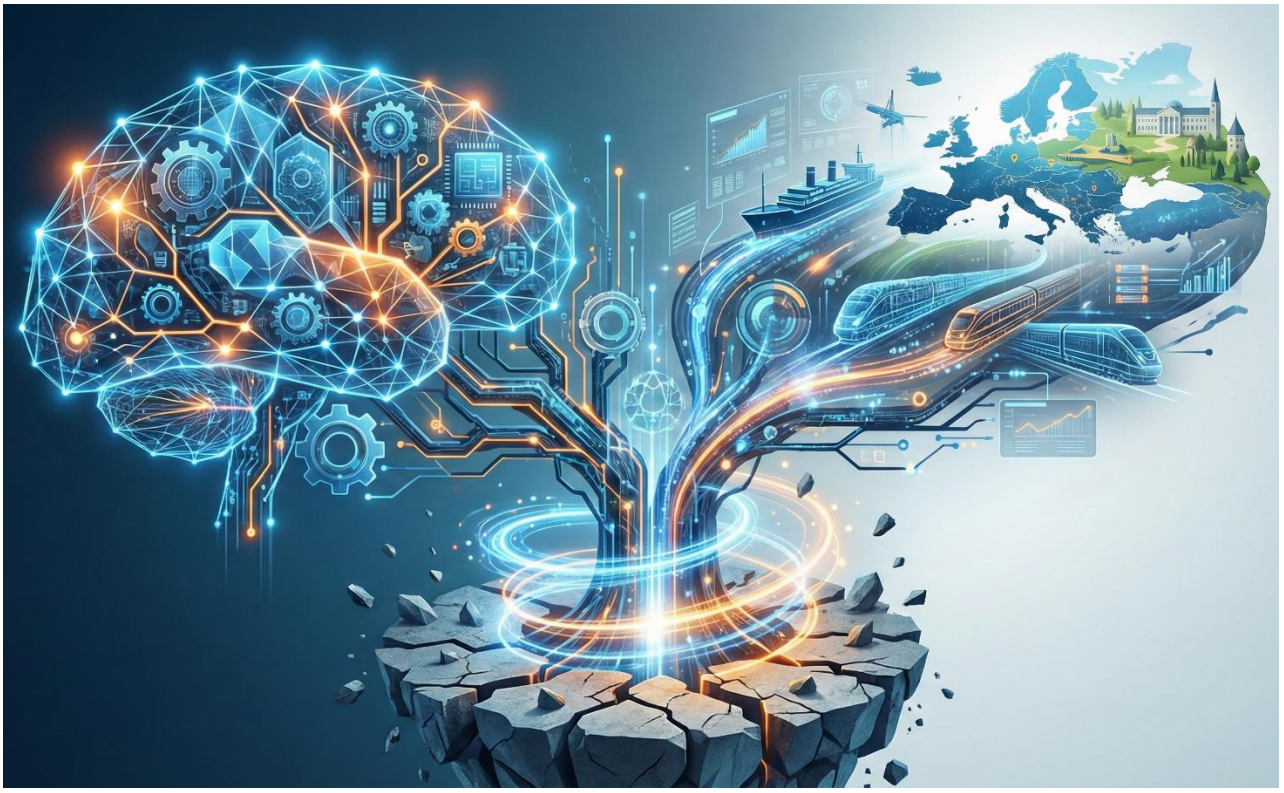
ТЕОРІЯ І МЕТОДИКА ВИКЛАДАННЯ У ТЕХНІЧНИХ ЗАКЛАДАХ ВИЩОЇ ОСВІТИ



Колективна монографія

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Колективна монографія
«Теорія і методика викладання у технічних закладах вищої освіти»

Рекомендовано вченою радою
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У монографії аналізуються ключові аспекти педагогіки вищої технічної школи: методи активного навчання, особливості інтеграції гуманітарних і соціально-економічних дисциплін, інструменти формування мотивації студентів, питання професійної компетентності викладача та модернізація змісту освіти. Окремі розділи присвячені економічній освіті, психологічному супроводу інженерної підготовки, а також інноваційним стратегіям викладання.

Монографія адресована науковцям, викладачам технічних ЗВО, методистам, здобувачам вищої освіти, а також усім, хто цікавиться трансформацією сучасної освітньої парадигми.

