

THE ECONOMIC MACRO-ENVIRONMENT AS A FACTOR SHAPING THE USE OF NEW TECHNOLOGIES. SELECTED ASPECTS

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Abstract: The economic macro-environment is a determinant of the decision-making process of many aspects of market stakeholders' lives. The various factors for assessing the economic macro-environment provide a rationale for, among other things, the implementation of modern technologies, sustainable development or the abandonment of such activities. The purpose of this article is to outline how the changing economic macro-environment has affected the use of modern technology, and to try to answer the question: what is the significance and role of the smart society in the economic macro-environment?

Keywords: unemployment, inflation, technology, artificial intelligence,

1. Introduction

The economic and, in particular, macroeconomic environment is a certain set of elements that affect market stakeholders, causing both the appearance of certain constraints and, at the same time, creating new opportunities for development. Market stakeholders interact closely with the environment, often competing with each other, defining requirements and expectations, and shaping business and consumption relationships. Macroeconomic parameters are created by variable data that directly affects the functioning of society, entrepreneurs, organizations, etc., creating a variable macroeconomic environment. The purpose of the article is to show how the changing environment has affected the use of modern technology. To achieve the goal, the research question was posed: what is the significance and role of the smart society in the economic macro-environment?

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2. Identification of the Economic Macro-Environment

When analyzing the impact of the macro-environment¹ on the development opportunities of market stakeholders, it is necessary to take into account a number of factors of economic, social and cultural, political and legal nature, and in particular relating to the rate of use of technical and technological development². The economic dimension of the macro-environment is an expression of the overall condition of the economic system in which the stakeholders operate. When analyzing the economic environment, the most relevant economic factors are³: total GDP and GDP per capita, inflation, consumer spending and net income, interest rate, currency fluctuations and exchange rates, government investment, private capital, foreign investment, cyclicity, unemployment, costs of energy, transportation, communication, production materials, availability of credit⁴ (Poradnik Przedsiębiorcy).

The condition of the economy nationally and globally determines both the long-term and day-to-day decisions of market stakeholders. Purchasing power in the economy depends, in particular, on the level of income, prices, savings, debt, availability of credit. Purchasing power is especially important for business entities which constantly need to analyze economic factors that affect both the current and future state of the economy. The analysis and evaluation of factors determine the achievement of stakeholder goals and the degree of involvement of the resources at hand, especially financial ones.

The essence of monitoring (analysis) of economic factors is to examine the economy, whether there is economic recovery or slowdown (recession)? It is important at this stage of the economic analysis of the environment to skillfully interpret the basic factors depicting the gross domestic product and national income generated in the industry in comparison with other industries⁵. The economic environment is also influenced by factors that are determined by the situation in the industry, the situation in the raw materials and sales markets. Fiscal

¹ Ha, H., Coghill, K. E-government in Singapore-a SWOT and PEST analysis. *Asia-Pacific Social Science Review*, 2008, 6(2), 103-130.

² Marek, S., Białasiewicz M. *Podstawy nauki o organizacji. Przedsiębiorstwo jako organizacja gospodarcza* Polskie Wydawnictwo Ekonomiczne, Warszawa, 2011, 82

³ Gierszewska, G., Romanowska, M. *Analiza strategiczna przedsiębiorstwa*, PWE, Warszawa, 2004, 40-48.

⁴ Samuelson, P., Nordhaus, W. *Ekonomia*. Dom Wydawniczy Rebis, Poznań, 2012;

<https://poradnikprzedsiębiorcy.pl/-jak-napisac-profesjonalny-biznesplan-cz-7-analiza-strategiczna-ocena-rynku-i-firmy/analiza> (accessed on 30 October 2023).

