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Administrative Decision-Making Under Conditions of Uncertainty

Abstract. Introduction. Enterprises of Ukraine today are at a new stage of development, which is determined both by pandemic events and changes of a political, financial and global nature, which significantly complicates the management decision-making.

It is clear that making a management decision is an important stage in the company's activity. Usually, a decision is made as one of many alternatives that are mutually exclusive. It is believed that the decision that allows to obtain the maximum profit is rational. However, today, this is not quite the case.

The effective functioning of the economic system as a whole and its individual subjects is determined by a certain level of uncertainty. It is impossible to thoroughly study its behavior without considering this level.

Purpose. The purpose of the article is to study the concepts of uncertainty, clarify the levels of uncertainty and determine the features of management decision-making at certain stages of uncertainty in modern dynamic conditions.

Results. Management decision-making in conditions of uncertainty is a process that results in the selection of an alternative based on the complex interaction of analysis, forecasting, optimization, economic justification, etc., which occurs in conditions of complete or partial lack of information.

The article updates issues related to the functioning of enterprises in conditions of risk and uncertainty. A brief analysis of the crisis situation in which our country and the world found itself was conducted, it was compared with other similar situations, and the main consequences of this situation were outlined. Questions are raised regarding the problems of identification and timely assessment of the level of uncertainty at which the company found itself, since its correct definition will allow effective decisions to be made for further development. The concept of uncertainty is studied, the reasons for its occurrence are analyzed. The main levels of uncertainty and their signs, which determine the peculiarities of decision-making at its individual stages in modern dynamic conditions, are outlined and clarified. An analysis of the features of management decision-making in crisis conditions was carried out. Directions of company behavior and decision-making at different levels of uncertainty are proposed.

Conclusions. Underestimating the uncertainty factor leads to choosing a strategy that will not allow the company to protect itself from challenges and threats. After conducting the analysis, we note the dependence of the risk degree on the level of uncertainty. To help in choosing an alternative, it is advisable to use a modern mathematical apparatus. The effectiveness of management decision-making depends on the correct definition of the level and type of uncertainty.

Keywords: management decision; decision-making; conditions of uncertainty and risk; uncertainty; levels of uncertainty; effective decisions.

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Прийняття управлінських рішень в умовах невизначеності

У статті актуалізуються питання щодо функціонування підприємств в умовах ризику та невизначеності. Проведено стислий аналіз кризової ситуації, в якій опинилася наша країна та світ, порівняно її із іншими схожими ситуаціями та окреслено основні наслідки цього стану. Піднімаються питання щодо проблем ідентифікації та

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своєчасної оцінки рівня невизначеності, на якому опинилася компанія, оскільки правильне його визначення дозволить прийняти ефективні рішення для подальшого розвитку. Досліджено поняття невизначеності, аналізуються причини її виникнення. Окреслено та уточнено основні рівні невизначеності та їх ознаки, що має визначати особливості прийняття рішень на окремих її етапах в сучасних динамічних умовах. Проведено аналіз особливостей прийняття управлінських рішень в кризових умовах. Запропоновано напрями поведінки компанії та прийняття рішень на різних рівнях невизначеності.

Ключові слова: управлінське рішення; прийняття рішень; умови невизначеності і ризику; невизначеність; рівні невизначеності; ефективні рішення.

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Formulation of the problem. Observing recent events, we can say with confidence that the words «uncertain» and «changeable» are no longer relevant to describe the state of the world economy, it would be more appropriate to call the development «completely uncertain» and «quickly changeable».

Therefore, for the sake of their functioning and survival, there is an urgent need for enterprises to find and apply the tools of the decision-making system in conditions of risk and uncertainty, which would allow to quickly react to changing conditions and to offset the negative impact of risk events and to optimize costs.

Today, in the conditions of the pandemic and the war period, the main task of economic development is precisely the adaptation of enterprises to changing conditions. That is why the task of researching the peculiarities of the influence of uncertainty on the process of management decision-making is quite relevant.

Enterprises of Ukraine today are not just at a new stage of development for them, which is determined by such general processes as globalization and the system of economic relations transformation or activities informatization. Making management decisions is greatly complicated by changes of a political, financial and global nature.

