Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 213 (2022) 276–284

Procedia Computer Science

www.elsevier.com/locate/procedia

2022 Annual International Conference on Brain-Inspired Cognitive Architectures for Artificial Intelligence: The 13th Annual Meeting of the BICA Society

Artificial intelligence as a driver of business process transformation

Nosova Svetlana[a]*, Norkina Anna[a], Makar Svetlana[b], Gerasimenko Tatiana[c], Medvedeva Olga[d]

[a] National Research Nuclear University "MEPHI", 31 Kashirskoe Shosse, 115409, Russian Federation
[b] Financial University under the Government of the Russian Federation, Leningradsky Prospectstr. 49, Moscow, 125599, Russian Federation
[c] Orenburg State University, 13 Pobedy Avenue, 460018, Orenburg, Russian Federation
[d] The State University of Management, 99 Ryazansky Prospekt, Moscow, 109542, Russian Federation

Abstract

The article is devoted to the analysis of the problems associated with the transformation of business processes as a result of the use of artificial intelligence (AI) in highly competitive conditions on the world market. AI is transforming business processes around the world. With the development of artificial intelligence, the world has seen new startups, numerous business applications and consumer applications, displacement and the creation of completely new defined jobs. Along with the Internet of Things (IoT), AI can radically transform business and the economy as a whole. In this regard, the purpose of this article is to study the role of AI as a driver of business process transformation in order to achieve high results faster, which are able to eliminate some limitations in business growth and create a new wave of opportunities in its development. The results of the study confirmed that AI technologies contribute to the growth of business profitability by: a) creating a new virtual workforce — what is called intelligent automation, b) increasing physical capital, supplementing and improving the skills of the existing workforce, which helps to better serve customers, allocate employees to solve more creative tasks, reduce costs and get high incomes, c) stimulating innovation, enabling its developers and companies to create an innovative product, remove restrictions in obtaining massive data sets based on global cooperation in the field of digital transformation in advanced countries, allowing adapting the development of foreign artificial intelligence technologies to meet the requirements of the national program for the development of AI in Russia. The future in the field of AI and cognitive computing attracts the economies of all countries, especially those who want to become a world leader.

* Corresponding author. Tel.: +7-495-788-56-99, ext. 9241.
E-mail address: SSNosova@mephi.ru

1877-0509
10.1016/j.procs.2022.11.067

Keywords: artificial intelligence; business processes; digitalization; business strategies; cognitive innovators

1. Introduction

The term "artificial intelligence", as it is known, was first used in a research paper presented by John McCarthy and his colleagues in 1955. [17] John McCarthy offers the following definition: "It is the science and technology of creating intelligent machines, especially intelligent computer programs. This is related to the similar task of using computers to understand human intelligence, but AI should not be limited to biologically observable methods." [30].

Artificial intelligence broadly refers to the application of technology to perform tasks that resemble human cognitive functions, and is usually defined as:

- The branch of computer science that deals with the modeling of intelligent behavior in computers.
- The ability of a machine to imitate intelligent human behavior. [3]

New research shows that artificial intelligence can be used to more precisely control the nuclear fusion reaction, potentially helping to accelerate the development of nuclear fusion as a practical energy source. [14] This is not the first time artificial intelligence has been used to control nuclear fusion. [15] AI is defined as:

- A sentient entity created by humans.
- Able to perform tasks intelligently without explicit instruction.
- Able to think and act rationally and humanely. [31]

"Artificial intelligence solves one of the most difficult puzzles. How is it possible for a slow, tiny brain, whether biological or electronic, to perceive, understand, predict and control a world much larger and more complex than itself? How can we create something with these properties? These are difficult questions." [26] But, as practice shows, they are gradually being solved. One thing is clear that artificial intelligence is a form of software that makes decisions independently, which is able to act even in situations not provided for by programmers. since artificial intelligence has a wider freedom of decision-making in contrast to traditional software. These features make AI a driver of digital transformation of business processes in all sectors of the economy.