⁵ Carruthers, H. Using PEST analysis to improve business performance. *In practice*, 2009, 31(1), 37-39

policy (tax system - concessions, exemptions) and monetary policy (inflation, interest rate levels, opportunities for entrepreneurs to obtain credit) are also important. Other macro-environmental factors include: unemployment rate, population income, infrastructure (roads, hotels, transportation), energy costs (access to cheaper sources), skilled labor.⁶

Due to its multiple dimensions, macro-environment analysis is a challenge for any stakeholder, as it should make an assessment of⁷:

- the economic sub-environment - the state of the economy, such as the rate of inflation and unemployment, the level of development of investment markets, the tax system,
- the technical-technological sub-environment - available methods and techniques to facilitate the conversion of owned resources into products or services, such as new machinery, technologies, production lines, level of innovation,
- the sociocultural sub-environment - concerning lifestyles, customs, consumer habits, social and ethical values,
- the demographic sub-environment – the social and ethnic structure, population age, gender, migration rate structure,
- the political and legal sub-environment- state policy, relations between the economy and the state, the number of legal norms, regulation of business activity and social life,
- the international sub-environment - political relations with other countries, membership in trade or economic zones, the occurrence of armed conflicts.

Through continuous analysis, market stakeholders can identify areas or trends⁸ which are worthy of attention when preparing an action strategy, e.g. for purchasing, investment or business development⁹.

⁶ https://static.scholaris.pl/resource-files/107/007/analiza_warunkow_otoczenia_67643.pdf (accessed on 30 October 2023).

⁷ Stabryła, A. *Zarządzanie strategiczne w teorii i praktyce firmy*. Wydawnictwo Naukowe PWN, Warszawa, 2011; Engelhardt, J. Zasady analizy makroekonomicznego otoczenia rynkowego w ramach studiów wykonalności projektów taborowych w transporcie kolejowym. *Prawo i finanse*, 2020, 10, 34-38.

⁸ https://mfiles.pl/pl/index.php/Analiza_sytuacji_przedsi%C4%99biorstwa (accessed on 30 October 2023).

⁹ Ho J.K. Formulation of a systemic PEST analysis for strategic analysis. *European Academic Research*, 2014, 2(5), 6478-6492.

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3. Identification and Evaluation of the Main Factors of the Economic Macro-Environment

One of the most important factors of the economic micro-environment is identification of the labor market, and in particular the factors that describe it. In this case, *the registered unemployment rate* determines the share of the unemployed population registered as looking for work in relation to the number of active population. Data on the number of registered unemployed persons, in accordance with the Act on Employment Promotion and Labor Market Institutions Law of 20 April 2004, in effect since 1 April 2004 (Journal of Laws of 2020, item 1409, as amended)¹⁰, includes persons (foreigners - family members of a Polish citizen) not employed and not performing other gainful work, who are able and ready to take up employment on a full-time basis (or if they are disabled persons - able and ready to take up employment at least on a half-time basis), not attending school with the exception of schools for adults or taking an extramural exam covering the curriculum of the school or higher education institutions where they study on a part-time basis, registered in the county labor office competent for the place of residence registration (permanent or temporary) and seeking employment or other gainful work. The number of unemployed people does not include those undergoing training, internship, adult vocational preparation, socially useful work, among others, as well as those referred to employment agencies based on orders for activation activities.¹¹ Analysis of the data indicates that unemployment has been declining until 2019 (Fig. 1). The lowest unemployment was recorded in 2018-2019.



Figure 1. Unemployment rate in Poland in 2003- 2021.

Source: Data from the Central Statistical Office of Poland.

¹⁰ Ustawa z dnia 20 kwietnia 2004 r. o promocji zatrudnienia i instytucjach rynku pracy. Dz. U. z 2020 r. poz. 1409, z późn. zm.

¹¹ <https://bdl.stat.gov.pl/BDL/dane/podgrup/tablica> (accessed on 30 October 2023).

An analysis of Figure 1 shows that a significant increase in the number of job seekers was recorded again in 2020. This is an effect primarily related to the COVID-19 coronavirus pandemic, as a result of which many companies laid off employees, reduced activity or closed down. For a better presentation of the phenomenon, changes in the Zachodniopomorskie region are presented (Table 1).