It is clear that making a management decision is an important stage in the company's activity. Usually, a decision is made as one of many alternatives that are mutually exclusive. It is believed that the decision that allows to obtain the maximum profit is rational. However, in our opinion, at present, management decision-making is a collective work that takes into account the collective personal interests of employees and therefore cannot be absolutely objective. In addition, in modern conditions, considerable attention must be paid to the physical and emotional state of both management and employees when making decisions.

Analysis of recent research and publications. The effective functioning of the economic system as a whole and its individual subjects is determined by a certain level of uncertainty. It is impossible to thoroughly study his behavior without considering this level. Many modern authors investigate the problem of riskiness and uncertainty in management decision-

making, explore the evolution of the concept of "risk", outline the stages of management decision-making.

Formulation of research goals. Modern scientists have made a significant contribution to the development of the main theoretical provisions regarding risk management and management decision-making. However, the events of the modern world, when the economy develops in conditions of hybrid wars, terrorism, constant and significant cyber attacks, pandemics, etc., require companies (enterprises) to react quickly, to be able to change instantly, to be mobile. Therefore, the issue of updating the existing and developing new modern standards regarding risk management and management decision-making is currently acute.

The purpose of the article is to study the concepts of uncertainty, clarify the levels of uncertainty and determine the features of management decision-making at certain stages of uncertainty in modern dynamic conditions.

Outline of the main research material. The period of 2020-2021 will go down in the history of the world economy as one of the most profound economic crises of the modern world. At the same time, we can note that this crisis was not cyclical or structural. To compare this crisis with the global financial crisis of 2007-2009 or with the Great Depression will not be entirely correct, since the causes and course are fundamentally different. This situation is more likely to be compared with the situation in Europe, the USA and Japan at the end and immediately after the Second World War (1944-1946). At that time, the development of the economy was determined by non-economic factors: military actions on the territory of certain countries and the end of the period of military mobilization of the economy.

The introduction of strict restrictions in 2020 with the aim of preventing the spread of the coronavirus infection was the cause of the largest economic crisis since those times. The extraordinary nature of the current crisis is that it was not so much a breakdown of the development trajectory, but a significant change in development at all levels (macro and micro), as the changes touched all spheres of life. The introduction of quarantine restrictions in the countries of the world had different forms and terms: from severe (complete isolation and contact tracing) in China, softer in Europe

and no quarantine state in Sweden in order to develop public immunity. But despite the differences, in general, these measures led to an unprecedented transformation of the behavior of economic entities, which was manifested both at the level of consumption and at the level of production. Precautionary principles and a background of constant uncertainty are now dominant.

After the end of the first wave of the coronavirus, there was a powerful recovery impulse associated with the lifting of quarantine measures in some countries, but then there was a slowdown in economic activity again.

In Ukraine, the maximum negative effect of strict quarantine measures was most felt in April-May 2020. In the second half of the same year, after the relaxation of anti-epidemiological measures, a certain revival of economic activity could be observed. During the year, the GDP of Ukraine decreased by 4% (Fig. 1). The introduction of quarantine measures (and now due to martial law) has brought down consumer activity, such industries as retail trade, hotel and restaurant business, air transportation, etc. have almost come to a standstill.

