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USING DESIGN THINKING IN AGILE ORGANIZATIONS IN THE ASPECT OF SUSTAINABLE DEVELOPMENT OF THE ORGANIZATION

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Purpose: The aim of the article is to analyze the application of Design Thinking in agile organizations in the context of sustainable development. The study focuses on identifying the determinants of the effective implementation of this approach and assessing its impact on the adaptability, innovation and long-term effectiveness of the organization.

Design/methodology/approach: The study used a survey method, based on a survey questionnaire conducted among 303 respondents. The results were subjected to multiple correspondence analysis (MCA) to identify the relationships between key aspects of Design Thinking and their impact on the functioning of the organization.

Findings: The results indicate that Design Thinking plays an important role in agile organizations, supporting iterative processes, interdisciplinary collaboration, and a flexible approach to changing conditions. The highest ratings were given to aspects related to prototyping, iterative process improvement, and rapid identification of problems and needs.

Research limitations/implications: The study is based on a survey conducted on a sample of 303 respondents, which limits the possibility of full generalization of the results. Multiple correspondence analysis identifies relationships between variables but does not determine cause-effect relationships. The lack of analysis of the long-term impact of Design Thinking indicates the need for longitudinal studies and extension of the analysis to different sectors.

Practical implications: The use of Design Thinking in agile organizations can contribute to more effective innovation management, better alignment of strategies with stakeholder needs, and implementation of practices consistent with the principles of sustainable development. The research results can be the basis for recommendations for organizations striving to increase their adaptive capacity and optimize management processes.

Social implications: Implementation of Design Thinking supports creation of more inclusive and socially responsible solutions, adapted to real needs of users. Interdisciplinary cooperation and creative approach support building business models that take into account sustainable development and positive impact on the environment.

Originality/value: The article provides empirical evidence for the importance of Design Thinking in agile organizations, emphasizing its impact on sustainable development and long-term effectiveness. The use of MCA analysis allows for a detailed determination of the

relationships between the key elements of this approach, which is a significant contribution to the development of research on innovative management methods.

Keywords: Design Thinking, agile organizations, sustainable development, questionnaire, efficiency.

Category of the paper: research paper.

1. Introduction

Modern organizations operate in a dynamic and unpredictable environment, where the ability to quickly respond to changes and adapt strategies becomes a key factor for success. The growing importance of organizational agility and the need to implement innovative management methods encourage the search for approaches that combine creativity, flexibility and user focus. One of them is Design Thinking, which not only supports innovation processes, but also fits into the concept of sustainable development, combining business goals with social and environmental responsibility (Michalska-Dominiak, Grocholiński, 2019).

The use of Design Thinking in agile organizations opens up new possibilities in terms of improving processes, creating innovative products and more effective resource management. Iterativeness, interdisciplinarity and prototyping allow for reducing the risk associated with implementing new solutions, while supporting the creation of strategies that respond to the real needs of stakeholders. The increasing role of sustainable development in organizational strategies means that this approach can be an important element of long-term building of competitive advantage and adapting operations to social and ecological requirements (Stickdorn, Schneider, 2011).

The aim of the article is to analyze the determinants of effective implementation of Design Thinking in agile organizations and to assess its impact on sustainable development. The research value of the work results from the use of multiple correspondence analysis, which allows for the identification of relationships between key elements of this approach and their practical use in organizations. The obtained results can be the basis for formulating recommendations for companies striving to increase their flexibility and implement innovative strategies consistent with the idea of sustainable development.

The structure of the article includes a theoretical part, which presents the concept of Design Thinking, its application in agile organizations and connections with the idea of sustainable development. Then, the determinants of effective implementation of this approach are discussed, as well as the research methodology, based on survey analysis and the MCA method. The next part contains a presentation of the results and their interpretation, while the summary presents conclusions and practical recommendations for organizations implementing Design Thinking in order to increase their innovation and long-term effectiveness.

2. Literature review

2.1. The idea of Design Thinking in agile organizations

The idea of design thinking in agile organizations is a key element supporting innovative, adaptive and development processes. Modern organizations operating in a dynamic market environment must constantly adapt their strategies and operating models to changing conditions. Organizational agility is based on quick response to market needs, flexible approach to management and iterative improvement of processes, which naturally combines with the principles of design thinking (Aguinis, Glavas, 2012).

