

INNOVATIONS OF THE DIGITAL ERA AND ECONOMIC CHOICE

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Abstract:

The article deals with the peculiarities of the economic choice from the standpoint of rational choice theory and behavioral economy influenced modern innovative changes. Behavioral economics in recent years has shown significant influence of irrational factors on the behavior of economic actors, acknowledging that the benefits of people are endogenous. In this regard, a fast-growing digital economy does not simply lead to accelerated innovation and its widespread use in many sectors of the economy, but essentially reflects the objective process of the ever-increasing influence of irrational motives in choosing and making decisions by the economic actors.

The new digital technologies have expanded the possibility of knowing the motives and reasons that motivate economic agent to make certain choices and adopt new business models. Changing technologies to collect and analyze information, reducing it to a knowledge base. Digital technologies on the basis of the created psychographic profile give an opportunity to influence all components, guiding the economic choice of the individual. Impact tools include, first of all, microtargeting and nudge-tech.

Consequently, the possibilities of modern innovative technologies allow us to obtain new behavioral knowledge that helps to clearly formulate value propositions for a particular audience, methods and relevant channels of communication with it, facilitate the successful launch of new products and services, and increase their sales. However, along with the possibilities, digital disruptive innovations also create threats, including manipulations, misuse of personal data, cyber attacks.

Key words: digital economy, disruptive innovation, economic choice, microtargeting, nudge technology, customer centricity.

JEL classification: D01, D03, D5, D8, O31, O33.

I. INTRODUCTION

The term "digital economy" is firmly entrenched in modern science and practice. This topic has been the subject of numerous diverse discussions in international forums and conference, in government, expert community and society as a whole. According to the words of the president of the World Economic Forum K. Schwab, the combination of technologies in the physical, digital and biological world creates new opportunities and influences political, social and economic systems.

The study of the influence of technologies and innovations on economic development originates in the work of the neoclassics (R. Solow), the evolutionary theory of J. Schumpeter, but today there is a bifurcation change - the key importance of technology is aimed not only at the production and distribution of goods and services, but on the person. If companies were previously working to meet the needs of consumers, then the modern changes open the possibility of creating these needs and adjusting the economic choices. Such changes actualize the need for an analysis of the use of opportunities of modern technologies regarding the impact on economic decision-making processes or the adjustment of economic choices.

II. CONCEPT OF ECONOMIC CHOICE

The problems of economic choice and decision making in economic theory are traditionally considered within the framework of the classical theory of "homo economicus," whose mathematical model was developed by F. Edgeworth, V. Stanley, L. Walras, and V. Pareto. This economic concept considers an individual as a logical thinking machine, he accurately analyzes all information coming and based on it, makes decisions that maximize his personal gain and minimize the degree of risk in achieving the goals set. Such behavior of a person is rational, which is subsequently formalized in the theory of rational choice. The theory of rational choice has substantially enriched a set of parameters that explain the behavior of individuals from the standpoint of their own preferences. This theoretical concept enables decision making modeling to take into account the important role of time, transaction costs and information. The theory of rational choice formalizes the logic of individual behavior in certain situations, which allows economists better understand the behavior of society in terms of individual actions. The combination of actions that is the result of choice is considered through rationality, the most important features of which are individual character (personal preference), limitation and subjectivity. The application of the theory of rational choice extends to various spheres of society's life - politics (the theory of social choice), sociology (the theory of social choice), history (cliometrics).

A rational person is convenient to use in modeling: it makes a logically flawless choice and has a significant share of predictability. But in the real life of a person there are emotions, feelings, instincts, mistakes. Consequently, a person can act differently from the model, non-standard, that is irrational. Thus, we can conclude that the psychological component has a significant weight in human decision making.

Economic science is constantly evolving, capturing new spheres and using methods of other sciences, which led to the emergence of a behavioral economy. As an independent direction of economic science, the behavioral economy appeared in the 1960-70s and was actively developed by prominent psychologists D. Kaneman, A. Tversky, P. Slovik and economists J. Acerlof, R. Schiller, V. Smith, D. Ariele.

