
Google	They released a cardboard headset virtual reality Google Cardboard worth \$ 15. It was specifically designed to be used on your phone or smartphone and interact with various apps and games. This led to their release, Google Daydream View. It's not hard to see that Google will continue to explore this world of virtual reality and possibly expand its presence.
HTC Vive	HTC Vive is a mix of Matrix, First Player, and the entire cyberpunk genre. HTC released this headset for \$ 799 (current price of \$ 599), which is advantageous to distinguish professionals from amateurs. It includes a headset, sensors for your room, and handheld devices. What I like about HTC is that they partnered with Valve on this project to make it more reliable.
Microsoft	Another big name, another possible serious player as a VR company. Microsoft is on the list, showing that VR companies can also be large existing companies. Microsoft pays great attention not only to virtual

	reality but also to augmented reality. We should all be familiar with this, as this is the main thing that fuels Pokémon Go 2016.
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Source: [28;30]

In this industry where ARVI VR works, it is difficult to talk about competition as it is because partial competitors become new partners or vice versa. In this industry, the law of competition does not work on all grounds, because there is creative potential and innovative and technical aspects of work.

ARVI VR partners are in more than 220 countries and continue to grow. The sale of franchises and the creation of projects from ARVI VR is already a certain image and brand for further development. Freedom in the implementation of the company's ideas of business ideas of the project, etc.

We will determine, nevertheless, using the 5-force porter method, the level of competition in the industry itself where ARVI VR operates and is implemented. (Table 2.3)

Table 2.3

Competition in the field of virtual reality (for the Ukrainian market)

Threat	Outcome	Description	Directions of work
The threat of intra-sectoral competition	Average	There are a lot of players in the market, but at the same time, the intensity of competition in the market is average. But in a few years, the competition can become tough.	It is necessary to monitor their main competitors, as well as those who have just entered the market. It is necessary to look for innovative approaches to business and improve your product. Create interesting and attractive for customers.
Threat from new players in the market	Average	There is a risk of new players entering. New enterprises can appear on the market due to the attractiveness of the industry	It is necessary to study new players in the virtual reality services market, to increase customer loyalty to this company.

		as a whole and due to the fact that rather low start-up investments in the business are needed.	
Threat from substitute goods	Average	On the market, there are substitute products, which allow the consumer to choose between this company and competitors.	It is necessary to improve their services and make them unique and different from others. Create your interesting consumer
The threat of supplier instability	Low	There are enough providers in the virtual reality services market.	There are suppliers, but you can work independently, without suppliers.
The threat of loss of customers	High	The number of consumers of virtual reality services is growing every year. And if you do not inflate prices, and carry out high-quality service, then customers will not leave, and will also, perhaps, bring new customers.	Use an individual approach to the client, improve the quality of services, and develop new profitable offers and services.

Source: [28;30]

The competitive analysis of the industry by Michael Porter helped to determine the intensity and severity of competitive forces in the field of virtual reality, to find a position in which our company will be as protected from the influence of competitive forces as possible and will be able to influence them for its part.

The work of management in ARVI VR is inevitably associated with the need to find and select personnel. Personnel selection is one of the purposeful functions of management since it is people who ensure the effective use of all types of resources available to the organization and it is people who ultimately depend on its economic performance and competitiveness.

Based on official statistics, in 2020, the number of employees was 42 people. In 2021, the number is already 60 people. For analysis, take the last 3 years

of the company's work. In 2020, the number of employees was 42 people, in 2021 as of 01.10.2021. and in 2019 there were 34 people. The dynamics of staff growth at ARVI VR can be seen in Fig. 2.4.

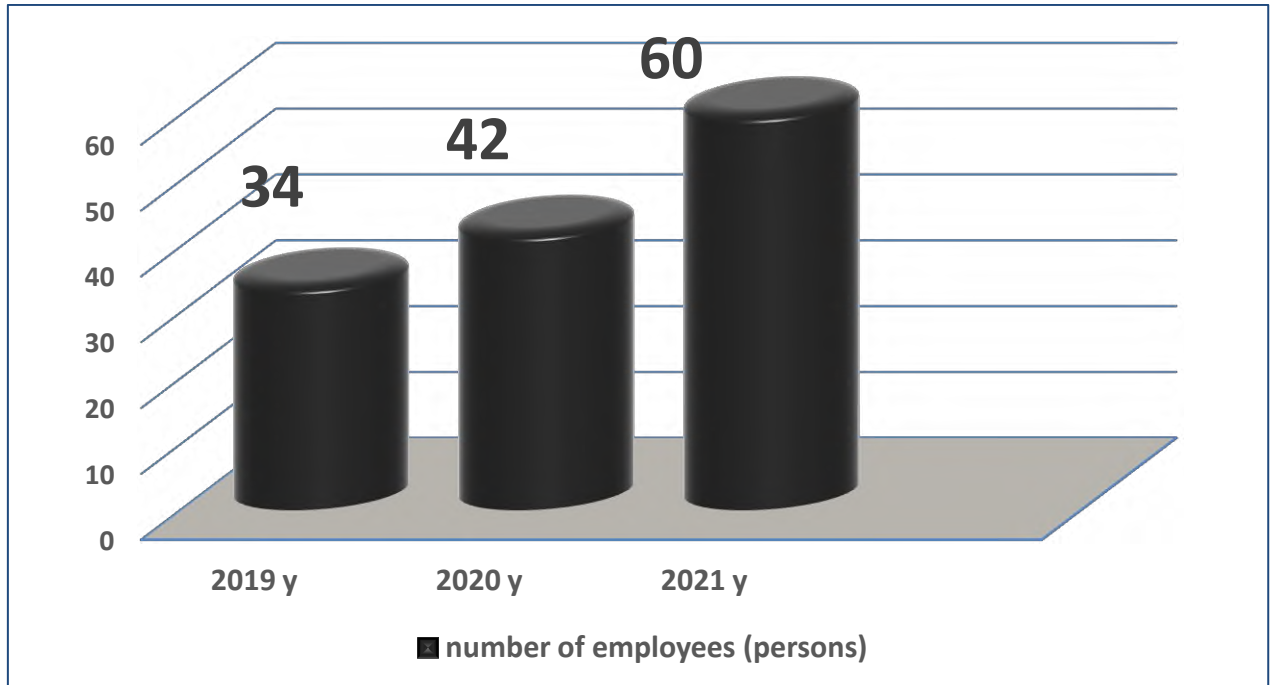


Fig.2.4. Dynamics of the number of employees of ARVI VR [30]