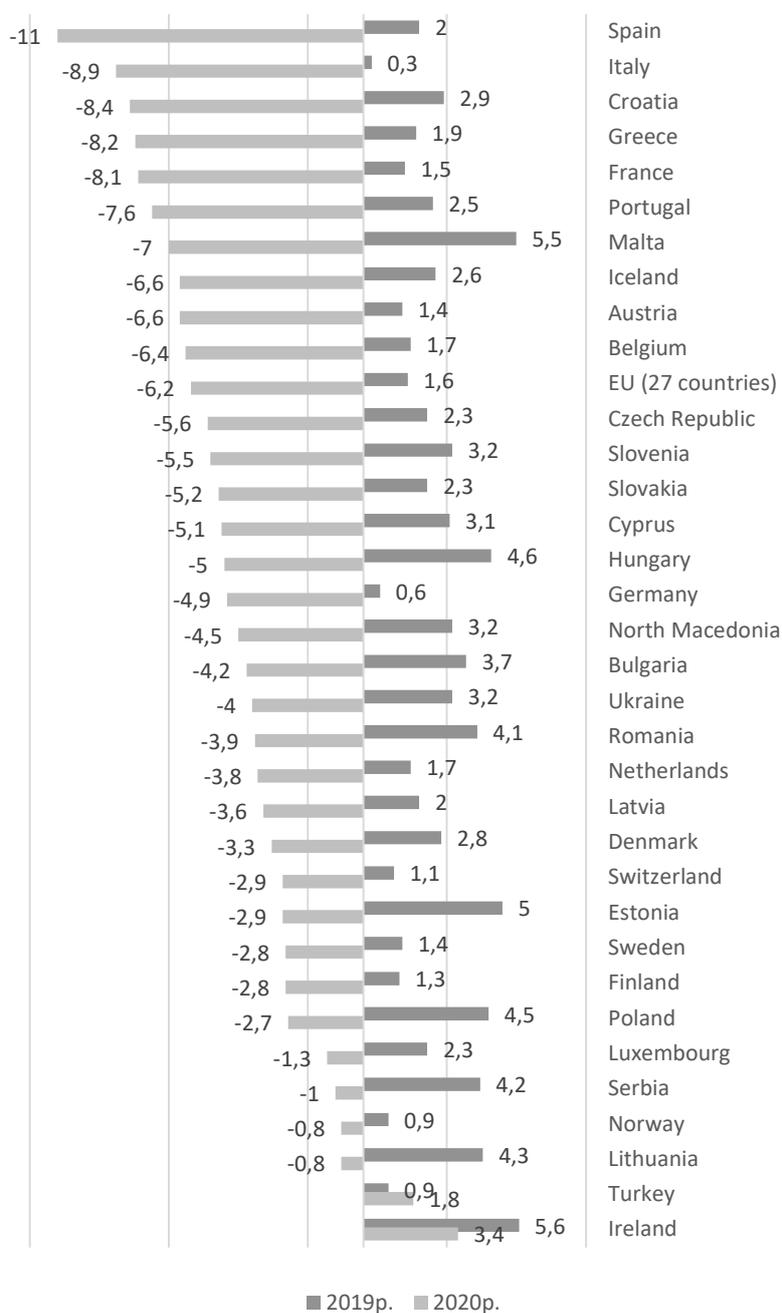


Figure 1 - Change in GDP in Ukraine and EU countries, in % to the previous year

Source: according to the Departameny of Straregic Plannig and Macrotconomic Forecast

Comparing the results of economic activity for 2020, Ukraine showed less negative rates and slightly better indicators of GDP dynamics than, for example, Hungary and Slovakia. However, the reasons for this are not significant preventive measures and strengthening of the economy. There is a transformational nature of the country's economy, a weak involvement in production

chains of added value in the world economy, a significant share of shadow business and income, poorly developed tourism, a fairly significant share of agriculture (which guaranteed food security), a large share of large-scale production, which did not stop even during peak periods, etc.

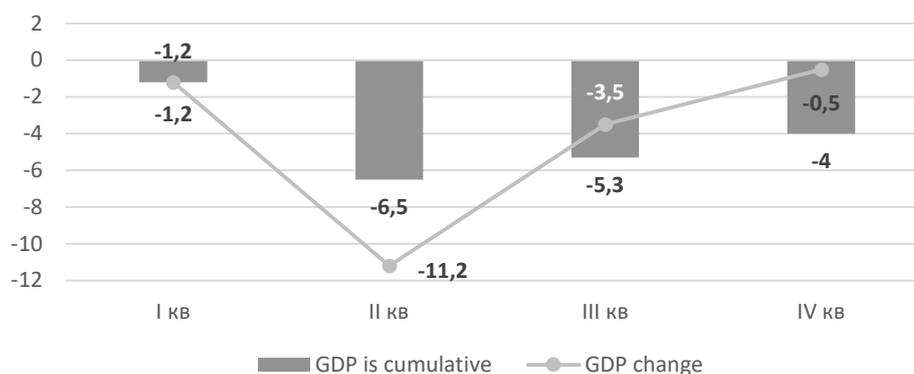


Figure 2 – Change in GDP in Ukraine, in % compared to the corresponding period of the previous year

