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STUDY OF THE PRINCIPLE OF AUGMENTED COMPETENCY IN THE AUDIT OF IT PROJECTS IN THE ENVIRONMENT OF ARTIFICIAL INTELLIGENCE

The development of artificial intelligence (AI) is revolutionizing various industries, including IT project management. The object of research is the principle of augmented competence, which is a new approach that uses AI to strengthen and expand the capabilities of IT project teams. The essence of this principle lies in the complementary interaction of AI and the competence of project teams. Instead of replacing project managers, AI complements their competencies (knowledge, skills and experience). One of the hot spots is the application of AI in the process of automating routine tasks, analyzing large volumes of data and providing recommendations and predictions, freeing up time for team members to focus on more complex and creative tasks.

The possibility of automating tasks and providing new knowledge, which will significantly improve the efficiency and productivity of the team, has been obtained through the use of the principle of augmented competence. As a result, data-driven recommendations and predictions enable teams to make more informed and effective decisions. Access to new knowledge and insights stimulates innovation and leads to new ideas and solutions, helps identify and mitigate potential risks, which can lead to more successful projects. Applying this principle to IT project management audits will automate software testing with AI, which replaces testers so they can focus on more complex types of testing such as exploratory testing, performs customer data analysis with AI, and enables companies to better understand your customers and their needs, which can lead to better marketing campaigns and products. It is important to note that this principle does not involve replacing project managers with AI. Instead, AI is used as a tool to empower human teams and help them achieve better results. As AI technologies continue to evolve, the principle of augmented competence is likely to play an even more important role in IT project management. AI can help teams overcome complex challenges, make better decisions, and succeed in a more dynamic and competitive environment.

Keywords: *project audit, IT project management, artificial intelligence, augmented competence.*

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1. Introduction

Artificial intelligence (AI) is becoming an integral part of modern IT projects, transforming approaches to management, planning and execution of tasks. The principle of augmented competence is the use of AI to improve the efficiency and effectiveness of human activity in IT project management.

In the modern world, where artificial intelligence (AI) is rapidly developing, its influence on various spheres of activity is becoming more and more noticeable. IT project management is no exception. Augmented Competency Principles offer a new approach to IT project management that uses AI to strengthen and expand the capabilities of management teams.

The essence of the principle of augmented competence is that AI does not replace human project managers, but complements their knowledge, skills and experience. AI can automate routine tasks, analyze large volumes of data, provide recommendations and predictions, freeing up time for human team members to focus on more complex and creative tasks.

Let's consider the advantages of using the principle of enhanced competence. This is improved efficiency and productivity based on the automation of tasks and the provision of new knowledge, which leads to a significant improvement in the efficiency and productivity of the project team. Data-driven AI recommendations and predictions help teams make more informed and effective decisions. Access to new knowledge and insights drives innovation and leads to new ideas and solutions. At the same time, AI de-risking helps identify and mitigate potential risks, which can lead to more successful projects.

Examples of the use of the principle of augmented competence in IT project management are related to the use of AI to automate software testing, customer data analysis, which can help companies better understand their customers and their needs. And this, in turn, can lead to improved

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marketing campaigns and products, demand forecasting, which can help companies better manage their inventory. And this, in turn, can lead to reduced costs and improved customer service.

Augmented competence, which combines human-cantered values with AI-assisted practices, is a promising approach to software development in the AI era [1].

Agile project management models are notorious in modern software development. However, distributed teams create management challenges, such as the need for effective communication and collaboration tools and the difficulty of monitoring progress and quality of work. [2] presents an agile governance model for distributed software development teams (AgiTeD), a Scrum-inspired framework based on transparency, validation, adaptation, and quality. AgiTeD defines four roles, six events within the development cycle and seven artefacts [2].

The convergence of global trends and Agile project management methodologies creates a new platform for evaluating the competencies of project managers in a hybrid world [3].

A flexible model for academic software project management can improve project-based learning and knowledge generation in computer science education [4].