As we can see, the number of virtual reality developers is constantly growing. Like the company itself, the developer of ARVI VR and their branch (franchise) in the Ukrainian market appreciates high-quality personnel who have all the skills of work in virtual reality. The retention and increased demand for work in a virtual reality company can be seen in Fig. 2.5.

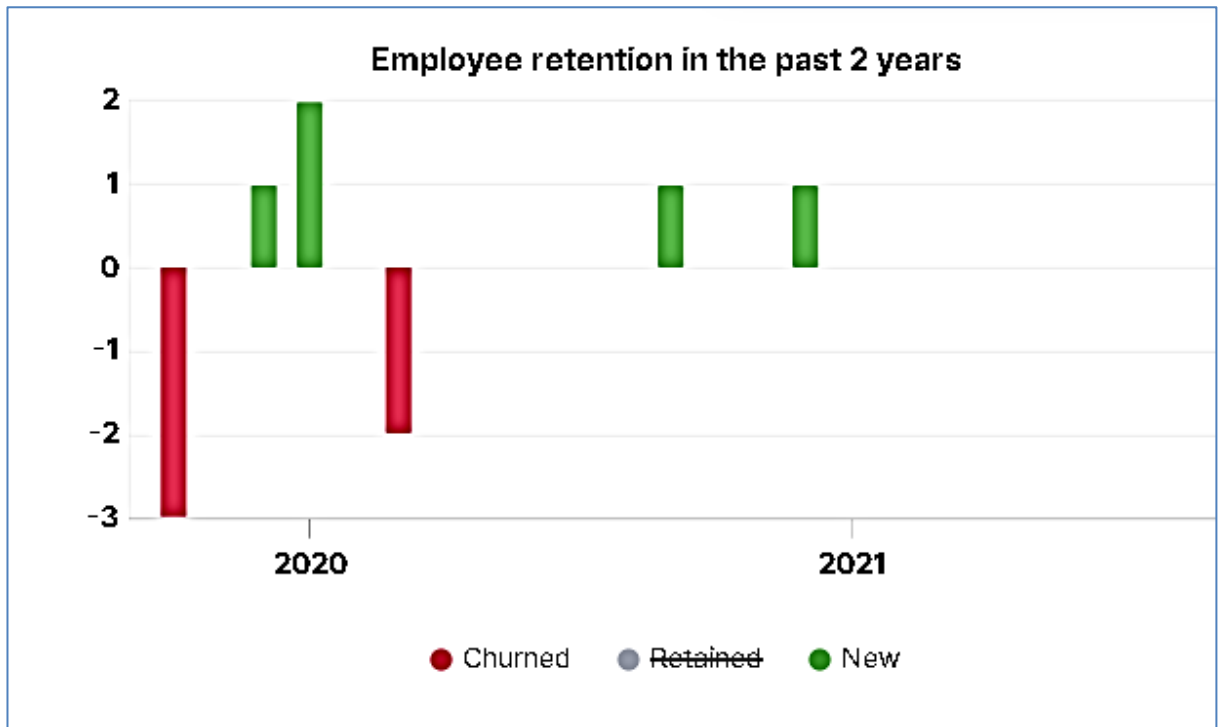


Fig.2.5. Dynamics of development and retention of personnel in ARVI VR
[30]

Since ARVI VR is a modern company, the approach to personnel and its management is not standard enough. The work will be completed on cooperation and interconnection between teams, where each employee acts as a separate element of the overall mechanism. The scheme of work of the management efficiency of ARVI VR is as follows Fig. 2.6.

The purpose of the company's management: To provide the company with qualified and loyal employees in accordance with the goals and strategy of the company

Tasks: ensuring competitive advantages, improving the quality of work, strengthening loyalty, strengthening motivation, identifying the best employees, attracting staff to the virtual reality change system

Company principles: cyclicity, accessibility, continuity, commitment, professionalism, Gamification

Company principles: cyclicity, accessibility, continuity, commitment, professionalism, Gamification

Processes: adaptation, professional training, study of customer specifics, self-development, preservation of knowledge, assessment of personnel

Compiled by author

Table 2.6. Scheme of management efficiency of ARVI VR [30]

The main management system of ARVI VR shows the effectiveness of its work because there is a high-quality selection of personnel and further adaptation in the team. If the employee shows a good result, the company helps to learn and develop at the expense of the company and in the future.

The analyzed management system showed that ARVI VR has non-standard approaches to working with personnel. Because the company works with talented and free people, how they work in a team as separate mechanisms. This approach works quite effectively on the result of the company's work and makes it possible to test the work of employees without additional tests because it immediately shows its result and efficiency in work. Next, consider the main problems faced by the company and highlight their possible solutions.

Virtual reality technology should create only positive sensations, this will stimulate the demand for the transition from familiar systems to modern ones. One of the problems may be social isolation, in a pandemic – well, in safe conditions – can be a problem for society. On platforms that use VR (virtual reality), AR (augmented reality), and MR (implicated reality) technologies, there are three groups: products for a personal computer, independent devices, and smartphone applications.

In each of these segments, changes and innovations are constantly emerging, huge changes have already occurred over the past two years, and the pace of change is gaining rapid development [4].