Source: according to the Departameny of Straregic Plannig and Macrotconomic Forecast

*GDP is cumulative, change in % compared to the corresponding period of the previous year

*GDP change in % compared to the corresponding quarter of the previous year

The decision-making process at the enterprise is always associated with challenges both in normal conditions and in pandemic conditions. And then questions arise, which risks to take into account, which sources of information are the best, what will be decisive in making a decision, etc. Therefore, it is important to correctly consider all factors and set priorities.

In our country, conditions of uncertainty in the business environment arise primarily as a result of economic restructuring and economic transformation. Undoubtedly, such complex conditions require new approaches to management decision-making. The uncertainty of the behavior of domestic enterprises, the different orientation of political forces in the state, which causes destabilizing processes in the economy, creates many factors that must be taken into account as much as possible.

Traditionally, when forming a company's strategy, managers, using analytical methods, make development forecasts that allow choosing a certain strategic direction. However, the factor of uncertainty is often leveled at the same time. In the same case, when the future is practically not determined, the analytical approach can be either minimally useful, or even harmful at all.

Making a management decision in conditions of uncertainty is a process that results in the selection of an alternative based on the complex interaction of analysis, forecasting, optimization, economic justification, etc.,

which occurs in conditions of complete or partial lack of information.

Underestimating the uncertainty factor leads to choosing a strategy that will not allow the company to protect itself from challenges and threats. At the same time, the other extreme is dangerous, when the inability to develop a strategy based on traditional analysis, managers completely abandon rigorous planning and make purely intuitive decisions. Therefore, decisions should be made without resorting to both extremes. And therefore there is a need to establish the level of uncertainty under which the company operates in order to develop a strategy in accordance with this level.

Let's first consider the strategic positions that a company can take in conditions of uncertainty: formative, adaptive, and preserving the right to participate in the game.

When choosing a formative strategy, the company tries to change the structure of the industry in accordance with its own concept. The strategy actually lies in the creation of new market opportunities through radical reorganization.

Under an adaptive strategy, the current and future structure of the industry is taken as a given. The company only reacts to the opportunities provided by the market.

The position of maintaining the right to participate in the game is a special form of adaptive strategy that is used in the presence of more significant uncertainty. Its main

goal is to make investments step by step in order to achieve a certain better position. Such a position allows you to wait for the level of uncertainty to decrease and then later choose one or another strategy.

Of course, it is possible to grade uncertainty on different scales or directions. We will highlight the following.

The first level of uncertainty can be described as a sufficiently accurately predicted future. In this case, it can be assumed that uncertainty does not play a significant role in making strategic decisions. Managers develop a forecast with the necessary degree of accuracy. At the same time, a standard set of methods is used, such as market research, competitor activity analysis, Michael Portet's five forces model, etc.

The first level of uncertainty creates a fairly predictable business environment in which most companies follow an adaptive strategy. If the forecast is worked out carefully enough, then the built strategy will consist of «win-win moves» that bring benefits in any scenario. Successful adaptive strategies of this level allow you to create value by improving production or improving business processes, without any radical changes.

The next level of uncertainty can be characterized as alternative options for the future. In this case, it is necessary to make a choice in favor of one of the separate scenarios. Analytical methods in this case do not allow to determine which of them will be implemented, but they can determine the probability of implementation of this or that option.

Companies whose activities depend, for example, on changes in government regulation and legislation, face this level of uncertainty. Also typical for this type of uncertainty is the situation when the choice of corporate strategy depends mainly on the actions of competitors, which cannot be predicted. That is, alternative strategies are known, but it is quite difficult to determine which one will be implemented. In this case, managers need to develop several scenarios, for the assessment of which different models may be needed. The primary task in this case is to collect information that will allow establishing the degree of probability of a particular outcome.