Digital transformation is not just about destruction or technology. It's about value, people, optimization, and the ability to adapt quickly when needed through the intelligent use of technology and information. In this regard, the structure of the economic system is changing, and with it its dynamic properties, since the key element of the digital transformation process is the transition from analog or physical technologies to digital data systems. "In this regard, the development of digitalization should be considered as a new phenomenon in modern economic life, as it manifests itself in the emergence of completely new technologies, such as big data, cloud technologies, artificial intelligence." [22, 659] AI technologies have changed the face of business and will continue to do so. At the same time, there are changes in the economy as a whole.

In order to better illustrate the role of artificial intelligence as a driver of business process transformation, it is necessary to identify and uncover the potential and limitations of artificial intelligence in terms of the spread of AI technologies, which are becoming mandatory to maintain a competitive advantage. This process not only lists the results, but also combines ideas to build a common concept for the development of artificial intelligence in order to better understand the various applications of technology in business processes, the problems associated with them and the measures taken to solve these problems. Artificial intelligence technologies can be combined with advanced predictive analytics and complemented by robotics and other forms of automation. As a result, artificial intelligence technologies and cognitive computing as drivers contribute to rethinking and the emergence of completely new types of business transformation. As it is correctly stated, "for this, it is necessary to actively cooperate with international organizations and analytical centers in theoretical and practical fields, especially in the field of robot

production. [24, 296]

In a robotic business, intelligent robots can perform economic operations autonomously. To carry out such activities, robots must be able to create and conclude digital contracts for their services or operations so that they can be fully integrated as autonomous agents into the human economy. The most important problem for a robotic business will be ensuring that all basic human needs are met. Therefore, in the value chain of any economic activity, the final result should be aimed at achieving this most important principle. This may lead, among other things, to the fact that, although robots will be able to act as autonomous agents, they will not be able to obtain ownership of the available resources. Therefore, robots must always perform tasks on a contractual basis, in which they act as intermediaries in the implementation of activities, the end result of which is the satisfaction of basic human needs. Companies benefit from digital technologies in addition to directly increasing productivity, a number of indirect benefits that materialize through numerous channels, which is crucial for understanding their multiplicative role in the digital economy. "World practice shows that digital transformation ensures the global economic superiority of the country that embodies it. It's reliable. In fact, this is the basis of the sixth technological order, the era of which is now beginning." [23,654]

Thus, the robotic business should develop within the framework of the digital economy. In the system of financial and economic transactions, robots can perform both the role of an agent initiating a transaction (supplier, seller) and as an agent accepting a transaction (buyer). As for the offer, some aspects of the robotic business are already developed, since industrial robots are largely used in production in many business sectors. Robots increase productivity when they are used to perform tasks that they perform more efficiently and efficiently than humans. As for demand, the robotic business has not yet reached any significant degree of development. However, it is expected that future robots will be able to purchase goods and services on behalf of their owners. As new robotic technologies develop, questions arise: which jobs are vulnerable? What will be the reaction of our institutions? What is the result of the robotic business in terms of global growth and income distribution? In the short term, can a robotic business lead to negative social outcomes?

Some people believe that a new business can lead to an imbalance in the current income distribution, which must be observed to maintain social balance. From their point of view, the distribution of income seems to be shifting towards the robotic business. Therefore, it would be logical to implement social measures at the expense of a robotic business, which is due to (a) increased labor productivity due to artificial intelligence technologies (auxiliary, autonomous and augmented intelligence) and (b) increased consumer demand as a result of the availability of products and services of higher quality.