The above technologies attract more and more investments in the world market, according to forecasts for 2030, the investment portfolio can reach more than \$ 30 billion. Along with investments, concepts appear on projects that take into account the future capabilities of devices and their characteristics: weight, the field of view, display type, and other essential physical parameters associated with the senses.

Taking into account development trends, demand, and problems of virtual reality technologies, current statistics are used, which are constantly engaged in international consulting agencies. IdTechEx group of experts and analysts annually holds large-format events where leading companies in this field gather with investors, vendors, and large IT corporations that create a unique characteristic of this industry.

VR and AR technologies have given a new impetus to retail. However, with the advent of electronic capabilities, trade has shifted to the e-commerce platform and augmented reality technologies have helped in the digitalization of goods for modern, virtual space.

Despite the already existing level of retail demand in the virtual space, because of the Covid-19 pandemic, it has increased significantly and stimulated the market with new trends and opportunities. In May 2020, Poplar received funding of \$2.5 billion due to increased demand for retail experience of augmented reality technologies [5].

Since the emergence and premiere of new, popular products, a presentation has always been held. A special event that encouraged interested users to be present at its announcement. With the advent of AR and VR technologies, it became possible to see and feel the atmosphere of the event, however, without spending money on moving and a place at the premiere. One of these events was the Augmented World Expo, which was focused on retransmission with implicated and augmented reality. Due to the great popularity of this event, large fashion shows, premieres, and announcements of new products began to appear in virtual viewing. The world has changed – the market has created a new offer.

Research in the field of AR always requires the use of special software, it was difficult because there have always been problems with the convenience and completeness of the information received.

A popular source was platforms based on WEB-AR, which made it possible to see the technology right in the browser [6].

Another promising area in the field of augmented reality is the segment of navigation in the room. This technology recognizes great potential, according to forecasts for 2022, when there is already modern navigation from Google and Apple, for devices that support this software.

Existing indoor orientation programs (ARKit and ARCore) enable indoor orientation in shopping malls, airports, hospitals, and some office centers.

In August 2019, a beta version of google's augmented reality walking trails app was released, based on Google maps. The idea of the application is the possibility, of using a mobile device, in real-time, to see information about the environment and the virtual route to the destination goal. In the future, this technology may have access to smart glasses, thus, it will allow in an up-to-date form, follow the route and receive useful information in real-time [7].

In early 2020, studio 8th Wall created ambitious new face mapping projects for the digital space.

One of their well-known projects was an augmented reality package for Siduru's wine industry. This experience was focused on display in the browser and did not require special goals and capabilities from the user.

Experience in face mapping and other augmented reality technologies is increasingly being used on well-known social networks. Constant use and interest form new requests, a new demand that is quickly realized. This creates first new niches, and then large markets of the Internet of Things. Photo filters, lenses, and interactive masks are of great interest on the popular social platforms Instagram, Snapchat, and WhatsUp, stimulating the development and conclusion of modern innovative technologies, and their continuous improvement, and new needs of users.

Modern AR and VR technologies are used for advertising purposes, to promote and sell products of popular brands, if a filter or mask becomes popular, a person learns about the product and brand and can make a purchase or make a permanent subscription that is trending.

Note that technologies are rapidly changing, for example, in the first AR technologies, it was possible to activate and switch to the resource only with the help of a QR code, now it has become possible to use the technology without special markers and identifiers. Such complications were planned in order to bind the QR code of goods, followed by interactive interaction between the user and the AR product.

Restrictions on the development of the VR industry in Ukraine. There are several problems in the industry at different levels, some of which are related to the quality of the ultimate user experience (table 2.7)

Problems of VR industry development in Ukraine

№ n/p	Problem	Characteristic
1	Hardware	The problem is to create a full-fledged lightweight device with a long charge, excellent image quality and good performance of the mobile processor. However, ideally, it should not have a controller to manage content. This has not yet been invented.
2	Lack of feedback	It seems that people have already reached the level of immersion in the matrix, but in fact we have just mastered the visual channel. When 5G is launched, we will not be limited by the productive power of the devices and will be able to do everything in the cloud. Now in a helmet you are actually looking at the stage through clear glass.
3	Full immersion	There are problems with the image quality in helmets and sound. As well as an unresolved story with tactile sensations and sense of smell. Until people pass it, it will be impossible to speak about full-fledged immersion.

4	Perception of information	<p>The main limitation is related to the thinking of those who create it. People are too accustomed to the two-dimensional format, to the perception of information on a flat screen.</p> <p>Even in three-dimensional games, people play in two-dimensional projection.</p> <p>When the first three-dimensional games began to be created, they were created for the computer. We are now at the stage of two-dimensional computer games, not because there are technologies, but because people's consciousness has not yet reached the desired level. Everything that is produced is done with a view to what is available - computer games. This affects the product and the end user experience.</p>
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Compiled by author

The main task of ARVI VR is to reflect the experience of interacting with a new environment, with these objects inside the environment, with objects, with other objects with each other.

While there is too little cumulative experience, too few people who have immersed themselves there, too little time they have spent there, too little content created.

You can go down an intensive path for a very long time and wait for a bunch of companies to make the same thing and persistently make the same mistakes. But this will not happen - the competition will put everything in place. The better the content, the higher the value of the company that creates it - but a limited number of people can understand what high-quality content is in the form of virtual and mixed reality.