In the conditions of the second type of uncertainty, companies must apply formative strategies and try to reduce the level of uncertainty in order to increase the probability of development under a favorable scenario. It is advisable to choose a strategy in this way so that, if necessary, you can change it quickly enough to another.

The third level of uncertainty can be defined as the range of possible options for the future. It is determined by a few key variables, but an individual result can be anywhere within this range. There are no longer any isolated scenarios. And at the same time, as in the second level, some (or all) elements of the strategy could change if the result was predictable.

Companies operating in new industries or entering new regional markets fall into this level of uncertainty. For example, when entering a new market, it is very difficult

to accurately predict the volume of potential demand, we can only determine the range of possible customer coverage. Similarly, if a company invests in some new technology, then there is information about possible costs and production results. And it is almost impossible to determine the real profitability.

At this level of uncertainty, it will be rational to use analysis and develop alternative future scenarios. Then it is necessary to focus on tracking market signals, by which to determine in which direction the development is going. However, of course, the development of specific scenarios is quite a difficult task. At the same time, we would recommend limiting the number of possible scenarios developed by the company and these should be unique. It is desirable to create such a complex of scenarios that would give a fairly probabilistic spectrum of results. This will allow managers to assess the degree of sustainability of strategies, to determine the approximate risk of implementing a stabilizing strategy.

In this case, the formation strategy of the company somewhat changes. If at the second level of uncertainty the goal is to increase the probability of the implementation of a specific variant of the development of events, then in this case it is to provide the market with a general impetus to the development of a direction beneficial for the company. The most common position is «keeping the right to participate in the game».

The next, highest level of uncertainty can be characterized as complete unpredictability. At this level, the uncertainty is very multidimensional, any characteristics of the surrounding environment can practically not be predicted. There is no way to define any isolated scenarios, nor the range of possible outcomes, nor the parameters on which the future depends. However, usually, the uncertainty of this level is a rare phenomenon, rather it is temporary and the situation changes towards one of the previous levels of uncertainty. Currently, the majority of Ukrainian companies and enterprises find themselves in such a situation of uncertainty. However, it is necessary to remember that this state is temporary, and the situation will change for the better towards one of the previous states of uncertainty. Of course, in such conditions, it will be much easier for companies that have already worked and developed than those that are just starting their activities.

It is clear that the situational analysis of this level of uncertainty is qualitative rather than quantitative. However, you should not act only on the level of intuition. It is necessary to systematize known data and information as qualitatively as possible, which will make it possible to make forecasts.

The best choice for the company at this level of uncertainty would be to choose to develop a formative strategy. Since all market participants do not know what the optimal strategy should be, the company that chose the formative strategy will serve as a reference point for other market players.

We considered more global (general) levels of uncertainty. The proposed approach will allow a more thorough and systematic approach to understanding uncertainty. This will make it possible to assess which analytical tools can be used for decision-making in conditions of different levels of uncertainty and to choose a particular strategy.

A number of authors support the view that risk and uncertainty are synonymous. However, without rejecting the interconnectedness of these concepts, we would not equate them. We are impressed by the opinion of I.V. Rishnyak [5, p. 264-269], who suggests that «risk» means the existence of the possibility of not achieving success (or goal) by a certain subject, because he is forced to make decisions in conditions of uncertainty. At the same time, «uncertainty» should be understood as an ambiguous state of the development of future events, a lack of knowledge and opportunities for accurately predicting the necessary parameters of development. Note that the higher the level of uncertainty, the greater the risk, that is, reducing the degree of risk is possible due to the reduction of the level of uncertainty.

A.V. Sheghd also supports the opinion that risk and uncertainty are not identical [8, p. 8–10]. He suggests describing the future using risk, based on probable distributions. At the same time, in his opinion, uncertainty should be divided into incomprehensibility and fundamental uncertainty. The state of uncertainty of the future can be overcome, but it is necessary to take into account that the cognitive capabilities of a person are limited. According to the author, the state of fundamental uncertainty means both the lack of knowledge about the future and the impossibility of overcoming it, since the necessary information is missing.