In the world of information technology, to keep up with the fast pace and constant changes, updated knowledge of processes and methods is an essential requirement. For constant changes and successful implementation of projects, technologies and a software project management structure were introduced. Currently, there are many different process models that are selected and implemented according to the needs of the project and organizations. To unify project management processes, PMI introduced a project management framework consisting of 10 knowledge areas and 5 processes. The framework consists of all aspects of project management and the processes that must be followed to execute the project from project initiation to project closure. Another popular project management software is agile project management, which emphasizes delivery in phases and releases known as sprints. Agile processes include Scrum, XP, Lean, Kanban, Crystal; Flexible unified process and much more [5].

Most tutors are aware of the importance of emotional intelligence for student success and how to solve the problem of low emotional intelligence in students [6].

Artificial intelligence, in particular machine learning, can significantly improve the effectiveness of project management in construction and IT projects by improving planning, measurement and uncertainty management [7].

Integrating AEC Industry 6.0 principles into the design and construction of buildings can create smart, durable, and environmentally friendly structures, but requires skilled experts, compatible standards, and cybersecurity measures [8].

[9] highlights the role of training and educational activities needed to support digital health in the future, so that students can develop the ability to recognize and use the potential of new technologies. It also briefly discusses the challenges and opportunities associated with healthcare systems in the era of digital transformation and beyond. Advanced technologies from the point of view of Industry 5.0 that support digital health are considered. And a new teaching and learning paradigm and strategies are presented that introduce Industry 5.0 technologies into academic curricula so that students can develop their abilities to embrace the digital future and minimize the disruptions that will inevitably accompany it [9].

Therefore, using the principle of augmented competence does not mean that AI should replace human project managers. Instead, AI should be used as a tool to empower human teams and help them achieve better results.

As AI technologies continue to evolve, the principle of augmented competence is likely to become even more important for IT project management. AI can help teams overcome complex challenges, make better decisions, and succeed in a more changing and competitive environment.

This is just the beginning of research in the field of augmented competence. Let's take a closer look at its concepts, advantages, examples of use and mathematical modelling.

The aim of this study is to research the principle of enhanced competence, conduct a SWOT analysis of applications, and build a mathematical model of the implementation of enhanced competence within the Agile methodology.

2. Materials and Methods

Augmented competence is a concept that involves the management team and AI working together, complementing and reinforcing each other. In IT project management, this means integrating AI capabilities to improve decisions and processes traditionally performed by teams of project managers.

The key five elements of the principle of augmented competence are shown in Fig. 1.

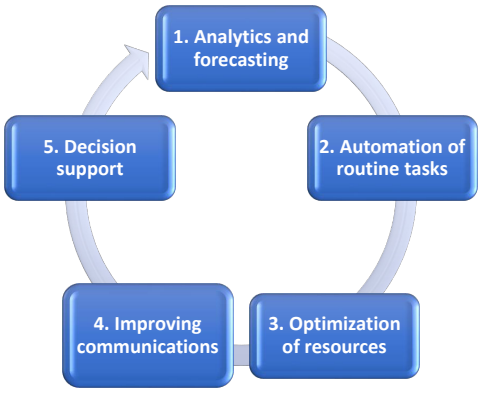

Fig. 1. Key principles of augmented competence

Let's consider the application of each of the principles of augmented competence in the management process. Thus, the principle in the process of processing analytics and forecasting AI can analyze large volumes of data, identify trends and predict results, which helps project managers make more informed decisions. When automating routine tasks, AI is able to automate routine and repetitive tasks, freeing up time for project managers for more strategic and creative aspects of management. In resource optimization, artificial intelligence helps optimize the use of resources, increasing efficiency and reducing costs. In the process of communications, intelligent communication systems contribute to the improvement of interaction between team members and stakeholders. In decision support, artificial intelligence provides project managers with the tools to quickly analyze the situation and make effective decisions based on data.

3. Results and Discussions

3.1. SWOT analysis of augmented competence in IT project management. A SWOT analysis of enhanced compe-

tence in IT project management shows that the use of AI can significantly increase the company's efficiency, productivity and competitiveness (Table 1). However, the high cost of implementation, technical limitations, and potential ethical and regulatory challenges must be taken into account in order to succeed. By leveraging strengths and opportunities, companies can successfully integrate AI into their processes, minimizing risks and maximizing benefits.