CHAPTER 3. PROSPECTS FOR FINANCIAL ASSISTANCE TO EMERGING MARKETS IN THE CONTEXT OF MODERN TECHNOLOGICAL TRANSFORMATION

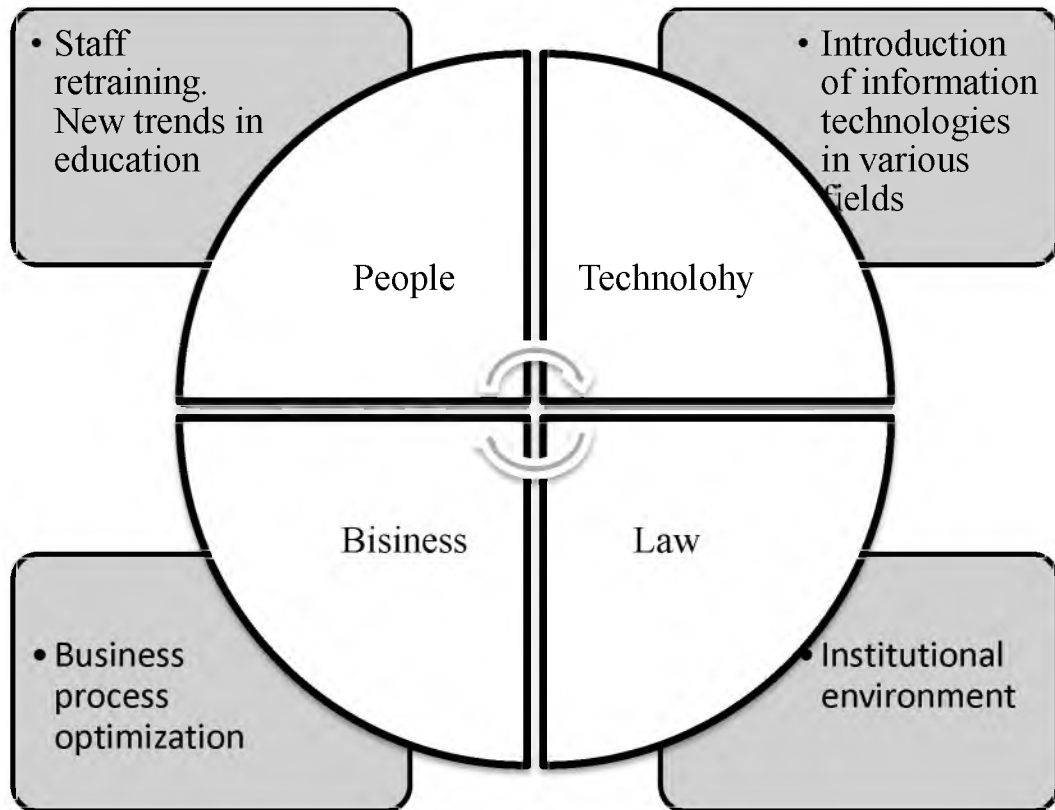
3.1 Comparative analysis of the impact of digitalization of the economy on the well-being of developed and developing countries

The digitalization of the world economy has entered an active phase of implementation at the country level in the last 10-15 years. One of the practice-oriented illustrations is the active implementation of the concepts of the "third industrial revolution", "Hindusria 4.0" and other approaches to integration into state programs and business strategies.

Reaching only 50% of the global internet market coverage, the global digital economy has become a space of huge opportunities. Today, integration into the world of digital technologies leads to the success of both business and consumer transactions. According to McKinsey's research, digital data now has a greater impact on GDP growth than traditional trade in goods and services [2]. Indeed, many countries have identified key priorities in development strategies based on methods to increase competitiveness by achieving digital superiority in the global market. Obviously, the openness of the digital market defines new rules of the game for all stakeholders in the global world, so innovation and trust play a crucial role in the digital development of the economy.

Only through a comprehensive transformation can a greater effect be achieved, with deeper and more integrated involvement in the digitalization process of all major economic agents. Objects of influence of digitalization can also be divided into four levels. The first level is software and hardware, the sphere of telecommunications [8]. The second level is digital services and platform economy (transaction platforms – Amazon, Uber, Alibaba, Airbnb, innovative platforms – Windows, Android, Salesforce). The third level includes the areas of

business of the sharing economy and genomics. At the fourth level, there are digital integrated areas of business - industry 4.0 sectors, as well as the economics of algorithms for processing streaming data. Spheres and directions are presented in Fig. 1. 3.1.



Rice. 3.1 Areas of economic transformation [25]

Thus, it can be concluded that the influence of the digital economy has gone far beyond the sphere of traditional technological industries, and therefore, hypothetically, the digital economy can affect almost all spheres of society, depending on the degree of its development in a particular country of the world. [16].

In addition to direct inclusion in the transformation of objects and spheres of the world economy, digitalization directly affects the state, society, and business. Analyzing the World Bank report "World Development Report 2016" on "digital dividends", it can be established that to strengthen the foundation of digitalization, it is necessary to focus on three key components: integration, efficiency, and innovation. The effect of these components on agents is presented in Table 3.1.

Table 3.1

The Impact of Digital Technology on Economic Agents

Agent	Integration	Effectiveness	Innovation
Company	Trade	Use of capital	Competition
Populace	Opportunities for employment	Productivity	Consumer welfare
State	Participation	The potential for the development of the public sector	Right to vote

Source: [24]

The main digital agents are the state, business, and society. Table 3.1 shows the impact on digital agents. Thus, in particular, through the introduction of digital technologies, the efficiency of doing business processes is increased (the use of modern analytical programs helps to use capital more efficiently, financial and technical reporting is automated, online documentation is maintained, quality monitoring, etc.), for society, technologies allow increasing labor productivity, for example, by participating in the sharing economy and remote work opportunities, for the state digital technologies are potential to increase the efficiency of routine processes and increase public engagement.

The innovative potential inherent in digital services can lead to increased competition among companies operating in the field of E-commerce, thus it has a positive effect on the well-being of consumers; in turn, the use of the electronic voting system can attract more people, and, therefore, make the system of elections more transparent. The integration of digital services into many business areas both helps the company to expand its presence in local markets and contributes to easier entry into new interregional and international markets. Thus, the recipients of the introduction of the digital economy become economic agents of its implementation.