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ЗМІСТ

дидактика професійної освіти; методика викладання фундаментальних, технічних, гуманітарних, спеціальних дисциплін; соціальні та поведінкові науки у технічних закладах вищої освіти; дистанційне навчання; інноваційні педагогічні технології; проблема вибіркових дисциплін у технічних закладах вищої освіти; використання штучного інтелекту в технічній освіті

концепції економічної безпеки; ризики і загрози, що впливають на економічну безпеку; механізми забезпечення економічної безпеки у кризових умовах; механізми взаємодії соціальних і правових аспектів у забезпеченні економічної безпеки; стратегії та механізми для підвищення економічної безпеки в умовах нестабільності

теоретичні засади підготовки інженерів транспорту; методика проведення лабораторних робіт на транспортних дисциплінах; моделювання та симуляція транспортних систем; цифрові інструменти в навчанні інженера транспорту; інтеграція міждисциплінарних підходів; методичний супровід підготовки фахівців на факультеті (тренінги, стажування на підприємствах)

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PRACTICAL ASPECTS OF THE EVOLUTION OF ECONOMIC THOUGHT

Introduction. Economics, like any other social science, focuses on studying the characteristics of human behavior within the economic life of society. In order to account for human behavior, economists have attempted over centuries to create a certain formalized description– a characterization of the main qualities and the modes of action of economic agents in the process of interacting with other economic subjects.

That is why, from the very beginning of its emergence, economic theory relied on the model of the "economic man," that is, an individual who, in the process of activity, interacts with other subjects under market conditions. The creation of such a model was driven by the need to study the problem of choice and motivation within individuals' financial and economic activity.

The works of A. Smith, C. Menger, W. Jevons, L. Walras, G. Becker, A. Bandura, K. Lewin, H. Simon, and J. Katona are devoted to the study of the evolution of economic thought. However, under conditions of dynamic societal development and its economic foundations, additional comprehensive studies of the practical aspects of this evolution are needed.

The purpose of this work is to examine the practical aspects of the evolution of economic science and its relationship with the development of the economic foundation and society as a whole.

Research results. The starting point in the creation of the model of the "economic man" can be found in the works of the representatives of the English classical school, particularly Adam Smith. He articulated the idea of the productivity of self-interest, provided that it is realized within market relations. Smith's "economic man" was characterized by the following features: an individual's self-interest plays a decisive role in motivating economic behavior; personal interest corresponds to societal interest, which is achieved through the mechanism of the "invisible hand of the market"; the economic subject is competent in managing personal economic matters; the primary motive of economic activity is profit maximization while considering non-material factors of well-being.

An important source for the development of the "economic man" model was Jeremy Bentham's ethical utilitarianism, which argued that morality could be turned into a precise science – a "moral arithmetic". He claimed that humans strive for pleasure and avoid pain, assuming that individuals can quantify the degree of any pleasure or suffering. A person must then choose the behavior that maximizes the arithmetic difference between "pleasure minus pain".

Подальший Further development of the "economic man" model was carried out by representatives of the "marginalist revolution": C. Menger, W. Jevons, and L. Walras. For the marginalists, humans act as utility maximizers. Behavior is driven not so much by egoism as by increasing economic rationality. The individual not only calculates but also optimizes personal benefits and actions. At the same time, the moral qualities of individuals cease to be of interest to researchers in this field.

After the marginalist revolution, the formation of neoclassical economic theory began. According to neoclassical principles, the model of the "economic man" includes the following main characteristics: the existence of a set of preferences and constraints, meaning that behavior always takes place under resource scarcity and involves choice; evaluative ability: the subject is always capable of comparing alternative goods, which are mutually substitutable ("everything has a

price"); the subject is guided solely by self-interest – formerly called egoism, now more neutrally defined as "indifference to the well-being of others"; perfect information: complete knowledge of personal preferences and the prices of all goods; rationality as the ability to maximize utility in every situation through a rational choice.

Further development of economic thought occurred in the concept of instrumental rationality, which is used in neoclassical rational choice theory. Instrumental rationality concerns only the relationship between means and ends. A particular action is considered instrumentally rational if the economic agent uses the best means to achieve given goals.

U. Hands noted the following:

- within instrumental rationality, goals are considered predetermined based on the preferences of agents;

- optimization is assumed – if goals and constraints can be expressed mathematically, instrumental rationality is represented as solving an optimization problem;

- instrumental rationality does not impose restrictions on the content of goals but does impose restrictions on their structure: preferences must be well-ordered so that an instrumentally rational (i.e., optimal) solution exists.

Based on neoclassical views of the economic agent, the rational choice model was supplemented by the expected utility model of von Neumann–Morgenstern, which analyzes decision-making under risk.

This model states that when choosing among alternatives, an economic agent will always choose the one with the highest expected utility. Scholars formulated axioms that characterize rational behavior, which became the basis for classical consumer behavior theory.