Behavioral economics in recent studies have shown that the benefits of people are endogenous, while in the classical theory they were accepted as persistent and assigned from the outside. Consequently, the benefits are prone to change, and more importantly, they can be formed, changing "within" the activities of people under the influence of various factors, which are also perceived by the behavioral model as endogenous. It became apparent that the external objective objects (which are defined by the classical paradigm as objective laws) are incapable of fully explaining the behavior of the subjects of the economy and their consequences, which means that they can't adequately fulfill the predictive functions. The ratio of objective and subjective as a philosophical component of the method of economic theory requires a new understanding.

Another postulate of rationality in the classical theory is the equilibrium approach. Acting rationally economic subjects predetermine the establishment of market equilibrium. The current approach (B. Arthur, 1999) examines the logical principles of applying the theory of complexity in economic science - based on the notion that the economy is not necessarily in a state of equilibrium: economic agents (firms, consumers, investors) are constantly changing their actions and strategies in the answer to the jointly created result by them. This, in turn, causes a change in the result, which requires economic agents to change their behavior again. Agents, thus, live in a world in which their beliefs and strategies are subjected to constant "verification" of survival within a certain "eco-environment" - as a result generated by these beliefs and strategies.

The comprehensive spread of the theory of rational choice, according to the famous scientist J. Hodgson, is a step towards the development of a universal theory of all social phenomena. However, the complexity of developing a comprehensive social theory lies in the fact that within the framework of the general theory it is impossible to take into account the multifaceted

characteristics and features of various socio-economic systems that have significantly influenced their development. The general characteristics of changes in social theory significantly limits the possibilities of its practical application (Hodgson, 2012).

III. DIGITALE ECONOMY EMERGENCE AND DISRAPTIVE INNOVATIONS

Digitalization or digital transformation of society is becoming a key factor that affects literally all social processes at all levels of economic aggregation. The digital economy is undergoing rapid growth, leading to the accelerated introduction of innovations and their widespread use in many sectors of the economy. It is becoming an increasingly important factor in global economic growth and plays an important role in accelerating economic development, increasing the efficiency and productivity of existing industries, the emergence and establishment of new markets and industries, as well as in ensuring a comprehensive, sustainable growth.

A digital economy can be defined as a wide range of economic activities, which includes the use of digital information and knowledge as a key factor in production, modern information networks as an important area of activity, and the effective use of information and communication technologies as a factor in productivity growth and optimization of the economic structure. New digital technologies (Table 1) are used for collecting, storing, analyzing and exchanging information in digital format and transforming social interactions.

Table 1. Key new technologies

Technology	Content
Application Program Interface(API)	a set of ready-made protocols, functions, structures that determine the interaction of different programs
Artificial intelligence (AI)	the ability of computer programs to perform tasks such as problem solving, speech recognition, visual perception, decision making and translation of languages
Machine learning	can be regarded as a subspecies of artificial intelligence, which focuses on the fact that computers were able to study without being specifically programmed for this through handwritten codes. Technology focuses on analyzing and studying large volumes of data, for the purpose of identification or forecasting, uses a variety of methods, including neural networks and in-depth training. Today, such technology analyzes the large amount and variety of data to recognize patterns that should not be intuitive or rational, or translated into software codes
Internet of Things (IoT)	this is not a technology, but a concept. It uses several technologies to connect household appliances to the Internet in order to provide value to the client, including facilitating financial transactions, or calling the security service among other applications
Big Data analytics	Big Data is a free term for identifying large volumes of unstructured (for example, emails, Internet traffic) and structured (for example, databases) data that can't be analyzed by traditional analytics tools. Also included are data collected through networks such as the Internet or corporate intranets, and other data that organizations create and store during normal business operations. Large data analysis focuses, for example, on identifying patterns, correlations and trends in customer data or preferences, based on machine learning or other technologies
Distributed ledger technology (DLT)	It is a database divided between several parties (nodes) for performing mutually agreed transactions based on a certain consensus mechanism. A key feature is that all nodes have identical versions of data that are output from the central trusted party (for example, a clearing house). These characteristics make cyber attacks and data changes difficult. An example is Blockchain technology
Smart contracts	a digital contract that can be fulfilled independently when the conditions are met.
Cloud computing	the use of remote and shared servers hosted on the Internet to store, manage and process data, and not servers and computers owned by each cloud user (such as a bank) and locally supported by them. This greatly increased the ability of financial institutions and other organizations to generate, store, manage and use data with lower costs and greater flexibility
Cryptography	protecting information by turning it into a secure format (for example, by encrypting)
Biometrics	technology refers to the digital reach and storage of unique characteristics of individuals such as clients (for example, fingerprints, iris, voice, face), mainly for the purpose of increasing the security (and convenience) of financial transactions