The development of the digital economy in the world is heterogeneous, this is due in part to different levels of economic development. Most of the work on studying the impact of digitalization of the economy is devoted to its impact on economic growth. For example, Rosso studied the impact of digital transformation on GDP in the European Union, namely the impact of investment in the ICT sector on economic growth and its key indicators: GDP, productivity, and employment. The positive impact of investments in the high-tech sector on the level of GDP of the European Union countries have been identified [13, p. 13-15].

In other blocks of research, it was found that digitalization has a positive effect on GDP per capita, employment levels, and employment growth [14]. An important aspect of the impact of digitalization on researchers is the impact on health policy, innovation, and employment in the European Union. The impact of digitalization on the labor market, especially the need to meet the skills obtained in universities, with the requirements of industry 4.0, has been identified. The impact on innovation potential can be negative due to the emergence of new business models, which require special skills to adapt to, while reasonably positive impact on the overall health of the nation [15]. The authors of the Digital Planet report 2017 [16] argue that digitalization leads to globalization, and thereby achieving digital benefits on the global digital stage can be a significant aspect for both states and business structures.

The digitalization of the economies of countries, according to the proposed index, depends on four factors, which are divided into 12 components and 108 indicators, respectively (Table 3.2).

Table 3.2

Structure of factors of development of the digital economy

Factor	Components	Indicators
Offer level	Infrastructure that ensures accessibility	System Component Relatedness Security
	Transaction infrastructure	Access to financial institutions Possibility of making electronic payments
	Security infrastructure	Quality of transport infrastructure Logistics operations

Conditions for demand	Opportunities to attract consumers	Propensity to consume
	Digital payments	Level of inclusion of financial institutions
	The pace of development of digital technologies	The amount of use of devices Interconnection of technology, Internet, mobile communications The level of consumption of digital services
Institutional environment	Environment for institutions and business	Effectiveness of legal measures aimed at resolving disputes in the field of technology, as well as protection of intellectual property rights and investments Level of bureaucracy
	Institutes and digital ecosystems	The level of use of ICT and digital technologies by the state The level of competition among telecommunications companies
	Institutional efficiency and trust	Level of openness Quality of regulatory authorities
Innovative climate	Attachment	Opportunities for financing Investments in start-up The ability to attract and retain talent
	Process	Complications of the business practice process R&D level
	Results	Depth of mobile engagement Getting innovate Use of social networks

Source: [33]

Four groups of countries are identified from the index in terms of digitalization of the economy: leaders, promising, slowing growth rates, and problematic ones.

We will choose the defining criteria for the socio-economic development of countries in accordance with the UN criteria: the level of development that determines the indicators of economic development, the type of economic growth, the level and nature of foreign economic relations, and the magnitude of the country's economic potential.

From the analysis of literature in order to assess the impact of digitalization of the economy on well-being, a method of regression analysis is chosen.

The study used selective observation of groups of countries for 2008, 2013, and 2017. This period is explained by the frequency of calculation of the digital evolution index by the Fletcher School and Master Card.

A sample of countries is presented by 50 countries according to the impact on the rate of digitalization calculated based on the Digital Evolution Index. The sample includes 9 leading countries, 14 countries that slow down the pace of digitalization, 14 problem countries, and 13 promising countries (Table 3.3).

Table 3.3

A selection of countries for the study

Groups of countries	Leaders	Promising	Slowing down	Problem
Developed	Estonia Hong Kong Israel Japan Holland New Zealand Singapore United Kingdom	Portugal	South Korea Australia Austria Belgium Canada Denmark Finland France Germany Ireland Italy Norway Sweden Switzerland UNITED STATES	Czech Republic Greece Hungary Poland Slovakia Slovenia Spain
Developing	U.A.E	Brazil China Colombia Indonesia Malaysia Mexico Philippines Saudi Arabia Turkey		Chile Egypt Kenya Nigeria VAPOR Thailand

Source: [25]

The following hypotheses are put forward in the study:

H1: digitalization of the economy within the structural approach has a positive impact on the well-being of countries as a whole;

H2: digitalization of the economy within the structural approach has a positive effect on the well-being of developed countries;

H3: The digitalization of the economy as part of a structural approach has a positive effect on the well-being of developing countries.

As a dependent variable that measures well-being, the HUMAN DEVELOPMENT INDEX is chosen, since it is a combined indicator that characterizes human development in countries and regions of the world within the framework of the United Nations Development Program [17]. Within the framework of the World Economic Forum in recent years, it is also often called the standard of living index, since this indicator largely demonstrates the quality of life and opportunities of citizens. The advantages of using the indicator include its complexity, scale, and availability of data. [18].

Based on the already published approaches to research on the impact on well-being, regressors related to the digitalization of the economy are selected and reflect the level of introduction of digital technologies into the economy of countries within the framework of the structural approach set out in the first part of the article.

As control variables are the state's expenditures on education (% of the total amount of public spending) and state spending on health care (% of GDP). As the variables studied are selected:

- index of digital evolution - consists of four main areas: the level of supply, consumer demand for digital services, institutional environment, investment climate [19];
- e-government development index consists of three sub-indexes characterizing the state of ICT infrastructure, human capital, and online public services [20];
- The Corruption Perceptions Index is a component index based on data from 17 different surveys and studies conducted by 13 independent organizations among entrepreneurs and local analysts, including surveys of residents of this country as its citizens and foreigners [21, p. 5-9]. The corruption index depends on

digitalization since the introduction of digital elements increases the transparency and availability of services, respectively, in countries where the corruption perception index is lower, there are fewer obstacles to transparency and a higher level of digitalization. At the same time, thanks to digitalization, corruption is transformed into new evolutionary forms, such as electronic banking phishing, replacement of electronic documents, cybercrime, and much more;

– digital technology index (calculated as the average between the number of Internet users in the country (% of the population) and the number of mobile subscribers (per 100 people).