Table 1.

Unemployed people registered from 2011 to 2020 in the Zachodniopomorskie region

Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[person]	[person]	[person]	[person]	[person]	[person]	[person]	[person]	[person]	[person]
ZACHODNIOPOMORSKIE	108,904	112,521	111,063	94,465	79,393	65,842	52,599	46,002	41,771	52,018
Koszaliński county	5,483	5,740	5,925	4,899	4,208	3,321	2,709	2,476	2,337	2,938
City of Koszalin	5,510	6,037	5,928	5,053	4,166	3,394	2,682	2,514	2,202	3,151

Own study on the basis of: Central Statistical Office of Poland, Local Data Bank, Data as of 2023.09.09.

The data shows a significant increase in the city of Koszalin, where the number of unemployed people increased by 949, as well as in the Zachodniopomorskie province, where an increase of 10,247 people can be seen.

Another factor important for the operation and development of stakeholders is the *consumer price index*, commonly referred to as inflation. In identifying this factor, it should be noted that it is the process of increasing the average price level in the economy. The result of this process is a decline in the purchasing power of money in a given country. Inflation has been declining since 2011, and even turned to deflation in 2014-2016 (Table 2).

Table 2.

Inflation in 2011-2020

	Total inflation									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
POLAND	104.3	103.7	100.9	100.0	99.1	99.4	102.0	101.6	102.3	103.4

Source: Central Statistical Office of Poland, Local Data Bank, Data as of 2023.09.09.

Nowadays, deflation is very rare, as the economic policy of most countries is dominated by the pressure to maintain constant, low inflation, now considered by a large share of economists to be beneficial to the economy (proponents of intervention-based money supply policies). In August 2014 the Central Statistical Office of Poland and the National Bank of Poland reported that signs of deflation appeared in Poland for the first time since

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1972. However, since 2017 there has been an increase in inflation, which reached 3.6% at the end of 2020. For a better presentation of the phenomenon, changes are presented in comparison with the Zachodniopomorskie region (Figure 2).

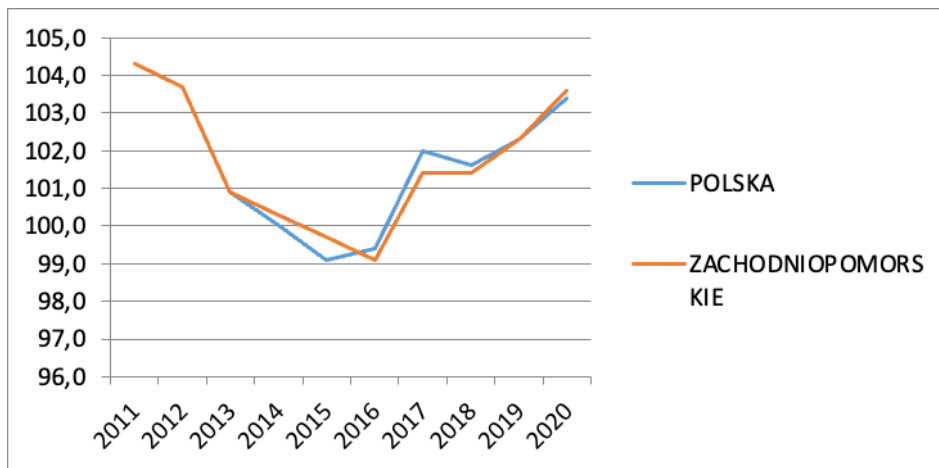


Figure 2. Inflation in Poland and the Zachodniopomorskie province in 2003-2020.

Source: Data from the Central Statistical Office of Poland.

It should be noted that this was the beginning of the changes seen in the following years. In 2021, the development of the Sars-CoV-2 (COVID-19) coronavirus pandemic accelerated the increase in inflation, also through the adopted state policy, which at the end of December 2021 stood at 8.6% compared to the month of December of the previous year. Food prices are rising fastest. It is the largest monthly increase in this category since the mid-1990s.