Source: FinTech, RegTech and SupTech, 2017.

Digital, network and intelligent information and communication technologies allow modern types of economic activity to be more flexible, mobile and efficient. These new technologies, from big data to machine learning to artificial intelligence to quantum computing to the internet of things, to much more, are intersecting and intertwining in unimaginable ways – a virtual revolution.

The rapid development of technologies, their jump-like changes, give rise to disruptive effects on socio-economic development, which was noted in studies by Christensen and co-authors Michael Raynor and Rory McDonald. According to scientists, as outlined in the Harvard Business Review, disruptive innovations have led to significant changes in the functioning of individual markets or industries (Christensen and etc., 2015). Such changes primarily affect the ratio of production and productivity costs, the measurement of alternative products or approaches, and secondly, they can be manifested in accelerating the pace of implementation of innovative solutions and improving opportunities on this basis.

Digital flows are now responsible for more GDP growth globally than trade in traditional goods. Automation, AI, the Internet of Things and business models such as the “sharing economy” are changing how we conduct business and our lives. The internet is the custodian of interactions and transactions of nearly one half of humanity today, having doubled its reach in under a decade. Digital platforms are increasingly permeating the essential functions of society. Businesses and governments are either leading the way or are being led by their stakeholders and consumers towards digitalization. As these technologies continue to evolve faster than our human and organizational capacities, our willingness and ability to trust these digital innovations and act on the basis of said trust to fully comprehend and get comfortable with them is a crucial ingredient for the continued onward march of digitalization writ large (Digital Planet, 2017).

Awareness of the possibilities and necessity of digitalization has led to the adoption of program documents on the development of the digital economy, for example in the EU it is the Digital Single Market strategy. The specified strategy was developed by the European Commission in order to provide opportunities for online activities of economic entities in compliance with the requirements of fair competition, protection of consumer rights, protection of personal and business data, as well as the avoidance of geocoding and intellectual property problems. Formation of the Digital Single Market provides opportunities for the development of new projects, startups, and also creates attractive conditions for the development of existing companies for the market volume of consumers over 0.5 billion. Completing the formation of a holistic digital single market will give an opportunity Europe's economy to receive EUR 415 billion annually, create new jobs, and improve the scope of public services (Digital Single Market, 2017).

By 2015, the value added of the digital sector for the EU economy was close to 2% of GDP (more than € 285 billion). Given the favorable institutional environment and the encouragement of investment in the rigid and soft infrastructure of the information and communication sector over the next 5 years, this figure can double, which will amount to 4% of the EU's GDP (€ 739 billion by 2020) (European data economy, 2017).

The accelerated development of technologies can cause both constructive and destructive effects on the socio-economic development of society. Disruptive technologies can change the status quo of firms, industries, countries, regions, create new opportunities or new threats and risks. K. Schwab highlights four main effects of the impact of the Fourth Industrial Revolution on business: the impact on consumer expectations, on product improvement, on joint innovation activities, and on organizational forms. An analysis of these effects shows that people and their choices and their satisfaction are the basis of change.