The information and empirical basis were the articles of leading economists of domestic and foreign practice, reports of international organizations, and normative legal acts. The most significant of them is the report "Digital Planet 2017. How competitiveness and level of digital trust vary in the world" from the Fletcher School and Mastercard payment system, the 2016 Global Development Report "Digital Dividends" from the World Bank Group; E-government survey 2018 from the UN, report on the measurement of the digital economy 2018 from the IMF, report on the information economy 2017: digitalization, trade, and development from UNCTAD.

Data collection for the study was carried out using World Bank statistics and United Nations development programs: Human development reports, UN development program: E-government survey, Mastercard Worldwide reports, Transparency International reports [19; 20; 21, p. 5-9].

Let's check the parameters of variables for modeling table 3.4.

Table 3.4

Selection of variables in the study

Denomination	Indicator
HDI	Human Development Index
ICT	Digital Technology Index
EG	Index of development of electronic Government

DEI	Digital Evolution Index
CORR	Corruption Perceptions Index
GEE	State expenditures on the formation
GEH	State expenditures on health care

In light of the use of different methods for measuring the digitalization of the economy, presented by indices, we will build two models, each of which will be chosen as one of the metrics of digitalization: the digital evolution index and the digital technology index.

The presented indices calculated by international organizations include components of variables. Despite the danger of the limitations of the study, the tests conducted to verify the reliability of the model did not reveal a problem of multicollinearity, which made it possible to judge the applicability of the method and a sufficient level of verification.

In model No. 1, the index of digital evolution acts as the main indicator of measuring the digitalization of the economy:

$$HDI_{i,t} = \alpha_{i,t} + DEI_{i,t} + EG_{i,t} + GEE_{i,t} + GEH_{i,t} + e_{i,t} \quad (3.1)$$

In model No. 2, the index of digital technologies acts as the main indicator of measuring the digitalization of the economy:

$$HDI_{i,t} = \alpha_{i,t} + ICT_{i,t} + EG_{i,t} + GEE_{i,t} + GEH_{i,t} + CORR_{i,t} + e_{i,t} \quad (3.2)$$

In the process of analyzing models No. 1 and No. 2, a simple panel regression, regression with fixed effects, and regression with random effects were built. The results of regressions are presented in tables 3.5,3.6.

Results of regression analysis of model No. 1

	POLS	FE	RE
Variables	HDI	HDI	HDI
DEI	0.00116* (0.00062)	0.000907*** (0.00026)	0.00125*** (0.00033)
EG	0.519*** (0.0537)	0.118*** (0.0276)	0.206*** (0.0337)
GEE	0.0188*** (0.00402)	0.00478 (0.00303)	0.00599* (0.00341)
GEH	0.00752*** (0.00243)	0.00525** (0.00214)	0.0105*** (0.00230)
Constant	0.473*** (0.0272)	0.654*** (0.0162)	0.606*** (0.0204)
Surveillance	100	100	100
R-squared	0.874	0.753	0.806
Quantity Countries	50	50	50
	Breusch-Pagan 5.07(0.024); VIF 3.19	H-Stat: 42.50(0.00)	

Table 3.6

Results of regression analysis of model No. 2

	POLS	FE	RE
Variables	HDI	HDI	HDI
ICT	0.001** (0.00024)	0.001** (0.000093)	0.001** (0.000128)
EG	0.414** (0.040762)	0.059** (0.021894)	0.130** (0.028926)
GEE	0.018** (0.003415)	0.002 (0.002218)	0.005 (0.002837)
GEH	0.006* (0.002174)	0.005** (0.0015801)	0.008*** (0.00193)
CORR	0.001** (0.0002403)	0.0000 (0.00047)	0.002** (0.000308)
Constant	0.447** (0.0215631)	0.693*** (0.0312)	0.551*** (0.02157)
Surveillance	100	100	100
R-squared	0.912	0.87	0.812
Quantity Countries	50	50	50
	Breusch-Pagan = 3.15(0.076);	H-Stat: 49.73(0.00)	

The e-government development index in the two models has the greatest impact, which is a confirmation of the importance of state initiatives and interference in the regulation of digitalization processes. The need to create an effective and transparent institutional environment is key to improving living standards through the digitalization of the economy.

Digital evolution and digital technology indices, taken as key indicators for measuring the structural digitalization of the economy, showed importance at the level of 95 and 99%, but their impact was almost insignificant. The findings correlate with a study of the real effects of digitalization in the business environment at present.

Digitalization is a growing trend in management theory and practice, but the practical strength of its impact on current metrics of economic development is rather the result of the coming period. An interesting result is the negative impact of education costs, which is associated with the investment nature of such costs. Thus, the results of our study demonstrate a U-shaped model of the application of the digital knowledge economy.

The corruption perception index within the second model is significant, but its impact is too small, and therefore the index is excluded from the first model.

In the process of conducting the study, interesting results were obtained. Thus, the greatest impact on welfare was demonstrated by the index of e-government development, in model No. 1 with an increase in EG by 1, HDI increased by 0.306 and by 0.13 in model No. 2, respectively. Digital evolution and digital technology indices, taken as key indicators of digitalization, showed importance only at the level of 95 and 99%, but their impact was small. With DEI rising by 1, HDI growing by 0.001, ICT showed a similar impact. It can be concluded that the key factor in the development of digitalization and its further impact on well-being in the aggregate of developed and developing countries is the development of the institutional environment.

In the group of developed countries, the e-government development index has the greatest impact. The best cases of the group of developed countries illustrate the need to increase the level of digital literacy of the population and the level of involvement of the state in the process of digitalization to improve well-being.

In a group of countries, to significantly influence the effects of digital development, it is necessary to develop appropriate infrastructure, wide access to the internet connection, a strategy for working with big data, and even ensuring data security. In the context of ensuring such tactical steps, the digitalization of the economy can lead to the expansion of state potential, the effective use of capital, and the creation of conditions for healthy competition for companies, to an increase in consumer welfare.