Thus, improved algorithms, the availability of large amounts of data and more powerful equipment allow AI to go beyond human cognitive abilities. According to the AI Index Report 2022: [2]

- AI becomes more accessible and more efficient.
- Private investment in AI has soared, investment concentration has increased.
- Language models are more capable than ever, but also more biased.
- Robotic arms are getting cheaper.
- The best AI results according to technical criteria increasingly depend on the use of additional data.
- More global AI legislation than ever.
- The United States and China had the largest number of cross-country collaborations in AI publications. 2.7 times more publications than between the United Kingdom and China — the second largest in the list.

This report on measuring trends in the field of artificial intelligence, tracking, comparing and visualizing data related to artificial intelligence, allows you to make optimal decisions, take meaningful actions to promote AI in all spheres of human life, including business. From the business point of view, it becomes important to identify and uncover the potential and limitations of AI, to present a holistic conceptual framework for using AI as a new driver of business processes that eliminates turbulence in economic development. It is correctly stated that "currently, businesses need to actively move to the development of automated technical systems. The effective use of AI technologies requires organizations to solve key data problems, including creating effective governance, defining ontologies, designing data around “channels” from data sources, and managing regulatory constraints." [19,384]

Accenture research shows that "companies that successfully apply artificial intelligence can increase profitability

by an average of 38 percent by 2035, which will lead to economic growth of $14 trillion in 16 industries in 12 countries." [1]

To realize this opportunity, it is imperative that companies act quickly, develop strategies around AI that put people at the center, and commit to using responsible AI systems that are consistent with moral and ethical values that will drive positive results and empower people to do what they do best – create and innovate. But this will happen only if organizations take bold and responsible steps to apply AI technologies in their business. This is especially true of the top 10 industries benefiting from AI:

- Education
- Housing and Nutrition.
- Construction.
- Wholesale and Retail trade.
- Healthcare.
- Agriculture.
- Social services.
- Transport.
- Manufacturing.
- Financial Services.

In particular, with the help of artificial intelligence, you can:

- Analyze data and offer what is interesting to the user.
- Predict results using statistical algorithms and machine and deep learning as well as artificial neural network algorithms.
- Design, manufacture and use robots that will learn, improve without clear instructions and, ultimately, understand human speech as it is pronounced.
- Include the search for patents, attract entrepreneurs to create new products and services that better monetize the assets of the enterprise, and attract new investments for other regions.

In this aspect, we can talk about the strategic importance of the influence of artificial intelligence on business in the near future. AI consists of several technologies that can be combined in different ways to feel, understand, act and learn. AI can improve the end result by: intelligent automation, increasing labor and capital, and spreading innovation. [4] "Artificial intelligence changes our lives every day. It is quite possible that in the near future the computer will start thinking for itself." [28]

2. Theoretical analysis

Computer scientist P. Domingos argues that "AI is the goal; AI is the planet we are heading to; machine learning is the rocket that will lead us to this. And big data is fuel." [8] Now we can say: "AI is a new economic accelerator, a new phenomenon in modern economic life, a new resource in the global market system of the 21st century, whose value is only increasing every day.[21,358] The largest technology companies are already participating in the competition in the field of AI technologies and applications to accelerate their business processes. Organizations devote significant resources to the study, development and implementation of applications based on artificial intelligence in order to offer new innovative products, increase revenue, reduce costs and improve customer service. First developed in the early 1940s, artificial intelligence technology has gained significant momentum over the past decade and has become more widespread in part due to the availability of low-cost computing power, large datasets, cloud storage, and complex open source algorithms. In a recent report based on the survey results, the heads of financial institutions noted that “AI is expected to become the most important driving force of business in the financial services industry in the short term, with 77% of all respondents expecting AI to have high or very high overall importance for their business”. [25] In practice, AI is used as a generalizing term covering a wide range of different technologies and applications. Artificial intelligence applications typically involve the use of data,

algorithms, and human feedback. Ensuring the proper structure and validation of each of these components is essential for the development and implementation of artificial intelligence applications.