IV. NEW DIGITAL OPPORTUNITIES AND ECONOMIC CHOICE

The proliferation of digital technologies and research in the field of behavioral economics and cognitive psychology have led to changes in the coordination tools and decision-making directions by economic agents.

The concept of rationality means that in everyday life, economic agents compare all available alternatives (on any question), and only then choose the best. Rationality is the ability to make the right decisions in their favor. Studies in the field of behavioral economics have shown that people are far from always rational in their actions; they are influenced by the environment, moments of impulses, emotions, prejudices (Stanovich and etc., 2010).

Understanding how and why a person makes one or another choice opens up opportunities, through the construction of the choice architecture, to influence the decision-making process and "push" the consumer to one or another choice, as well as causes the emergence of new business models - client-centric (Fig. 1).

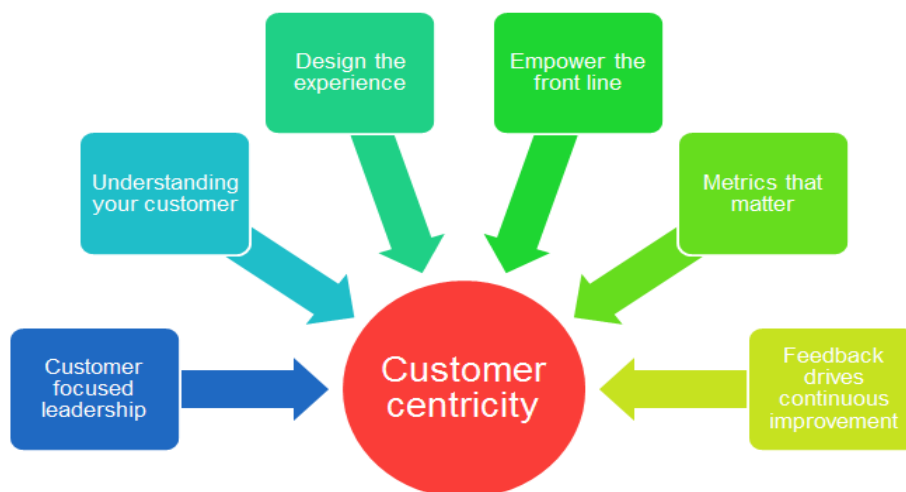


Fig. 1. Concept of client centricity

Source: How to Create a Customer Centric Strategy For Your Business. Retrieved from <https://www.superoffice.com/blog/how-to-create-a-customer-centric-strategy>

The concept of client centricity is characterized not so much by the service at the stage of meeting the needs, but rather by the orientation of the client and the client all the way from awareness, the formation of the need for its ultimate satisfaction and awareness of the experience of the consumer. Accordingly, doing business is based not on the satisfaction of specific needs, but on customer satisfaction as a whole.

New digital technologies have expanded the possibility of knowing the motives and reasons that motivate economic agent to make certain choices and adopt new business models. Thus change the technology of information collection and analysis. Today, consumer information is available, which has never been available, and in very large quantities. You can bring to one knowledge base information about where a person buys, what a person buys, what is the amount of check, at what price, does a person pay attention to discounts (that is, what percentage of discount products in his check), which gadgets does a person use, which points does a person visit. That is, you can recreate the so-called psychographic profile based on various sources of information. This information can be displayed in the form of web activity, diverse publications in social networks, sociological research on market development, data on the style of life from open sources, geolocation of mobile communication, data of Internet payments, weather, appeals. In the future, the information obtained is formed into a coherent picture of the individual keys in the form of converted text.

Considering economic behavior, as a rule, three closely interconnected components are singled out for analysis: 1) the decision is usually preceded human perception, comprehension, understanding of the situation and himself in it, ie cognitive (cognitive) components; 2) subjective attitude, painted by feelings, that is, affective (emotional) components; 3) action or, conversely, its containment, that is, conative (dynamic) components. Digital technologies on the basis of the created psychographic profile give an opportunity to influence all components guiding the economic choice of individuals.