Another important factor is the *growth rate of national income*, called real gross national product (GDP). The factor presented means the ratio of the growth of national income in the period under review to the volume of national income in the base period. Gross Domestic Product has been growing year after year during the period under review. For a better presentation of the phenomenon, changes are presented in comparison with the Zachodniopomorskie region (Table 3).

Table 3.

Volume of GDP per capita in 2011-2019

	Gross Domestic Product								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
	[PLN]	[PLN]	[PLN]	[PLN]	[PLN]	[PLN]	[PLN]	[PLN]	[PLN]
POLAND	40,628	42,130	42,770	44,466	46,837	48,494	51,789	55,230	59,741
ZACHODNIOPOMORSKIE	34,158	35,423	35,776	37,423	39,681	40,704	43,194	45,949	49,496

Source: Central Statistical Office of Poland, Local Data Bank, Data as of 2023.09.09.

It is worth noting that there can be many reasons for economic growth. The most commonly cited determinants include: growth in labor input, growth in labor productivity, growth in capital input, growth in workers' knowledge and experience, technical and organizational progress, changes in the allocation of resources in the economy, legal, cultural, social and other changes. It should also be remembered that GDP growth directly indicates the development of a given economy.

An important factor for assessing the economic macro-environment, whether from the point of view of investing or saving, is the *level of interest rates*. Over the past 10 years, interest rates have been falling (Table 4). This has provided an opportunity for market stakeholders (e.g., businesses, local governments, or households) to invest, develop businesses, and take out loans for the purchase of goods and services.

Table 4.

Basic interest rates of the National Bank of Poland in 2011-2020

Valid from:	Reference rate	Lombard rate	Deposit rate	Rediscount rate on bills of exchange	Discount rate on bills of exchange
2011					
2011-01-20	3.75	5.25	2.25	4.00	*
2011-04-06	4.00	5.50	2.50	4.25	*
2011-05-12	4.25	5.75	2.75	4.50	*
2011-06-09	4.50	6.00	3.00	4.75	*
2012					
2012-05-10	4.75	6.25	3.25	5.00	*
2012-11-08	4.50	6.00	3.00	4.75	*
2012-12-06	4.25	5.75	2.75	4.50	*
2013					
2013-01-10	4.00	5.50	2.50	4.25	*
2013-02-07	3.75	5.25	2.25	4.00	*
2013-03-07	3.25	4.75	1.75	3.50	*
2013-05-09	3.00	4.50	1.50	3.25	*
2013-06-06	2.75	4.25	1.25	3.00	*
2013-07-04	2.50	4.00	1.00	2.75	*
2014					
2014-10-09	2.00	3.00	1.00	2.25	*
2015					
2015-03-05	1.50	2.50	0.50	1.75	*
2020					

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2020-03-18	1.00	1.50	0.50	1.05	1.10
2020-04-09	0.50	1.00	0.00	0.55	0.60
2020-05-29	0.10	0.50	0.00	0.11	0.12

Source: National Bank of Poland, Data as of 2023.09.09.

Analysis of the data presented in Table 4 indicates that the years 2011-2020 were conducive to the development of companies and other market stakeholders, and consequently to the development of the economy as a whole. Low interest rates, credit availability, rising GDP, and household income levels created favorable conditions for development. Also, the creation of new businesses and the associated job creation has resulted in a long-term decline in unemployment rate.

It is worth noting that Poland's national income in 1990 was \$65.978 billion, and in 2017 it rose to \$524.5 billion. Obtaining such values was possible thanks to the privatization of state-owned enterprises, the development of private enterprise, but also the rapid improvement in labor productivity and the opening up to direct foreign investment. Poland's economy grew by 5.1% in 2018, compared to 4.8% in 2017. Poland's economic growth in the fourth quarter of 2018 was 4.9% on an annual basis, down slightly from the third quarter, when GDP grew by 5.1%. During the period, investment increased by 6.7%, private consumption also grew by 4.3%, and domestic demand - by 4.8%. Under the conditions of a market economy, increasing competition, globalization, computerization, or automation, this is particularly important for maximizing the profitability of the capital involved¹² (Sudoł, 2006) and the development and stability of the economic and financial condition of market stakeholders.