Data plays a crucial role in the learning and success of any artificial intelligence application. The importance of data has grown rapidly, and some even call data a more valuable resource than oil. [29] AI applications are typically designed to analyze data by identifying patterns and making decisions or predictions based on these patterns. Applications continuously and iteratively learn from any inaccurate definitions made by such applications, which are usually identified through human reviews, as well as from new information, and refine the results accordingly. Therefore, AI applications, as a rule, are best suited for obtaining meaningful results when the underlying data sets are substantially large, reliable and relevant.

An algorithm is a set of well-defined step-by-step instructions for a machine to solve a specific task and generate output data using a set of input data. The AI algorithm is not programmed to perform a task, but is programmed to learn how to perform this task." The availability of open source AI algorithms, including from some of the largest technology companies, has helped drive AI innovation and made the technology more accessible to the industry.

Artificial intelligence is not a thing. Just looking at one context where AI and cognitive functions, intelligent document recognition are used, there are several forms of artificial intelligence such as semantic understanding, statistical clustering and classification algorithms such as SVM, Bayes and Neural-Ne and others that show how AI helps solve the problem of information and big data. (Fig.1.)

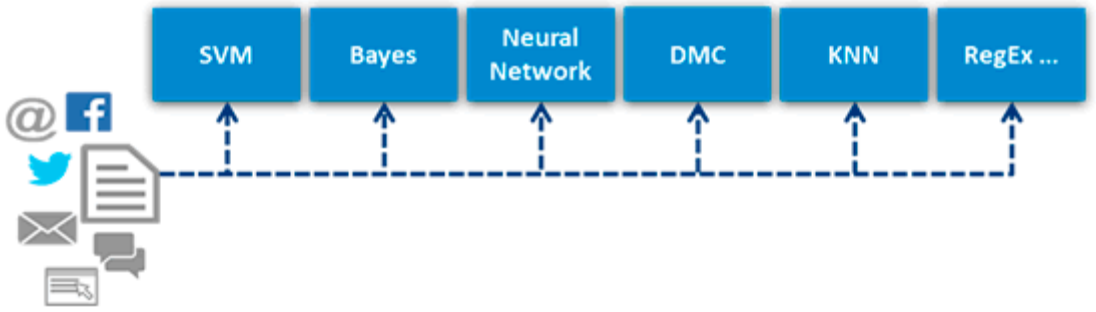

Fig. 1. AI - about solving the problem of information and big data using AI: Intelligent document recognition algorithms: algorithms like SVM, Bayes and Neural-Net, all with their strengths and weaknesses; source: Artificial Intelligence and Cognitive Computing: A Business Guide to Artificial Intelligence (i-scoop.eu).

Business and technology stakeholders typically work together to analyze AI-based results and provide appropriate feedback to AI systems to refine the model. The absence of such human analysis and feedback can lead to inappropriate, incorrect or inappropriate results of artificial intelligence systems, potentially creating inefficiency, missed opportunities or new risks if actions are taken based on erroneous results. AI applications can expand human knowledge and transfer data and ideas directly into human hands. As algorithms sift through the data and generate outputs (e.g. classifications, outliers, and forecasts), the next important component is human analysis of the results for relevance, accuracy, and usefulness. Human participation is necessary throughout the life cycle of any AI application, from data preparation and algorithms to testing output data, retraining the model and verifying the results. As data is collected and prepared, human reviews are essential to process the data according to the requirements of the application.

There are two important factors to consider when researching artificial intelligence. Firstly, people are still far from general artificial intelligence, and secondly, it is not capable of performing the full range of tasks that humans are capable of performing. [5] Through intelligent automation, artificial intelligence capabilities can help uncover valuable information from hidden data and use it to make decisions. They can integrate new sensor data sources based on the Internet of Things (IoT) and, through access to more detailed analysis and real-time analysis of equipment data, help significantly reduce production downtime.