In 1968, Nobel laureate Gary Becker published his work "Crime and Punishment: An Economic Approach", which marked the introduction of psychological factors into economic decision-making. The criticism of cognitive psychology is primarily associated with its tendency to equate the human brain with a machine, significantly oversimplifying the complex inner world of the individual by reducing it to simplified schemes and models.

Albert Bandura, the founder of the social-cognitive theory, argued that people mutually determine each other and are also influenced by their environment. His theory explores the impact of society on people's thoughts and actions, as well as the role of cognitive processes in shaping motivations, emotions, and behavior in economic relationships.

The ideas of Kurt Lewin were also scientifically fruitful for economic psychology. His "field theory" – that is, behavior shaped by the situation in which an individual or group operates – explains the motives of economic activity.

A practical recommendation of Gestalt theory is as follows: if you want people to behave in a certain way, change the situation in which they operate. Examples of applying Gestalt approaches include the influence of fashion on consumer behavior, or episodes of panic and depositor distrust in the banking system.

Emotional factors affecting decision-making in behavioral economics are also characterized by behavioral game theory – a branch of game theory that adapts theoretical game situations to experimental design. This direction analyzes interactive strategic decisions and behavior using methods of game theory, experimental economics, and experimental psychology. It studies how real people behave in strategic decision-making situations in which individual outcomes depend on the decisions of other participants.

Thus, economic science came to recognize the need to distinguish behavioral economics as a separate field. It identifies systematic deviations from rational behavior and analyzes erroneous decisions. Behavioral economics reveals the influence of emotional, cognitive, and social factors on the decision-making of individuals and firms, as well as the market impact of these decisions. It seeks the boundaries of rational choice and studies behavioral models, which makes the field closely connected to psychology and behaviorism [2; 13].

The main object of study in behavioral economics is the limits of rationality among economic agents. Behavioral models often combine insights from psychology with neoclassical economic theory and cover a wide range of concepts, methods, and research areas.

The main methods used in behavioral economics include:

- experiments,
- field studies,
- surveys and observations, etc.

Necessary information can be obtained through experimental simulations (for example, simulating stock trading). In behavioral economics, experimental conditions approximate real-life situations as closely as possible. Specialists sometimes use functional magnetic resonance imaging (fMRI) to determine which parts of the brain are involved in financial and economic decision-making. Three basic economic effects commonly observed in behavioral economics are:

Heuristics. People often make decisions based on practical judgment, which is not always logically justified. Behavioral economics examines the mechanisms behind such decision-making.

Market Efficiency. This area focuses on errors in economic decisions. These errors may manifest as irrational choices, anomalies in profit calculation, incorrect pricing, etc.

Framing. A frame is a semantic "frame" used by a person to interpret something, and subsequent actions align with this interpretation. Framing refers to the way a problem is formulated, which affects preferences. People are sensitive to small differences in wording. Therefore, experts, politicians, advertisers, and others can influence public opinion without distorting facts – simply by adjusting how information is presented.

In economic theory, two approaches to decision-making are distinguished: the normative and the descriptive (positive).

Positive economic theory examines what actually happens, while normative theory describes how things should be. According to U. Hands, beginning in the 1940s, economists traditionally viewed rational choice theory as a positive scientific theory – one that adequately describes, explains, and predicts the real behavior of economic agents. However, some researchers presented evidence showing that decision-making often significantly differs from what conventional theory predicts. This divergence unfolded in several directions.

Firstly, these are the works of H. Simon and G. Catona, aimed at substantiating the importance of using the results of psychology in economic theory. Simon was one of the first to highlight the unrealistic assumptions underlying standard neoclassical models. He introduced the concept of bounded rationality, describing the limitations of human knowledge and computational abilities, which prevent real individuals from behaving as neoclassical theory predicts. He argued that when people lack complete information, they aim to find a "satisficing solution", not the optimal one. Here, the criterion of "optimality" is replaced by the criterion of "satisfaction," meaning the pursuit of an acceptable level of outcomes. If this level is not achieved, the individual changes their strategy to reach the desired threshold.

In "Psychological Analysis and Economic Behavior," Katona wrote that economic behavior must be studied as it truly is. He insisted on describing and classifying reactions and their causes – then asking whether such reactions can be considered "rational," and to what extent.

The works of Simon and Katona became the foundation of modern behavioral economics.

However, at the time, their ideas were not widely accepted and only gained recognition decades later.

Secondly, a significant part of the doubts about the descriptive capacity of rational choice theory were brought by the studies of M. Alle and D. Ellsberg, who criticized the basic axioms of the Neumann-Morgenstern expected utility model. Their famous paradoxes showed numerous anomalies and inconsistencies proving that the maximization of expected utility cannot reliably describe real behavior under risk and uncertainty.