4. Identification and Evaluation of the Use of New Technologies

Rapid changes in the economic macro-environment of market stakeholders make it increasingly difficult to make investment decisions. The dynamic development of technology, production processes makes it necessary to systematically observe the ongoing changes in the internal and external market and assess their impact on the entity's development opportunities.

¹² Sudoł, S. *Przedsiębiorstwo. Podstawy nauki o przedsiębiorstwie. Zarządzanie przedsiębiorstwem*, Wyd. PWE, Warszawa, 2006, s. 38.

The proper action strategy adopted encourages people to actively participate in order to materialize the identified, planned, expected changes, especially technical and technological ones¹³. Technology often unites the efforts of market stakeholders and creates conditions for joint responses to social, political and economic challenges. It is a flexible tool, and the main limitations are usually associated with the traditional form of its use.

It should be noted that during the period under review (2011-2020), stakeholder behavior changed significantly due to the ubiquitous and continuous connection to the *Internet*. The Internet became a tool, both for communication and work. On the one hand, there is now the possibility of immediate online purchases, and on the other hand, it allows you to obtain information and reach out to members of the target group. Everything depends on the personalized content of the page you want to reach. Using the Internet, we can be socially active, such as monitoring health, playing games, evaluating applications, or activating other forms of social benefits. Depending on the intensity of Internet use, the needs and requirements as well as expectations are rising, which means that we are increasingly starting to do our professional work remotely and spending our leisure time “surfing” the net. As new technologies, platforms and services become part of people's digital lifestyles, their activities in all these areas are changing (Figure 3.).

¹³ Safin, K.(red). *Foresight jako metoda kształtowania przyszłości: identyfikacja potencjału i zasobów Dolnego Śląska w obszarze nauka i technologie na rzecz poprawy jakości życia*, Katowice: Uniwersytet Ekonomiczny we Wrocławiu, 2011.

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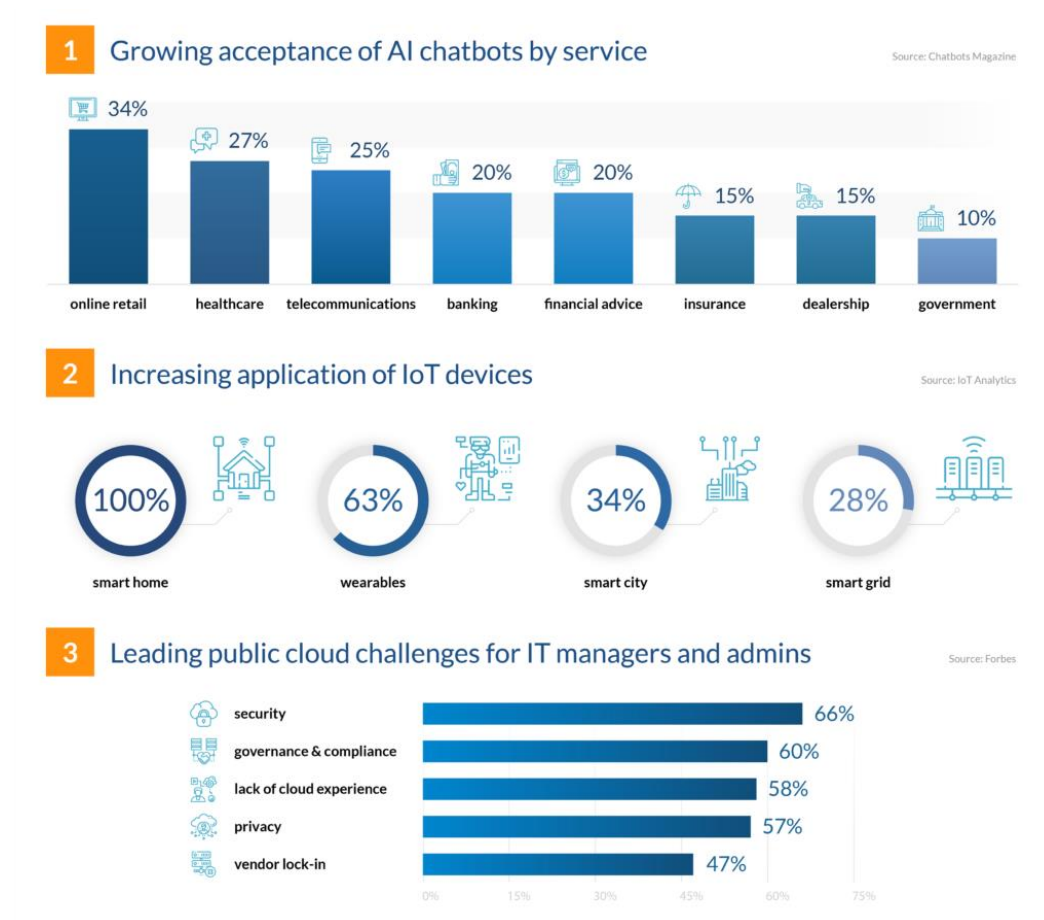