Artificial intelligence can help organizations formulate hypotheses, identify and test new ideas, accelerate and deepen scripting throughout the incubation period, and create unexpected associations. [9] In particular, artificial

intelligence, as cognitive innovators unanimously recognize, changes and develops many skills of business employees. As a rule, they are already able to realize the value of both structured and unstructured data. This can help to effectively improve projects by significantly reducing the time of the verification process associated with design changes, as well as help risk management managers better assess different types of risks, anticipate regulatory compliance gaps that people may miss. The use of artificial intelligence can help accelerate the development of solutions and improve the skills of employees. Artificial intelligence can support faster and more efficient planning, development and testing of enterprise software, as well as provide greater flexibility. Information technology is considered the highest priority among the managers surveyed in the global sample.

The capabilities of artificial intelligence in the supply phase can:

- Help companies significantly improve their understanding when making decisions.
- Increase confidence in the type, quantity and quality of goods purchased, delivered, received and billed.
- Reduce the need for working capital to support trade.
- Help logistics professionals better predict the likelihood of an impact on the supply chain.
- Anticipate the necessary actions and predict employment more accurately.

Eventually, "AI will be able to perform even intuitive and sensitive tasks, which provides innovative ways to integrate humans and machines to provide services." [12, 155]

Artificial intelligence applied to the business sales phase can help organizations improve customer service efficiency, expand customer account management capabilities, increase cross- and additional sales opportunities, and - through a deeper understanding of the context - improve the effectiveness of potential customer management. The capabilities of artificial intelligence in procurement or cognitive computing can help organizations improve global sourcing and vendor integration, accelerate and improve analysis, and increase efficiency.

There are many examples in the field of consumption of artificial intelligence achievements. Artificial intelligence or cognitive computing systems can help companies establish a closer connection with customers by better understanding what customers want, by automating huge amounts of information.[16] With a deeper understanding, organizations can not only better identify customer relationships, needs and desires, but can also better anticipate and solve problems in order to increase customer satisfaction.

In the financial function, artificial intelligence capabilities can help organizations reduce risks, actively prevent fraud, and speed up and improve due diligence processes for new suppliers. They can also help increase cash flow by speeding up payment cycles and significantly improving the decision-making process to meet regulatory requirements through natural language processing, machine learning and automated reporting.

In the field of fraud, artificial intelligence capabilities can provide faster and more reliable detection of criminal activities in volumes of structured and unstructured data. This could potentially save thousands of hours of employee time by allowing staff to focus on more business-critical initiatives by accelerating threat detection and reducing problem resolution time.

3. Results

The rapid development of AI technologies creates a multiplicative effect that generates innovative breakthroughs and makes it possible to successfully predict the economic development of a business.[20,368] As research by the McKinsey Global Institute shows, there is a yawning gap between leaders and laggards in the use of AI both between sectors and within them. Managers hoping to close the gap should be able to solve the AI problem in an informed manner. In other words, they need to understand not only where AI can drive innovation, but also lead to revenue growth. The most valuable companies in the world have one thing in common: they are all leaders in the platform economy.

Leaders with strong operational skills have emerged in most companies. But they face a critical shortage: they lack people in leadership positions with the know-how, experience and confidence needed to solve what management scientists call "evil problems." Such problems require companies to transform the way they do business. Companies can create the potential for strategic leadership. This begins with the recognition that the organization undoubtedly already has new strategic leaders. In many companies, people who make their way to the

top of the hierarchy do so by demonstrating excellent performance, constant ambition and the ability to solve strategic problems. [10]

But all this requires the use of artificial intelligence. Artificial intelligence can cost-effectively increase customer satisfaction and retention through more customized approaches, as well as by opening up new consumer segments using a combination of indicators such as location, gender, time, and trends. Customer service departments can regulate customer requests using a combination of artificial intelligence and traditional approaches to increase satisfaction. Managers can better control customer satisfaction by analyzing current situations and flexibly reorganizing the strategy. [13]