While conducting IT project audits, the following challenges of implementing artificial intelligence were identified, shown in Fig. 2.

Table 1

SWOT analysis of augmented competence in IT project management

Strengths	Opportunities
1. Increased efficiency Using AI to analyze and automate routine tasks allows managers to focus on strategic aspects of project management. *2. More reasonable decisions* AI's analytical capabilities provide deep data analysis and forecasting to help make more informed decisions. *3. Optimization of resources* AI helps to optimally allocate resources, reducing costs and increasing team productivity. *4. Improvement of communications* Intelligent communication systems facilitate better interaction between team members and stakeholders, increasing overall coordination. *5. Reduction of risks* Through forecasting and data analysis, AI allows better identification and minimization of risks, which increases the overall safety of the project	*1. Innovative products and services* The use of AI opens up new opportunities for creating innovative products and services, which can become a competitive advantage in the market. *2. Expansion of markets* Thanks to optimization and increased efficiency, the company can expand its activities to new markets and segments. *3. Improving customer satisfaction* More accurate forecasting of customer needs and adaptation of services to these needs increase the level of customer satisfaction. *4. Increasing competitiveness* The use of advanced management technologies allows the company to stay ahead of competitors by offering higher quality and effective solutions. *5. Management of complex projects* AI helps manage complex projects more efficiently by providing better coordination and control over all aspects of the project
Weaknesses	**Threats**
1. High initial costs Implementation of AI technologies requires significant financial investment in development, implementation and training of personnel. *2. Dependence on data quality* The effectiveness of AI strongly depends on the quality and volume of available data. Insufficient or unreliable data can lead to incorrect predictions and decisions. *3. Complexity of integration* Integrating AI into existing processes can be complex and require significant effort from the IT department and management. *4. Technical limitations* AI technologies still have limitations that can affect the accuracy and reliability of the results obtained. *5. Change of organizational culture* The implementation of AI requires changes in the organization's culture and ways of working, which can be met with resistance from the staff	*1. Competition* Competitors may also introduce advanced technologies, which reduces uniqueness and competitive advantage. *2. Regulatory changes* The implementation of new technologies may face regulatory restrictions and data security and privacy requirements. *3. Technological risks* Technological failures and cyber-attacks can significantly affect the operation of AI systems and the overall security of the project. *4. Ethical issues* The use of AI raises ethical questions about privacy, transparency and fairness in decision-making. *5. Economic instability* Economic fluctuations and volatility may affect investments in new technologies and a company's ability to innovate

The principle of enhanced competence in the management of IT projects in the environment of artificial intelligence provides companies with significant advantages. This makes it possible to increase the efficiency, accuracy and adaptability of management processes. At the same time, for successful implementation, it is necessary to take into account potential challenges and be ready for changes in the structure and culture of the company.

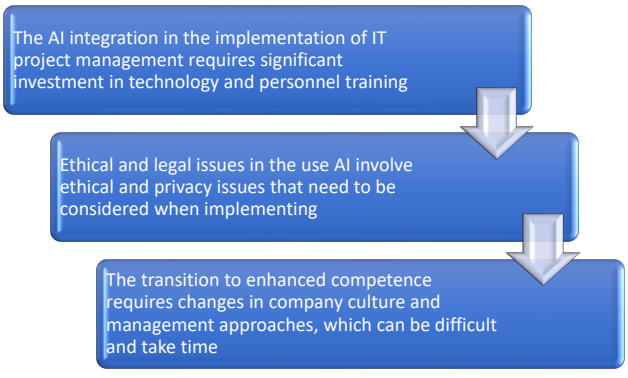

Fig. 2. Challenges of implementing artificial intelligence

3.2. Model of augmented Agile competence in IT project management. The Agile Augmented Competency (ACA) model is a theoretical framework that integrates artificial intelligence (AI) into syncretic project management methodologies to improve project outcomes. It seeks to overcome the limitations of traditional agile approaches by using AI capabilities to complement human expertise, enabling teams to more effectively manage complex IT projects.

Developing a model for increasing the competence of artificial intelligence (AI) in IT project management requires a multifaceted approach that takes into account various factors and their interaction.

The development begins with the definition of key competencies [10, 11].