Figure 3. Statistics on the use of high technologies by the society

Source: <https://financesonline.com/it-trends/> (accessed on 2023.09.10.)

In the long term, technical and technological changes have brought semi-automation and automation (robotics) to the market, which, on the one hand, can affect unemployment and, on the other hand, forces the continuous improvement of the society. Also apparent is a reduction in demand for traditional types of work, which should lead to the spread of alternative occupations. This trend is also evident in the "direct to consumer" (D2C) channel, with a reduction in the number of intermediaries between the producer and the consumer, also as a result of use of the Internet. It is assumed that the bond with the customer will only get stronger in the future (Figure 4), as the customer will be the co-creator of products and services.

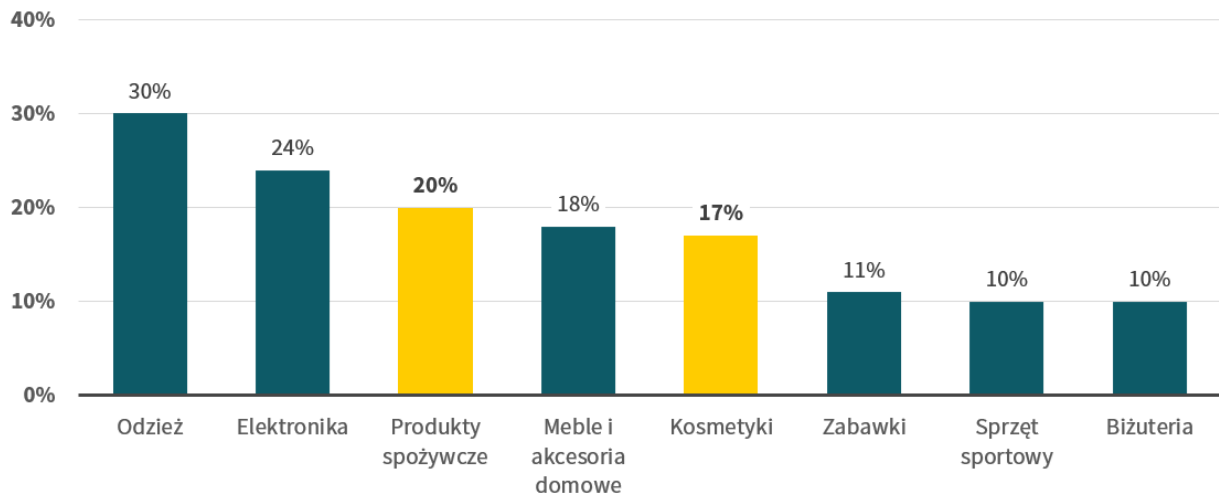


Figure 4. Customers planning to buy more in the D2C channel

Source: <https://enkyconsulting.com/innowacje/direct-to-consumer-w-fmcg-czesc-1/> (accessed on 2023.09.10.)