A situation arose in which the theory of rational choice was positioned as a universal economic theory for explaining economic behavior. However, in the course of applied research by a

number of scientists, various paradoxes began to emerge over time that could not be rationally explained within the framework of the existing theoretical system of knowledge. This state of affairs led to the growth of methodological contradictions in the then mainstream, which led to the development of alternative to neoclassical research, especially experimental and interdisciplinary, at the junction of economics and other social sciences about man.

On one hand, mathematics and physics significantly shaped neoclassical theory in the early 20th century. On the other hand, advances in psychology, sociology, natural sciences, and history strengthened competing schools: institutionalism, the historical school, Marxism, and others. After World War II, the scientific-technical revolution highlighted the potential of cybernetics, computer science, mathematics, and theoretical physics. As a result, economic theory adopted the principles of rationalism, controllability, modeling, and systematization. However, when economics attempted to impose rational egoism as a universal methodological principle on other social sciences, it encountered strong resistance. These disciplines urged economics to revise its methodological foundations.

Early behavioral economics was built on data from psychological experiments rather than purely economic studies. Psychology had been conducting experiments since the early 20th century, and economic researchers later recognized these methods as crucial for understanding decision-making and negotiations. Interdisciplinary collaboration between economists and psychologists thus became one of the key prerequisites for the emergence of behavioral economics.

Another indirect influence came from cybernetics, which provided a methodological framework for both neoclassical theory and psychological approaches, facilitating their convergence.

The development of cybernetics, including the research of John von Neumann, has a double significance in terms of its impact on economic science.

First, they made it possible to transform abstract neoclassical optimization models into computational models. On the other hand, they caused a certain restructuring in related disciplines, the research of which is based on the principles of information processing and the construction of behavioral models that coincide with the principles of cybernetics. Thus, cybernetics created a methodological basis for the development of both neoclassicism and psychology, and for theories aimed at their convergence and unification.

So, today behavioral economics is a direction in economic theory, which in some studies complements neoclassical ideas, and in some begins to supplant them.

First of all, this happens in the practical plane: the principles of human behavior in a real situation associated with making almost every economic decision are reflected. The significant potential for practical application of the achievements of behavioral economics to achieve more efficient functioning of the economic system places it at the center of the paradigmatic structure of modern economic theory.

In scientific discourse, the term “experiment” refers to a research method in which phenomena are studied under deliberately chosen or artificially created conditions.

In economics, experiments include such large-scale examples as Keynesian macroeconomic regulation or monetarist policies. However, when speaking of experiments as controlled scientific procedures, their role in economics long remained modest. The widespread adoption of laboratory experiments in economics is largely associated with the works of Vernon Smith and Daniel Kahneman. Their research established experimental economics as a field in which controlled laboratory experiments serve as the primary research tool.

Laboratory experiments in economics pursue two main objectives:

1. Testing the initial axioms and hypotheses of economic theories, and
2. Accumulating data to formulate new assumptions and axioms.

The basic axioms of economic analysis are behavioral assumptions – about goals, motives, and reactions during decision-making. It is therefore not surprising that experimental economics

focuses on studying human behavior, because behavior underlies economic phenomena at both micro- and macrolevels.

Harvard professor Edward Chamberlin attempted to test neoclassical theory of perfect competition and market equilibrium through classroom experiments. Students were divided into buyers and sellers, each with budget constraints (buyers had limited money; sellers had production costs). The results were surprising. Participants who according to theory should not have reached any deal did conclude transactions – and even with a profit. Those who should have successfully traded were sometimes pushed out of the market. These outcomes were not random but systematic (with a probability of about 25%).

Chamberlin's experiment revealed:

1. Real equilibrium depends on far more factors than theory assumes – the correct result may be reached by different paths.

2. A real market resembles a system of sub-markets whose configuration changes with every new transaction.

Later, Nobel laureate Reinhard Selten, together with H. Sauermann, conducted early experimental studies of pricing in oligopolistic markets.

There were also early experimental tests of game theory predictions, carried out by John Nash and his collaborators.

S. Siegel and L. Fouraker published experimental findings on bargaining behavior.

Nevertheless, Vernon Smith is widely considered the founder of systematic experimental research in economics.Смiт.

A key issue in experimental economics is external validity, also known as parallelism.

It concerns the similarity between laboratory models and real-world conditions – that is, whether experimental results can be reliably extrapolated to actual markets. Several issues challenge external validity. Participants may behave differently because they know they are in an experiment. Students (a non-representative group) are often used as subjects. Monetary incentives may be insufficient to reflect real-life stakes. Institutional settings in experiments are artificial and differ from real-world constraints.