V.P. Reshetylo [4, p. 149-154] proposes to distinguish the following types of uncertainty:

- promising: the unpredictability of factors influencing the development of the object;
- retrospective: lack of information about the behavior of the object in the past;
- technical: it is impossible to predict the exact results of decisions;
- stochastic: probabilistic nature of processes and phenomena;
- uncertainty of the state of nature: complete or partial ignorance of environmental conditions;
- targeted opposition: a conflict situation between two or more players;
- goals: ambiguity or impossibility of choosing one goal;
- conditions: full or insufficient awareness of decision-making conditions;
- semantic: descriptive approach in the analysis of economic processes;
- actions: ambiguity in choosing a decision.

In modern decision-making theory, a rather powerful mathematical apparatus is used for choosing the optimal strategy. These are well-known methods (criteria) of Wald, Savage, Laplace, Hurwitz, extreme optimism, mathematical expectation, etc. Using each of them has its advantages and disadvantages. But none of them (or even their complex) guarantee an unequivocal choice of a certain strategy. With their help, you can only recommend the choice of one or another path. The ultimate responsibility rests with the person making the decision.

Conclusions. Many authors equate the concepts of risk and uncertainty. However, after conducting the analysis, we note the dependence of the degree of risk on the level of uncertainty. To help in choosing an alternative, it is advisable to use a modern mathematical apparatus. The effectiveness of management decision-making depends on the correct definition of the level and type of uncertainty.

References:

1. Vitlins'kyj, V. V. & Velykoivanenko, H.I. (2014). Ryzkolohiia v ekonomitsi ta pidpriemnytstvi. Kyiv: KNEU [in Ukrainian].
2. Kramchaninova, M.D. & Vakhlakova, V.V. (2020). Pandemics as a new type of threat to economic security in the conditions of globalization. *Biznes Inform*, 11, 18–23 [in Ukrainian].
3. Petrunia, Ye., Litovchenko, B. & Pasichnyk, O. (2020). Pryjniattia upravlins'kykh rishen'. Dnipro: Universytet mytnoi spravy ta finansiv [in Ukrainian].
4. Reshetylo, V. P. & Fedotova, Yu. V. (2020). Uncertainty and risk: relationship of concepts and specificity of decision-making. *Problemy systemnoho pidkhodu v ekonomitsi*, 3(77), 149-154. DOI: <https://doi.org/10.32782/2520-2200/2020-3-4> [in Ukrainian].
5. Rishniak, I. V. (2003). Systematic analysis of the category of risk and uncertainty. *Visnyk Natsional'noho universytetu «L'vivs'ka politekhnika»*. *Informatsijni systemy ta merezhi*, 489, 263–275 [in Ukrainian].
6. Sosnovs'ka, O. O. & Dedenko, L. V. (2019). Risk management as a tool for ensuring stable functioning of the enterprise in conditions of uncertainty. *Yevropejs'kyj naukovyj zhurnal Ekonomichnykh ta Finansovykh innovatsij*, 1(3), 70–79. DOI: <http://doi.org/10.32750/2019-0106> [in Ukrainian].
7. Ukraina pislia koronakryzy – shliakh oduzhannia : naukova dopovid' (2020). Kyiv : NISD. Retrieved from <https://cutt.ly/sK9oTFE> [in Ukrainian].
8. Filippov, V. & Antoschuk, V.M. (2020). Information support for management decisions based on insider expert assessment. *Ekonomichnyj zhurnal Odes'koho politekhnichnoho universytetu*, 4 (14), 109-114. Retrieved from <https://cutt.ly/VK9oG12>. [in Ukrainian].
9. COVID-19 and the evolution of money laundering, terrorist financing and cybercrime risks (2022). Retrieved from <https://cutt.ly/VK9iDog> [in Ukrainian].

10. Engelmann, J.B. (2022). Anticipatory anxiety disrupts neural valuation during risky choice. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/25698745> [in English].
 11. Risk management, recovery and resilience. COVID-19 Survey Report (2020). Retrieved from <https://tsutt.ly/IK9iMkV> [in English].
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