The biggest problem and threat may be that a direct connection to the manufacturer will create a need for trust and honesty. The requirement of fair price, quality and corporate responsibility as well as customer interaction¹⁴.

Social interaction is already evident in the "new media" that accompany communications¹⁵. There is a significant increase in the "power" of social media (Figure 5), as everyone has the opportunity to set up their own blog or respond to an event or post.

¹⁴ Cocchia, A. *Smart and digital city: a systematic literature review*. [in:] R.P. Dameri, C. Rosenthal-Sabroux, (eds.) *Smart city*. Switzerland: Springer International Publishing. 2014

¹⁵ Coe, A., Paquet, G., Roy, J. E-governance and smart communities: a social learning challenge. *Social Science Computer Review*, 2001, 19, p. 80–93.

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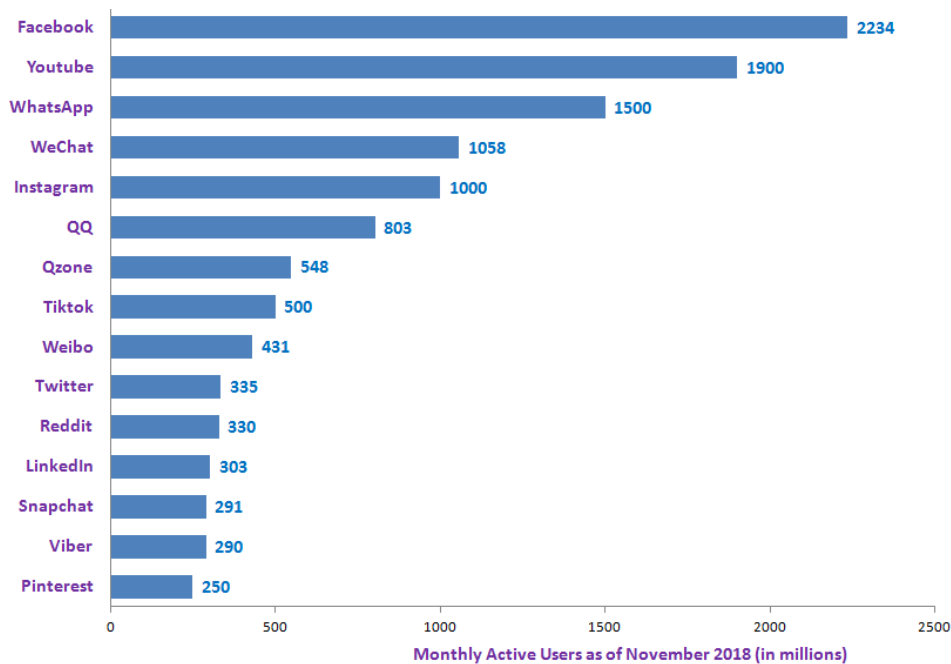


Figure 5. The most popular social networks in the world

Source: <https://socialmedialist.org/social-media-news-statistics.html> (2023.09.10.)

An analysis of developments in this field indicates that one may predict that in the future useful content will increasingly be generated by "artificial intelligence". Nowadays, the symbol of development is the concept of artificial intelligence, with such examples as "smart homes" or "smart things". Artificial systems are becoming active assistants that recommend, prompt, and place orders for people¹⁶. Relief from household chores (smart home) will provide time for other activities, such as travel, education, entertainment. The use of information systems, artificial intelligence, raises many concerns in the network (cyber threats). However, the future, and technology in particular, simply offers many possibilities, but how we are going to use this potential, is up to us. Adaptability makes it possible to quickly adjust to changes in the surrounding world, as evidenced in Figure 6.