The fragment of main competencies required for effective audit of IT projects are listed in Table 2.

Table 2

Application Key Competency Indicators product content audit. Assessment case

Name of group and KCI	Benchmark	Assessment
1. Content quality	7	6
Relevance. The ability of the AI to generate content that is relevant to the topic and audience	7	5
Accuracy. The accuracy of the information presented in the generated content	7	6
Creativity. The ability of the AI to generate original and innovative content	7	8
Coherence. The logical flow and structure of the generated content	7	5
2. Efficiency and productivity	6.66	5.66
Speed. The time it takes the AI to generate content compared to human creators	6	5
Scalability. The ability of the AI to handle large volumes of content generation	7	6
Cost-Effectiveness. The cost savings associated with using AI for content creation	7	6
3. User experience	7	7
Usability. The ease of use of the AI content creation tool	7	8
Customization. The ability to customize the AI's output to meet specific requirements	7	8
Integration. The ease of integrating the AI tool into existing workflows	7	5
4. Ethical considerations	6.33	5.33
Bias. The absence of bias in the generated content	7	6
Plagiarism. The originality of the generated content	6	5
Misinformation. The accuracy and reliability of the information presented	6	5
5. Specific to AI-powered content creation	6.33	6.33
Natural language understanding. The AI's ability to understand and interpret natural language prompts and inputs	7	6
Domain expertise. The AI's knowledge and understanding of specific domains or industries	7	6
Adaptability. The AI's ability to learn and adapt to new information and trends	6	7

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Assessment case done for muster education program «Artificial intelligence. Cognitive technology». This program implemented in Kiev national university of construction and architecture. Assessment done group of 2 assessors. Proposed checklist has 10 tables. In each table assessors team define benchmark and make interview, check documents, facility etc. In assessment process applying key competency indicator approach.

At the next stage, the quantitative assessment of the AI contribution to the processes of IT project management is determined. AI will increase each competence defined in Table 2. A scale of 1–10 is used.

3.3. Audit of IT projects in the environment of artificial intelligence. The audit of IT projects using artificial intelligence has its own peculiarities related to the unique characteristics and risks inherent in artificial intelligence systems. Let's consider a step-by-step IT project audit scheme.

Step 1. Assessment of goals and expectations.

It is evaluated how clearly and within the limits of SMART the goals and expectations of the project related to the AI use are formulated. At the same time, it is necessary to make sure that the goals of the AI project are consistent with the overall strategic goals of the organization.

Step 2. Analysis of risks and ethical considerations.

Potential risks associated with the AI use in the project, such as bias, discrimination, security and data privacy issues, should be identified and assessed. As a result, a risk mitigation plan is developed to minimize negative consequences. At the same time, it is necessary to take into account the ethical aspects of the AI use, such as transparency, accountability and responsibility.

Step 3. Assessment of effectiveness and suitability of AI systems.

In this step, it is necessary to ensure that the AI systems used in the project meet the stated goals, requirements, accuracy, reliability and overall performance. It is important to analyses whether AI systems are properly integrated with other components of the IT infrastructure.

Step 4. Data management and security.

In the audit process, it is necessary to ensure that the data used for training and operation of AI systems are of high quality, representative and ethically collected. It is important to evaluate the security measures taken to protect data from unauthorized access, use and disclosure. At this step, compliance with all data protection laws and regulations is analyzed.

Step 5. Control and management.

At this step, the clarity of the distribution of roles and responsibilities for the management and control of AI systems is assessed. It is important to ensure that there is a clear process for monitoring, evaluating the performance of AI systems, plans for upgrading, maintaining and potentially decommissioning AI systems.

Step 6. Impact on people and the organization.

The audit process assesses the impact of AI implementation on employees' workplaces, skills and work processes, develops a support and training plan to help employees adapt to AI-related changes, and assesses the overall impact of AI on culture and organizational structure.

Step 7. Documentation and reporting.

In this audit step, it is necessary to ensure that all aspects of the AI project are clearly documented, including objectives, risks, methods, results and conclusions, and a clear reporting plan is developed to inform stakeholders about the progress of the project and its results.

To audit IT projects in the AI environment, such tools and methods as surveys and interviews, documentation analysis, testing and evaluation were used [10, 11].