3.2 Formation of an advanced concept of the digital experimental environment

The financial market is one of the most important economic institutions of the economy. Technological innovations of the financial market are not a new phenomenon, but in recent years investments in advanced financial technologies have increased significantly, and the growth rate of innovative solutions is exponential. Venture capital investments in companies developing innovative technologies for the financial market increased worldwide from 1.89 billion in 2010 to \$53.3 billion in 2019 [40]. Currently, the client's interaction with the bank is carried out using a mobile application, allowing payments to be made, funds transferred and investments made. Artificial intelligence, social networks, mobile applications, distributed ledger technology (blockchain), cloud computing, and big data analysis have led to the transformation of traditional services and business models of financial institutions, as well as to the emergence of new market participants - FinTech companies.

The spread of FinTech naturally entails the reconceptualization of RegTech - technological innovations in the field of financial regulation of the activities of digital financial market participants and the management of their risks.

Regulation – its insolvency or insufficiency – is a common complex problem for all financial market participants related to the search for methods and tools for managing the risks of market participants and the risks of the regulator.

Participants in the digital financial market need a regulatory tool to reduce risks that limit the introduction of innovations. This, in our opinion, is the digital electronic environment (CES).

There are such risk groups of digital market participants, the quantitative assessment of which is ensured by the use of CES:

1. The risks of the regulator are the risk of the impact of innovative technology on the financial market and the country's economy.

2. Risks of digital financial market participants - financial institutions or fintech companies:

- compliance risks after leaving the CES;

- risks of the unprofitability of regulated activities – the risk of exceeding the cost of compliance over added value from an innovative product.

It is important to highlight the risk that arises when the CES regulator uses a RegTech control tool. The risk of CES insolvency (or sandbox paradox) is the simultaneous existence of two categories of risks:

- the risk of high barriers to access to participation in CES (in other words, the risk of limited resources of the regulator for fair selection of projects);

- the risk of artificial competitive advantage for CES participants due to incorrect interpretation by consumers of an innovative product or service, as well as the goals and objectives of CES. A consumer of a financial product or service may believe that a financial institution that has successfully tested its product at CES has received "approval" from the central bank, making such financial institutions more attractive even though competing companies may have the same technology.

The risks of CES participants are assessed by each company independently and depend on the technology underlying the innovative product, as well as the risks of reducing the availability of financial services. Since the results of corporate internal risk management are confidential information, it is not possible to study in detail the accumulated experience in managing compliance risks with CES. It is difficult to offer on this basis any universal recommendations for use by financial market participants – financial institutions and FinTech companies when developing a testing plan at CES.

In addition, the CES (regulatory sandbox) paradox is a specific set of risks that have not received proper attention from researchers. Except the encouraging financial market innovation, CES has the potential to grant certain economic privileges. Since one of the key tasks of CES is to reduce compliance costs allowed to participate in the sandbox, participants in the digital financial market can gain an unfair competitive advantage. Close cooperation between business and the state can potentially lead to the resolution of these uncertainties, as well as to greater transparency of regulation in general.

CES is introduced into the practice of financial regulation as a risk management tool for participants through their testing and support of their innovative solutions.

A digital experimental environment, CES (as well as a regulatory sandbox or regulatory framework) is a risk management tool that allows for living, time-limited testing of digital innovation under the supervision of the regulator. Testing consists of four main stages: application submission, its consideration by the regulator on compliance with the requirements of entry, testing, and decision-making on the admission of digital innovation to the open market.

New financial products, technologies, and business models are checked and tested in accordance with a set of predetermined rules, regulatory requirements, and appropriate security measures, including consumer protection of digital financial services or products.

Thus, CES is a separate experimental platform for market participants testing an innovative financial solution in real-time with the involvement of real customers who have previously agreed to participate in the experiment. The organizer, consultant, and controller is the financial regulator, whose responsibilities also include technical support. After the end of the testing period, as well as if the goal of the experiment is achieved, participants enter the open market.

CES requirements may vary depending on the regulator's policy, but usually have the following general characteristics:

- the testing period is limited and predetermined;
- a limited number of financial service consumers participate in the experiment;
- the framework must necessarily contain provisions on consumer protection, as well as a compensation package for customers - consumers of a digital product that has consented to participate;
- during the testing of a product or service, sandbox participants must provide all relevant information to the regulator.

CES creates a favorable and at the same time limited ^{what?} both in time and in the coverage of the market environment in which existing legal entities, financial institutions, or fintech companies, as well as startups, experiment with innovations on the verge or even outside the existing regulatory framework.

CES, firstly, reduces the cost of innovation, by reducing the expected costs associated with both the long deadlines for the approval of a financial product or service, as well as the need to raise additional funds (for example, attracting an external consultant) to ensure the process of adapting a financial product or service to the current regulatory norms and rules; Secondly, it reduces barriers to entry into the financial market and allows regulators to accumulate important information for the further development of regulatory and supervisory rules.

The result of successful testing may be the full or partial implementation of innovation; changes in the current regulation; or the decision to stop testing.

The first regulatory sandbox was implemented by the UK financial regulator back in 2015, the result and contribution to the development of the digital financial market which was recognized worldwide. Today, the digital experimental environment is actively used or developed by regulators in more than 20 countries.

For example, the British regulator FCA has created its CES to support "breakthrough innovations" in the financial services market in order to manage the risk of a lack of regulatory norms and standards (or their violation). The aim of the Australian Safety and Innovation Hub (ASIC's Innovation Hub) is to "drive innovation that could benefit consumers by helping Australian fintech start-ups navigate the regulatory system" [12]. Finally, the goal of the U.S. Consumer Financial Protection Bureau's Compliance Assistance Sandbox (CAS) is to promote "increased availability of financial solutions and innovations."

In addition, CES makes it possible to expand the capabilities of regulators. By fostering a more open and active dialogue with innovators, sandboxes help to resolve the conflict between, on the one hand, the need to strictly regulate financial market participants, and on the other hand, to promote innovation.