By analyzing the data, processes can be adjusted depending on the behavior of customers and the requests of other stakeholders, controlling the supply chain or reforming production. Managers can make more informed decisions and get information by analyzing artificial intelligence reports and consulting with staff. Surveillance systems with artificial intelligence can proactively affect critical parts of the production process. In addition, artificial intelligence can create associations between data that can lead to innovations in the future. [19]

Artificial intelligence can automate tasks so that human resources can be allocated for more creative and intuitive tasks. This shift also reduces the percentage of human errors when performing repetitive tasks. As for information security issues, AI has more reliable and faster solutions for detecting fraud and inconsistencies by processing both structured and unstructured data.

In recent years, people have started using sharing economy platforms like Airbnb and Uber. Thus, the rapid development of such platforms of the sharing economy has become an important business topic. Research on the sharing economy discusses resource providers, but not users. For example, this study builds a model to measure the driver components of the sharing economy and the correlation between these drivers between Airbnb and Uber. According to the results, the drivers of the sharing economy are social drivers, economic drivers, technological drivers that influence the intention of use, and various combinations of components of the sharing economy, such as pleasure, network externalities, perceived quality, cost savings and efficiency.

Davenport and Ronanki [7] conducted a study of 152 cognitive projects to assess the impact of artificial intelligence in business. They divided the impact of artificial intelligence into three parts: process automation, cognitive understanding, and cognitive interaction. According to their research, process automation is associated with back-office automation when performing administrative and financial tasks, such as transferring data from email and call center systems to structured database systems and outputting content from legal documents using applications. Cognitive understanding reveals patterns based on huge amounts of data using machine learning techniques such as predicting purchasing behavior, detecting fraudulent activities and personalized marketing. Cognitive interaction is associated with automatic communication with customers and employees also using applications. Applications include round-the-clock customer service for the most in-demand services, such as changing account information, answering general questions from employees, diagnosing diseases and treatment recommendations.

A study conducted by the McKinsey Global Institute on 400 scenarios for the use of artificial intelligence in 19 industries in nine business functions showed that the functions of marketing and sales, as well as supply chain management and production represent the greatest potential value of the introduction of artificial intelligence.

4. Discussion

Research in artificial intelligence and machine learning (AI/ML) has grown exponentially over the past few years. Discussions about the use of artificial intelligence (AI) and machine learning (MO) have gained momentum as financial services firms evaluate potential applications of AI, including, for example: to improve the quality of customer service and improve operational efficiency. AI is the subject of countless discussions and articles, from treatises on technical advances to tabloid headlines about its consequences. Even as the debate continues, the technologies underlying AI are moving forward step by step, permeating our lives. [11] Artificial intelligence (AI) is expected to profoundly change societies It is expected that AI and robots will become more human-like and will cope with tasks usually performed by individuals claimed that there is a constant transition from the current economy of thinking to the economy of feelings. In the long run, AI is likely to promote communication, interaction

and empathy for tasks previously performed by humans. Intelligent chat-bots are already a working example of this process.

Trust has psychological and sociological dimensions. From developmental psychology, researchers know that people build basic trust in those closest to them, and later they are taught to understand how much and whom they should trust. In sociology, trust is considered a social glue that unites people and good things in societies. Trust can be divided into trust in people close to individuals (family, friends and colleagues) and trust in people who are more distant from individuals (people in general or strangers). Personality traits affect trust and the ways people use technology. Evidence suggests that extroverts are more susceptible to robots and that low neuroticism is associated with robot acceptance Another study found a link between increased trust in automation and high agreeableness or conscientiousness. The potential of AI allows companies to use the data already at their disposal to measure in real time, learn more about the customer and anticipate what will happen next. [6]

We argue that the analysis of trust in the relationship between humans and AI technologies is important for understanding the transformational changes caused by AI and new generation social robots. Trust is essential for human interaction and human well-being, and without trust, human societies would not function in a civilized manner. There is currently a need for research examining trust in AI and robots, especially in first-encounter situations involving a small amount of information about another subject.