¹⁶ Buczkowski, Ł. (2022). *Smart living, czyli jak podnieść jakość życia w mieście?* <https://tylkotorun.pl/smart-cities/smart-living-czyli-jak-podniesc-jakosc-zycia-w-miescie/> (accessed on 2023.03.12).

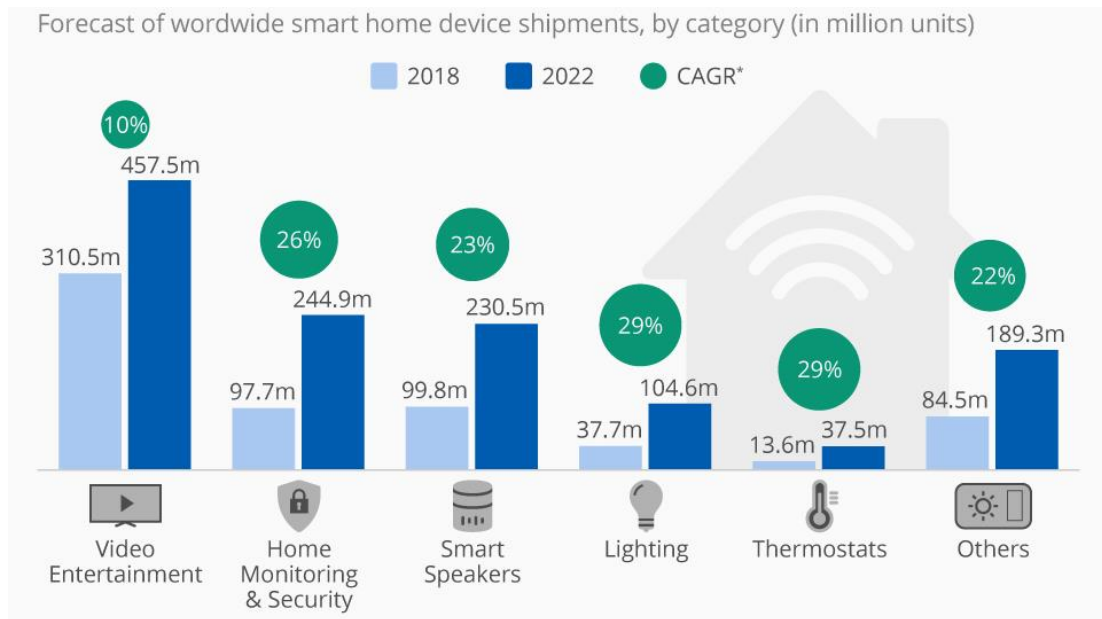


Figure 6. Smart Home Technology

Source: <https://www.statista.com/chart/15736/smart-home-market-forecast/> (accessed on 2023.09.10.)

In the perspective of any opportunities of using technology, it is particularly important to responsibly implement changes, as they can sometimes lead to irreversible consequences

5. Summary and Conclusions

The economic macro-environment is an important element in assessing the situation, the investment and decision-making capacity of market stakeholders. By properly assessing the respective economic factors underlying the financial condition, market players can evaluate their own planned investment activities, for example in the area of implementing the latest technology. This makes it possible to identify and evaluate the direct factors affecting the operation and development of an entity, i.e. a business or household. The purpose of the article was to show how the changing environment has affected the use of modern technology. The results of the study have proved that, in a significant way, the respective factors of economic macro-environmental assessment significantly have contributed to implementation of new technologies. Public acceptance of the use of modern technology is a growing trend, demonstrating that market stakeholders have become a smart society. It is up to the smart society to determine the pace and scope of technical and technological changes implemented

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in the market. Therefore, it is important for stakeholders to keep in mind the need for continuous monitoring of market phenomena, through which they will minimize the risks of undertaking and determining the feasibility of ambitious goals.

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