Behavioral economics is a discipline that studies how various factors influence real human economic behavior and decision-making under real-world conditions.

Behavioral economists rely on psychological and sociological knowledge to develop theories that are far more realistic than those of traditional neoclassical economics. In classical economic theory, the basic behavioral model is the rational "economic man". In modern literature, the term REMM (Resourceful, Evaluative, Maximizing Man) is used to describe this concept – meaning a person who is resourceful, evaluative, and utility-maximizing. According to this perspective, humans are fully economic when seeking personal benefit, and rationality implies the following:

- the individual possesses complete information necessary for decision-making;
- in economic matters, the person is an absolute egoist, indifferent to how their actions affect others' well-being;
- there are no external constraints on exchange (if exchange leads to utility maximization);
- welfare improves as a result of economic transactions.

Thus, rationality can be defined as follows:

A subject will never choose alternative X if alternative Y, which the subject considers better than X, is available at the same time.

Herbert Simon drew attention to the unrealistic nature of the neoclassical assumption of full rationality. He believed that the task of behavioral economists was to "discover empirical laws that describe behavior correctly and as accurately as possible," and to modify economic theory on the basis of empirical testing.

Behavioral economics is a modern direction of economic theory, which is actively developing. In the process of formation, a theoretical foundation is being formed, which is reflected in various theories, models and paradoxes. The most famous among them are: the theory of

bounded rationality, prospect theory, mental accounting theory, Thaler's model, Ale's paradox, Ellsberg's paradox, etc.

H. Simon focused on the study of the extent to which decision-making is rational. He was committed to "empirically testing the assumptions of neoclassical economics about human behavior and modifying economic theory based on what is found in the testing process." His term, bounded rationality, refers to the limitations of all people's knowledge and capabilities, as well as the complexity and uncertainty of typical real-world situations that people deal with. It is these factors that prevent real economic agents from behaving in accordance with the rational assumptions of neoclassical theory. Because of bounded rationality, people must learn to make decisions in the real world by using simplifications, finding new data, adjusting aspirations, developing improved decision-making processes, dealing with uncertainty, and so on.

Emphasizing the need to revise the unrealistic premise of complete information used in neoclassical theory, G. Simon noted that in order to maximize utility or profit, an economic entity does not have enough opportunities to process it because the total amount of information is very large. Also, in real life, a person seeks to obtain not the optimal result, but the one that will satisfy him (an acceptable result). Therefore, the decision-making process in G. Simon's model can be described by two main concepts - the search for and acceptance of a satisfactory option. The utility function, according to G. Simon, has only two {0, 1} or three {– 1, 0, 1} values, where "1" means a satisfactory option, "-1" - unsatisfactory, and "0" - indifferent.

The search for options continues until the first acceptable option is found. At this point, further search stops. This makes it possible to reduce awareness and the need for accurate information about the outcome of this option. This eliminates the need to research and compare alternative options. It is enough to understand that the selected option is above or below the acceptable level.

The acceptability or unacceptability of an option is determined by each person. Simon characterizes this process using the category of "claim level".

The concept of the level of claims assumes that at each moment a person has an idea of what he can (has the right) to count on. The level of claims is a kind of bar to which a person strives. It is not fixed. The bar moves depending on the result of the last jump. If it was successful, the level of claims rises: the person sets a higher goal for himself. In case of failure, the level of claims decreases, as the person begins to critically assess his abilities. An option is considered satisfactory if it allows a person to overcome the bar, that is, the level of claims.

Making optimal decisions is, of course, the goal of traditional models, whose methods involve integrating all available information, weighing it, and combining it in a computational way. Boundedly rational decision-making does not attempt to integrate all available information; it is based on limited knowledge, memory searches, and reasonable guesses about unknown features of the world.

Boundedly rational decision-making methods are those that the human mind can realistically apply when it has limited time and knowledge.

Boundedly rational decision makers often use educated guesses and go beyond the information provided. Boundedly rational decision making makes extensive use of heuristics, quick decision-making processes that are useful for solving complex problems.

According to H. Simon, a heuristic is a mechanism for evaluating decision options. Its essence is that an individual sets an acceptable standard for himself in a particular situation, and then, from the proposed alternatives, chooses the one that best suits him. Such heuristics were aimed at optimizing decisions, speeding up the choice and reducing the time for information processing in order to lead to a result acceptable to the individual.