Generally speaking, AI and human collaboration will produce better results when tasks requiring more creative, interpersonal and intuitive skills are handed over to people. Consequently, some jobs and tasks that are repetitive and do not require complex intellectual abilities will be replaced by artificial intelligence, and the role of people should be reconsidered. However, for certain tasks, manual monitoring may be required in case of ethical considerations or prevention of cases that could undermine the prestige of the company. In addition, for vital missions, AI can offer options only to a human specialist, for example, medical diagnostics and treatment.

Strategic solutions from this perspective are to consider how to conduct collaborative research between humans and AI, as well as redefine tasks and jobs. By matching the capabilities of AI with the usual way of performing tasks, AI can help improve productivity. For example, by launching an artificial intelligence-enabled chat-bot in the customer service department to respond to basic requests, call center employees can handle complex customer requests that the chat-bot may not respond to. Well-known researchers in the field of artificial intelligence from the National Research Nuclear University "MEPhI" correctly state: "Modern AI has achieved many superhuman abilities in narrow directions, but the social compatibility of artificial agents with humans is currently at a low level. AI should be able to establish a relationship of mutual understanding and trust with a human. In the direction of creating social-emotional AI there is a lot of work on the basis of neural networks and cognitive modeling. In some cases, the two approaches come together, while it remains a big question how to make them. The breakthrough has not yet been achieved. " [27,787] In general, AI is an exciting new field for research in the field of transformation of business processes in the system of economic and social activities, which will largely depend on the availability and rapid dissemination of knowledge about AI at the international level.

5. Conclusion

1. Artificial intelligence can be used in almost all business processes. Optimal productivity can be achieved by introducing artificial intelligence technologies into business processes by re-evaluating tasks and jobs based on its capabilities.

2. Artificial intelligence offers the starting conditions for improving the efficiency of business processes. In order for such development to become possible, it is necessary to have a powerful digital sector, where artificial intelligence technologies are being created directly.

3. Artificial intelligence should be introduced into business processes as a result of careful study, since automated solutions can destroy a firm's reputation if ethical and regulatory provisions do not work properly. A timely assessment of economic indicators related to the use of artificial intelligence can help managers determine the timing of investments and the share of the state budget in its development.

4. Given the potentially destructive nature of artificial intelligence, it should be recognized that new problems may arise for economic security and social stability. In this regard, it is necessary to strive to minimize these risks by ensuring reliable and controlled development of artificial intelligence, which will facilitate its perception, thereby

strengthening confidence in the processes of human interaction with artificial intelligence, including the selection of data that determine the growth of business process efficiency.

Acknowledgements

This work was supported by the National Research Nuclear University MEPhI.

References

[1] Accenture Research: AI Boosts Industry Profits /https/www.huffpost.com/entry/accenture-research-ai-boosts-industry-profits

[2] AI Index Report – Artificial Intelligence Index (stanford.edu)

[3] Artificial Intelligence, Merriam-Webster.com https://www.merriam-webster.com/dictionary/artificial%20intelligence.

[4] Artificial Intelligence for Industrial Growth now and for the Future. IoT & AI World Summit Eurasia (iotsummiteurasia.com)

[5] Brynjolfsson, E., & Mitchell, T. (2017) "What can machine learning do?" *Workforce implications. Science* **358 (6370):** 1530-1534.

[6] Conick, H. (2016, January) "The past, present and future of AI in marketing. American Marketing Association." https://www.ama.org/publications/MarketingNews/Pages/past

[7] Davenport, T., Ronanki, R. (2018) "Artificial Intelligence for the Real Word." *Harvard business rev.* **96 (1/2):** 108-116.