Impact tools include, first of all, microtargeting and nudge-tech. The concept of nudge-

technology (Thaler, Sunstein, 2008) arose in search of possibilities for managing irrationality as heuristics and cognitive distortions, limiting the rationality of decision-making. Combining the achievement of behavioral economics and cognitive psychology, this approach allows, without limiting the freedom of choice, to carefully influence the behavior of individuals and gently "push" them to a particular decision. The term "Nudge" is defined as "pushing" through the creation of an architecture of choice, which, given the cognitive distortions and heuristics that arise in the decision-making process, forms the context and conditions of choice. At the present stage, nudge-marketing, which takes into account human nature, its inertness, inattention, tendency to behavioral distortions, is characterized by tendencies of ever greater simplification, individualization, excessive concern about "consumers" and excessive involvement in their lives are used both in public (election campaigns), as well as in private (digital marketing) spheres.

Microtargeting involves setting targets in the work, impact on a particular group of people. Modern reality is an era of information. Knowledge has become a valuable product for which you are ready to pay a lot. But economic agents not only consume information, but also produce it every second. In recent years, the volume of information was created that is more than 90% of the total amount of knowledge created by mankind. An information tag that users leave online is huge. Social networks with their targeting tools have become the headliner of the digital-environment. Here is just a small part of the criteria for segmenting the target audience, which are already available in social media such as: religious views; political preferences; interests and hobbies; family and relationships; ethnic affiliation; work; events of life.

Future targeting tools with technology development will become even more sophisticated, and messages that reach potential customers will become more personalized. That is, having received the maximum information about the visitor, you can more accurately understand the reasons for making a purchase decision and offer the product, which he will buy with a greater probability. It is unnecessary to use promptly powerful computer technologies to: 1) save digitally, and archive huge amounts of input data, 2) increase the quantity and quality of information coming from a wide variety of sources, 3) to integrate disparate data sets (information the results of the poll, weather and geographic data etc.), and 4) create analytical tools to identify new structures and important relationships with strategic and tactical value (within the task).

V. CONCLUSIONS

World is in the midst of an era of disruption, driven by the extraordinary scale, scope and speed of technological change, and spawning transformative innovations throughout economies and societies.

Modern studies in the field of behavioral economics, economic complexity, as shown in the article, prove that it is the person who determines the basic laws of the functioning of the economy, determines whether it is in the phase of rise or fall, whether it is in equilibrium or just aspiring to it. All of this person makes by making decisions based on its benefits, expectations, knowledge, calculations, that is, everything depends on how the model of a person is arranged in one or another economic system. Accordingly, the success of any business directly depends on the depth of knowledge of its consumers with their needs, desires, thoughts, motivations, values, their behavior, including image and lifestyle, as well - from an understanding of the personal and social factors affecting the decision to purchase. It is necessary to understand how this process takes place when making a decision on the purchase of goods and services for individual consumers and corporate customers.

The analysis showed that the possibilities of modern innovative technologies allow obtaining all this knowledge, they help to formulate a clear value proposition for a particular target audience, effective methods and relevant channels of communication with it, which facilitates the successful launch of new products and services, and the growth of their sales. At the same time, cyberspace is undergoing rigorous economic competition and ideological struggle, countering foreign cyber-attacks, the fight against terrorism, theft of intellectual property and personal data.

This state of affairs necessitates the development of technological and managerial innovations in the tandem. On their own technological innovations do not increase productivity, it is growing through innovation management, changes in business models. However, managerial innovations in the private sector will not be sufficiently effective without managerial changes in the public sphere. Disruptive global trends are reshaping our world. One consequence: the status quo is not a strategy for future success, anywhere. A second consequence: a large capacity gap has emerged between a world of “Technology 4.0” and “Policy 1.0”. We need to incent collaboration; innovation is a team sport not a solitary endeavor.

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