The rationality described in the theory of H. Simon can be considered limited only to the formal, maximization criterion. At the same time, the decision-making model of G. Simon fully corresponds to the broader criteria of rationality, which apply not only to the results of action, but also to the decision-making processes. However, the main content of behavioral analysis lies not in

the field of motivation, but in the field of information processing and decision-making. Therefore, the title of the founder of behavioral theory rightfully belongs to the Nobel laureate H. Simon.

The continuation of the theory of bounded rationality of H. Simon was the concept of R. Heiner. According to the theories of Simon and Heiner, a person does not react to new information coming to him, although in case of luck he could receive additional benefit. The choice of the subject ultimately turns out to be relatively independent of the specific situation and is largely determined by a predetermined rule of behavior. This model explains the relative inflexibility of behavior often found in economic life and the phenomenon of "thresholds": behavior changes only when the external stimulus exceeds a certain threshold value.

Further development of the theory of bounded rationality is represented, in particular, by the theory of X-efficiency, which focuses entirely not on the availability of information, but on a person's ability to comprehend it.

X-efficiency is a concept of the efficiency of an economic agent's functioning, proposed by Harvey Leibenstein in 1966, which represents the ability to reduce costs and increase productivity for a given technology by stimulating organizational improvements, increasing employee motivation, and other internal improvements. The losses and gains caused by the action of the X-factor, H. Leibenstein called X-inefficiency and X-efficiency, respectively.

The negative effect of the X-factor leads to the fact that the enterprise is unable to reach the optimal growth path and compensates for the inefficiency of its own activities by increasing additional resources.

D. Kahneman and A. Tversky published the article “Prospect Theory: Analysis of Decisions under Risk” in 1979. Prospect theory explains the phenomena of irrational human behavior.

Experiments by A. Tversky and D. Kahneman proved that irrational behavior is more common, especially in conditions of uncertainty, and can be predicted using psychological methods.

Prospect theory shifts the emphasis from the traditional level of income to its growth, because a person perceives and evaluates not the final states of income or wealth, but changes as “gains and losses”. “Decision-making under risk can be viewed as a choice between prospects (alternatives) or as a game of chance”. Prospect theory describes how individuals evaluate their losses and gains and shows that for a person “losses are more sensitive than gains”, that is, people are more worried about losses than about equivalent gains.

The degree of satisfaction a person gets from receiving, for example, $100 is much lower than the degree of disappointment from losing the same amount, so people are willing to take risks to avoid losses, but are not inclined to take risks to gain. Scientists have also proven that people underestimate the probability of events that are more likely and overestimate much less likely events.

Even mathematics students who know probability theory do not use this knowledge in real life, and make decisions not only based on logical thinking, but also under the influence of emotions and stereotypes.

According to prospect theory, decision-making involves two stages: editing and evaluation. The editing stage involves a preliminary analysis of alternatives and their presentation in a simplified form. In the second stage, the selected alternatives are evaluated and the perspective with the highest value is selected.

The value function proposed by D. Keneman and A. Tversky, presented in the "loss-gain" range, demonstrates certain features of decision-making under risk conditions:

The assessment of losses and gains is carried out in accordance with the initial position (some reference point), which corresponds to the current level of income of the person.

The value function for losses is steeper than for gains, which means a greater desire to avoid losses than to gain income, that is, a loss will be perceived much more painfully.

The value function for gains is concave, and for losses – convex, which indicates a decreasing sensitivity. A decrease in sensitivity to losses is manifested in the fact that a gradual increase in losses leads to a less pronounced reaction to them.

When making decisions, people overestimate low probabilities and underestimate high ones Kahneman and A. Tversky.

The process of choosing between risky alternatives leads to some serious results that contradict basic principles of utility theory. In particular, people underestimate the unlikely outcomes over the more likely ones. A similar tendency, known as the "certainty effect," promotes risk aversion in situations involving a sure win and risk aversion in situations involving a sure lose. It should also be noted that people tend to reject elements that are common to all prospects. This tendency, known as the "isolation effect," leads to conflicting preferences when the same choice is presented in different ways.

Thus, according to this theory, the average person is unable to correctly assess future benefits in absolute terms, and in fact evaluates them in comparison with some generally accepted standard, seeking primarily to avoid worsening his situation. With the help of prospect theory, one can explain many irrational actions of people that are incomprehensible from the perspective of "economic man".

Along with Tversky and Kahneman, Richard Thaler pioneered modern behavioral economics and was awarded the 2017 Nobel Prize for his contributions to its study. Thaler introduced psychologically realistic assumptions into the analysis of economic decision-making. By examining the implications of bounded rationality, social preferences, and lack of self-control, he showed how these human traits systematically influence individual decisions as well as market outcomes. Overall, Thaler's contributions bridged the gap between the economic and psychological analyses of individual decision-making. His empirical and theoretical findings have played a major role in establishing the new and rapidly growing field of behavioral economics, which has had a profound impact on many areas of economic research and policy.