The practical impact of augmented competency in IT project auditing is significant. By leveraging AI, auditors can enhance their efficiency, improve the quality of their work, and contribute to better governance and risk management. It is important to note that the successful implementation of augmented competency will require careful consideration of the challenges and limitations involved, as well as a commitment to ongoing training and development.

Research restrictions are limitations or constraints that can affect the conduct and scope of a research project. These restrictions arise from various sources, including ethical considerations, legal requirements, resource constraints, and practical challenges.

The war in Ukraine has had a profound influence on various aspects of life, both within Ukraine and globally:

1. Economic impact.

Inflation: The war has led to a surge in energy and food prices, contributing to inflation worldwide.

Supply chain disruptions: Disruptions in Ukrainian grain exports and other commodities have affected global supply chains and increased food insecurity in many countries.

Economic downturn: The war has caused economic downturns in Ukraine and neighboring countries, leading to job losses and poverty.

2. Humanitarian crisis.

Displacement: Millions of Ukrainians have been forced to flee their homes, becoming internally displaced or refugees in other countries.

Civilian casualties: The war has resulted in a significant number of civilian deaths and injuries.

Destruction of Infrastructure: The conflict has destroyed critical infrastructure, including homes, hospitals, and schools.

3. Geopolitical implications.

Realignment of alliances: The war has led to a strengthening of Western alliances and a renewed focus on European security.

Increased military spending: Countries have increased their military spending in response to the perceived threat posed by Russia.

Energy dependence: The war has highlighted the risks of dependence on Russian energy and prompted efforts to diversify energy sources.

4. Environmental impact.

Destruction of ecosystems: The war has caused damage to ecosystems, including forests, wetlands, and agricultural lands.

Pollution: Military activities have led to pollution from weapons, fuel, and other contaminants.

5. Cultural and social impact.

Loss of cultural heritage: The war has resulted in the destruction of cultural heritage sites, including museums, churches, and historical monuments.

Trauma and mental health issues: The war has caused widespread trauma and mental health problems among Ukrainians and others affected by the conflict.

Further research. Building on the case studies. Analyze real-world examples of AI-driven audits to identify best practices and challenges. The synergy between humans and artificial intelligence (AI) is reshaping various industries,

from healthcare to business. This collaboration isn't merely a combination of skills but a new form of intelligence, where human intuition and creativity complement AI's computational power and accuracy.

4. Conclusions

The SWOT analysis showed that the added competence that uses the capabilities of artificial intelligence (AI) in the management of IT projects has significant advantages. Key strengths include increased efficiency, more informed decisions, resource optimization, improved communications and reduced risk. The integration of AI allows project managers to focus on strategic aspects of management, improving overall productivity and quality of project execution.

At the same time, the SWOT analysis also revealed weaknesses in the use of additional competence. These include high initial implementation costs, dependence on data quality, complexity of integration, technical limitations, and the need for changes in organizational culture. The AI implementation requires significant financial and human resources, as well as the company's readiness to adapt new approaches and technologies.

Analysis of opportunities shows that the use of additional competence opens wide prospects for companies. The AI implementation can contribute to the development of innovative products and services, the expansion of markets, improved customer satisfaction and increased competitiveness. In addition, AI helps manage complex projects more efficiently by providing better coordination and control.

However, there are also threats that can affect the success of AI implementation. These are high competition, regulatory changes, technological risks, ethical issues and economic instability. Companies need to be prepared to meet these challenges by implementing appropriate strategies to minimize risks and protect their investments in new technologies.

A SWOT analysis of enhanced competence in IT project management shows that the use of AI has significant potential to improve the efficiency and competitiveness of companies. Key benefits include improved decision-making, resource optimization, increased productivity and reduced risk. However, high initial costs, complexity of integration, and potential ethical and regulatory challenges must be considered for successful implementation. Companies that are ready to invest in AI and adapt new approaches will be able to make the most of its opportunities and gain competitive advantages in the market.

Conflict of interest

The authors declare that they have no conflict of interest about this research, whether financial, personal, authorship or otherwise, that could affect the study and its results presented in this paper.

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Data availability

The manuscript has no associated data.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the presented work.

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