One of the key features of the regulatory framework is to demonstrate the openness of the market for innovation. [86] Sandbox is an initiative of the regulator, which can be a positive signal in the market, attracting investment.

CES not only allows the introduction of a product on the market, the concept of which has already been tested but also makes the risks eliminated through calculations based on actual data, on a par with a decrease in uncertainty in terms of regulation. It potentially ensures the introduction of innovations with greater speed and efficiency, and more low costs for financial market participants. This can be especially relevant when outdated regulations hinder the growth of FinTech.

During the consideration of the launch of CES, regulators should allocate sufficient funding for its implementation. Thus, CES can become an effective model for regulating innovations in the digital financial market and managing the risks of participants. Taking into account the accumulated international experience, we will form a list of recommendations to developing countries on the

modernization of the criteria for access to the experiment in CES, in order to consolidate positions on the prospects for financial assistance in the context of modern technological transformation:

- strengthen the development of the market of financial products and services by creating an effective competitive environment;
- maintain the integrity of the financial market by developing data-based approaches to regulation;
- increase the availability of financial services;
- monitor support for PID/ATP standards;
- ensure the stability of the functioning of financial institutions;
- maintaining the highest standards of customer trust;
- introduce innovative business models to the financial market. These goals are implemented by the following methods:
- Creation of a regulatory environment that contributes to the deployment of FinTech projects in the country.
- Testing innovations in a real environment by admitting to a wide market.
- Encouraging innovation that increases the availability of financial services.
- Based on large amounts of own data risk management.
- Reducing the time and cost of bringing an innovative idea to the wider market.

But it is worth noting that CES is not a universal remedy for all problems of regulating the risks of digital financial market participants and is not the only solution. Innovations can address traditional barriers to financial accessibility, such as legal (e.g., PID/CFT requirements), operational (e.g., costs associated with the need to open a branch), and physical (e.g., restrictions on traditional distribution channels). This was demonstrated by the success of the "mobile banking" project in Africa, [121] which implements a test-and-learn approach to test new ideas in a

special environment in a real environment (also applied in Indonesia, Kenya, and the Philippines, Rwanda).

Also, an alternative to the sandbox is a wait-and-see strategy, the task of which is to continuously track innovative trends without the use of state official intervention (for example, peer-to-peer lending, cryptocurrencies). The purpose of this approach is to accumulate knowledge about the innovative product in the subsequent decision on the need for amendments to the regulation. In comparison with these approaches, digital experimental environments seem to be noticeably more structured and at the same time objectively manageable, formal in terms of technology, and resource-intensive (in terms of the regulator's costs for organization and support).

CONCLUSIONS

In the thesis, we analyzed financial assistance to developing countries in the digital environment on the example of Arvi VR.

1. The developing market is a country that is at an accelerated stage of economic development, based on structural reforms, active processes of globalization, and high investment activity of foreign investors. It is also characterized by relatively low GDP per capita, poorly developed capital markets, and bank-oriented economy, significant volatility of financial assets, macroeconomic instability, high political risks, and weak information transparency.

2. The analyzed characteristics of emerging markets provide an opportunity for those investors who are ready to take significant risks in search of high revenue. Taking into account the significant risks and high returns, investment in developing countries is higher than investment in developed economies. This in turn poses significant risks to developing countries themselves. The most common factors of economic and market instability may be the reason that does not directly affect the emerging market, as the emerging market has a high ratio of investment to GDP and also concentrates significant (relative to the domestic market) portfolio investment. As a result, there is a high degree of dependence on the behavior of global investors, for whom any global signal could lead to a rebalancing of the investment portfolio - as there is a risk of rapid withdrawal of investment from the market economy. Thus, it is necessary to emphasize the high dependence of emerging markets on external factors.

3. Analysis of ARVI VR made it possible to establish that the company's layout is not high, because there are not enough developers of this experience yet. ARVI VR is in the TOP 10 and occupies the 3rd place in it as the best developer of virtual games and in the number of franchises sold in different countries of the world. The analyzed management system showed that ARVI VR has non-standard approaches to working with personnel. Because the company works with talented

and free people, how they work in a team as separate mechanisms. This approach works quite effectively on the result of the company's work and makes it possible to test the work of employees without additional tests because it immediately shows its result and efficiency in work.

4. The main problems that were separated to work with the virtual reality market in Ukraine are: hardware, lack of feedback, perception of information, and lack of personnel of this level of virtual reality development. The main output and directions of market development are training and cooperation with various international companies. The importance is also attached to the readiness for innovation and opportunities to develop in the direction of virtual reality.

5. The results of the study of the prospects for financial assistance to emerging markets in the context of modern technological transformation confirm the previously conducted measurements of the effectiveness of digital projects by international organizations, such as McKinsey and the World Bank, illustrating the insufficiency of exclusively business initiatives. The results of a study by group of countries showed that a significant factor is the e-government development index. The digital development strategy requires the following measures aimed at improving welfare: creating the necessary institutional conditions for business; investing in the development and provision of information technology in various industries that can be digitized; initiating educational programs to increase digital literacy of the population.

6. The results obtained by a group of developed countries are the reason for the formation of the basis of best practices, which demonstrates the empirical effects of digitalization of the institutional environment, the conditions for the development of educational and telecommunications systems on welfare. At the present stage, the level of state involvement in the development of digitalization and an adequate institutional environment are key factors in the formation of tools for managing the digitalization strategy for regions with different levels of socio-economic and technological development.

7. Taking into account the accumulated international experience, a list of recommendations has been formed for developing countries to modernize the criteria for access to the CES experiment in order to consolidate positions on the prospects of financial assistance in the context of modern technological transformation: creating a regulatory and legal environment that contributes to the deployment of FinTech projects in the country, the introduction of innovation testing in real environment with the access to the wide market, encouraging innovations that increase the availability of financial services, based on large amounts of own risk management data, shortening the time and cost of bringing an innovative idea to the wide market.

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