Mental accounting is a new model of consumer behavior developed using a hybrid of cognitive psychology and microeconomics. Thaler, in his article "Mental Accounting and Consumer Choice," introduced the theory of mental accounting, which describes how bounded rationality influences the spending, saving, and other financial behaviors of households.

According to the classical view, for Homo economicus there is no difference between money of different origin or purpose: whether it is a salary, or income from stocks, or winnings from participating in the lottery. One dollar is always one dollar, regardless of the source from which it was received and for what purposes it was spent.

For a real person, the same amounts, but received from different sources, have different values. According to this theory, a person making economic decisions forms several "accounts" in his mind, which take into account the arguments for or against making a certain decision.

If one-time and occasional income (such as a lottery win or a year-end bonus) people prefer to spend on visiting restaurants, purchasing luxury items, etc., then regular income (such as a salary) is spent on purchasing necessities (food, clothing, etc.).

This is an obvious violation of the principle of rationality: with the same budget, a person begins to buy different sets of goods and services depending on the sources from which his expenses are financed. In such a case, we can also talk about the plurality of "I", one of which is more concerned with satisfying basic needs, while the other is more concerned with various kinds of entertainment.

Empirical observations conducted by R. Thaler led to an understanding of mental accounting. He found that people group their expenses into different categories (housing, food, clothing, entertainment, etc.). Each category is associated with a separate mental account, which corresponds to its own budget. At the same time, the interchangeability between mental accounts is limited: people are ready to reduce spending on essential goods, even when the total income remains unchanged, but the sources of income have changed. Thus, the value of a certain amount of money depends on the mental account to which it is mentally credited, that is, the value of the same monetary units can be different.

In the modern economic literature, the standard model of intertemporal choice is the exponential discounting model. The basis of this model is the assumption that utility at any two adjacent points in time is discounted equally..

But in 1956 Strotz put forward the idea that in the real behavior of people today's utility plays a special role, that is, tomorrow's utility is discounted compared to today's more strongly than the day after tomorrow's utility compared to tomorrow. This theory was reflected in the concepts of hyperbolic and quasi-hyperbolic discounting.

R. Thaler provided the first experimental evidence of hyperbolic discounting. Together with Hersh Shefrin, he created the "planner-doer" model and proposed a simple theoretical model of intrapersonal intertemporal choice, which explains the natural behavior of a person who, on the one hand, plans something, and on the other hand, implements his plans through self-control, but, of course, not always as he would like. In this model (planner-doer model), two participants act (two "I" of the same individual - a short-sighted doer and a far-sighted planner). The planner tries to maximize utility throughout his life, while the doer is indifferent to the future.

According to R. Thaler, the deviation from exponential discounting is explained by the problem of self-control: from a rational point of view, the time intervals "today-tomorrow" and "tomorrow-the day after tomorrow" are the same in terms of discounting, but "today" we tend to experience all the pleasures "today" and postpone the unpleasantness to tomorrow. At the same time, if we choose between the distribution of pleasures and unpleasantness to "tomorrow" and "the day after tomorrow", then, most likely, we will agree to meet the unpleasantness "tomorrow" in order to enjoy the pleasantness "the day after tomorrow". But when "tomorrow" comes, it becomes "today", and again we want to postpone the unpleasantness for later.

As a result, long-term and short-term plans are in constant conflict. As a result, in conditions of hyperbolic discounting, a person (individual) begins to be torn between opposing decisions, grabbing one or the other. This type of behavior is clearly irrational and can cause addictive behavior (addiction to alcohol, overeating, etc.), regular postponement of important decisions for the future, formation of portfolios of mutually exclusive financial instruments, immersion in debt, low savings rates, etc.

Thaler showed that desirable social changes in people's behavior are possible through minimally aggressive policies that "nudge" people to make the right decisions. How people make intertemporal decisions is important for the lives of individuals, households, and the economy as a whole and requires further attention and study.

The development of behavioral economics has resulted in the identification of anomalous phenomena and paradoxes that confirm the limited rationality of the individual.