[8] Domingos, P. (2016) "The Supreme Algorithm. How Machine Learning Will Change Our World. Artificial Intelligence (AI): what, why and why." by Dilya Zhanispayeva Medium

[9] Gillham, J.& Paich, M. (2018) Macroeconomic impact of AI. PwC Report. – PricewaterhouseCoopers

[10] Hambrick, D., Fredrickson, V. (2001) "Are you sure you have a strategy?" *Academy of Executive Management* **15 (4):** 48-59.

[11] Harris, J. (2016) "Turning artificial intelligence into business value." https://pdfs.semanticscholar.org/a710/a8d529bce6bdf75ba589f42721777bf54d3b.pdf

[12] Huang, M., & Rust, R. (2018) "Artificial intelligence in service." *Journal of Service Research* **21(2):** 155-172.

[13] Jordan, M., & Mitchell, T. (2015) "Machine learning: Trends, perspectives, and prospects." *Science* **349(6245):** 255-260. https://doi.org/10.1126/science.aaa8415

[14] Kan, D. Fortune, (2022, February **16** (fortune.com)

[15] Katwala, A, Wired, (2022, February **16** (wired.com)

[16] Leitch, J. & Dawson, M. (2016) "10 Principles of strategic leadership." https://www.strategy-business. com/article/10-Principles-of-Strategic-Leadership?gko=25cec

[17] McCarthy, Minsky, Rochester, Shannon (1955, August) Proposal for the Dartmouth Summer Research Project on Artificial Intelligence.pdf/https://github.com/mmcguill/historicalai/blob/master/Papers/McCarthy,%20Minsky,%20Rochester,%20Shannon%20

[18] Nosova, S., Norkina, A., Makar, S. (2022) "Digitalization as a New Paradigm of Economic Progress." *Studies in Computational Intelligence* Vol. **1032** SCI : 344-354.

[19] Nosova, S., Norkina A. (2022) "Digital Technologies as a Process of Strategic Maneuvering in Economic Development." *Studies in Computational Intelligence* Vol. **1032** SCI: 380-392.

[20] Nosova, S. Norkina, A., Makar, S. (2022) "The Collaborative Nature of Artificial Intelligence as a New Trend in Economic Development." *Studies in Computational Intelligence* **1032** SCI: 367-379.

[21] Nosova, S., Norkina, A., Makar, S. (2022) "Artificial Intelligence Technology as an Economic Accelerator of Business Process." *Studies in Computational Intelligence* **1032** SCI: 355-366.

[22] Nosova, S., Norkina, A. (2021) "Digital transformation as a new paradigm of economic policy." *Procedia Computer Science* **190:** 657-665.

[23] Nosova, S., Norkina, A. (2021)"Digital technologies as a new component of the business process."*Procedia Computer Science***190:** 651-656.

[24] Nosova, S., Norkina A. (2021) "Fundamentals of the digital Economy." Moscow, KNORUS: 378.

[25] Rill,L. et al., (2020) "Transforming Paradigms: A Global AI in Financial Services Survey." https://www.researchgate.net/publication/339029184_Transforming_Paradigms_A_Global_AI_in_Financial_Services_

[26] Russell, S., Norvig, P. "Artificial Intelligence: A Modern Approach." 3rd Edition, 2010 by Prentice-Hall, Inc. A Simon & Schuster Company Englewood Cliffs, New Jersey 07632

[27] Samsonovich, A., Tsarkov, V., Enikeev, V. (2021) "Toward a socially acceptable model of emotional artificial intelligence." *Procedia Computer Science* **190:** 771–788.

[28] Schubhendu, S., Vijay , J. (2013) "Applicability of Artificial Intelligence in Different Fields of Life" (ijser.in)

[29] (2017) "The World's Most Valuable Resource is no Longer Oil, but Data." *The Economist*, (economist.com)

[30] (2022) "What is Artificial Intelligence (AI)?" *IBM*

[31] (2022) "What is Artificial intelligence? How does AI work?" *Great Learning* (mygreatlearning.com)