Among the most famous is the Alle Paradox. The paradox is named after Maurice Alle (1911-2010), a French economist whose work, along with that of P. Samuelson and J. Hicks, formed the basis of the neoclassical synthesis school of economics. In 1953, his article "Le Comportement de l'Homme Rationnel devant le Risque. Critique des Postulats et Axiomes de l'Ecole Americaine" was published in the journal Econometrics, describing the paradoxical results of his experiments. The paradox contradicts the theory of expected utility, which shows that people do not always make decisions that meet their needs and desires. They tend to make decisions based on what they can gain or lose right now, rather than in the final result.

People tend to choose certainty over risk, even if the riskier option is closer to what they really want. When questions are framed in terms of profit or loss, people are more likely to consider losses first and try to minimize them. This phenomenon has been called "loss aversion" in economics. Studies have shown that people almost always choose certainty over the highest probability of utility. Economic agents do this even in cases where the outcome is interesting and highly probable.

The essence of this paradox in decision theory is as follows: a real agent sees rationality in the behavior of achieving absolute reliability, authenticity, and not in the process of obtaining maximum expected utility. The rational paradigm drives the theory of expected utility, but

experiments in the context of behavioral economics show that people do not always choose rationally.

Conclusions. Summarizing the above, we conclude that economic science is closely related to the development of society and reflects social changes, creating new areas of economic science. One of the interesting modern areas is behavioral economics. This is a branch of knowledge that reveals the peculiarities of the influence of emotional, cognitive and social factors on the adoption of economic decisions by people and companies, as well as the impact of these decisions on the market; seeks to find the limits of rational choice and explores behavioral models.

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ФОРМУВАННЯ ЕКОНОМІЧНОЇ КОМПЕТЕНТНОСТІ МАЙБУТНІХ ІНЖЕНЕРІВ В УМОВАХ ЦИФРОВІЗАЦІЇ ТА НЕВИЗНАЧЕНОСТІ

Сучасний розвиток економіки визначається процесами цифровізації, які докорінно змінюють характер професійної підготовки та вимоги до компетентностей майбутніх фахівців. Якщо раніше інженерна освіта зосереджувалася переважно на технічних знаннях, то сьогодні дедалі очевиднішою стає потреба поєднання технологічної підготовки з економічним мисленням, підприємницькими навичками та здатністю ухвалювати обґрунтовані рішення в умовах швидкоплинних змін. Формування економічної компетентності майбутніх інженерів стає важливою складовою їхньої професійної готовності, адже цифрові технології, що пронизують виробництво і бізнес-середовище, висувають нові вимоги до інтеграції знань.

Особливу актуальність ця проблематика набуває в умовах невизначеності. Глобальні кризи, фінансова та політична нестабільність, зміни у структурі ринків і стрімке поширення інноваційних технологій суттєво трансформують професійний простір. Український контекст лише посилює ці виклики: війна, економічна турбулентність, потреба у відновленні та модернізації промисловості вимагають від інженерів не лише технічної майстерності, а й розуміння принципів економічної безпеки, уміння працювати з ризиками та знаходити ефективні рішення для сталого розвитку. У таких умовах саме інтеграція економічних знань у підготовку інженерів стає інструментом їхньої адаптивності та конкурентоспроможності.

Зазначені тенденції безпосередньо впливають на сферу вищої освіти, де акцент зміщується від вузької спеціалізації до формування комплексних компетентностей. Цей підхід підтверджується як на міжнародному, так і на національному рівні.

У цьому контексті особливої ваги набувають європейські рамкові документи, що визначають орієнтири для розвитку ключових компетентностей упродовж життя. Так, Європейська рамка EntreComp [1] визначає підприємництво однією з ключових компетентностей для всіх громадян, яку вони повинні мати можливість розвивати. Одним з елементів складової EntreComp є сфера «Resources», до якої входить financial and economic literacy (економічна грамотність), що прямо включає знання економіки. Крім того, EntreComp підкреслює значення «thinking creatively», «valuing ideas», «mobilizing resources» - ці навички можна вважати підприємницьким потенціалом і елементами критичного мислення.

Подібні орієнтири закріплені і в українських стандартах вищої та професійної освіти [2], де компетентнісний підхід розглядається як базовий принцип, що передбачає поєднання технічної підготовки з розвитком критичного мислення, адаптивності та ініціативності. Даний підхід означає формування ключових, загальних та професійних компетенцій, релевантних ринку праці, а також розвиток особистості. Це включає не лише технічні навички, але й здатність працювати в умовах змін, приймати рішення, критично оцінювати інформацію.

Показовим є й досвід міжнародної акредитації інженерних програм за стандартами ABET (Accreditation Board for Engineering and Technology, USA), які включають здатність працювати з економічними та соціальними факторами поряд із технічними рішеннями [3]. Стандарти ABET містять результати навчання («student outcomes»), серед яких – «здатність