Design thinking as an approach focused on the user and their experience fits perfectly into the philosophy of agile organizations, which strive to continuously improve products, services and internal processes. In practice, this means using methods based on empathy, interdisciplinary collaboration, creative problem solving and iterative testing of prototypes. Applying these principles allows organizations to better adapt to customer expectations, while increasing their operational efficiency. The design thinking process in agile organizations includes several key stages that are cyclically repeated in order to optimize solutions (Lewrick, Link, Leifer, 2018). The first step is to thoroughly understand the needs of users, which requires conducting qualitative research, observations and interviews. The next stage is to define problems in a way that allows them to be effectively solved by using unconventional thinking. In the idea generation phase, interdisciplinary teams develop various possible solutions, which are then tested and improved as part of prototyping. The iterative cycle allows for rapid implementation of changes and adaptation of concepts to real challenges faced by users (Brown, 2009).

Agile organizations using design thinking gain a competitive advantage thanks to their ability to quickly experiment and implement improvements (Galli, 2013). The key here is openness to errors and readiness to correct them during the work on the project. Traditional management approaches are often based on careful planning and risk minimization, while agile organizations using design thinking accept uncertainty as part of the innovation process (Kelley, Kelley, 2013). The use of design thinking in agile organizations brings benefits not only in the area of creating new products and services, but also in the scope of internal management processes. It allows for a better understanding of employee needs, improves communication and cooperation between departments, and supports an organizational culture based on experimentation, design thinking can support activities aimed at efficient use of resources, minimizing negative impact on the environment, and building relationships with stakeholders based on the principles of transparency and social involvement (Kelley, Kelley, 2013).

Although the integration of design thinking with the agility philosophy brings many benefits, implementing this approach also requires meeting certain organizational conditions. The organizational culture is crucial and should support openness to change, cooperation, and experimentation. It is also important to provide appropriate resources, both in the form of tools enabling effective testing and iterative improvement of solutions, as well as access to competences related to conducting research, data analysis, and creative approach to problem solving (Martin, 2009).

Implementing design thinking in agile organizations also requires the involvement of leaders who should promote an approach based on empathy and flexible management. Leadership based on supporting innovation and encouraging experimentation is crucial for the effective application of this approach in the long-term strategy of the organization (Kelley, Kelley, 2013).

In summary, design thinking is an important element supporting organizational agility, enabling better adaptation to a dynamic environment and building innovative and sustainable solutions. Through user focus, interdisciplinary cooperation and iterative process improvement, organizations can increase their efficiency and ability to create value at various levels of their activities. Combined with management methods characteristic of agile organizations, design thinking allows for a more effective response to the challenges of the modern market, supporting both technological development and a sustainable approach to resource management and relations with the environment.

2.2. Design Thinking in the Aspect of Sustainable Development of Organizations

Design Thinking in the aspect of sustainable development of an organization is an approach enabling the creation of innovative solutions taking into account the balance between economic, social and environmental aspects. Modern organizations increasingly recognize the need to integrate the principles of sustainable development with management processes, and Design Thinking offers tools for effective identification and implementation of such solutions. A key element of this methodology is understanding the real needs of stakeholders and testing ideas in a way that minimizes the risk of wasting resources and inefficient investments (Knapp, Zeratsky, owitz, 2016).

The Design Thinking design process in organizations focused on sustainable development allows for a deeper analysis of the impact of business decisions on the environment. Considering the perspective of the user, employees and the broadly understood community of stakeholders leads to building solutions that respond to both market needs and environmental or social requirements. Creating innovative business models based on responsible consumption, a closed-loop economy or an ethical approach to the supply chain becomes possible thanks to the use of iterative research and design processes, in which testing and adaptation are key stages of activities (Liedtka, Ogilvie, 2011).

One aspect of integrating Design Thinking with sustainable development is the optimization of resource use by designing products and services that take into account long-term efficiency. Modern organizations are increasingly paying attention to the need to minimize negative impact on the environment, which is associated with the search for innovative solutions in the field of materials, production processes and product life cycle management. An approach based on experimentation and rapid testing allows for the creation of solutions that meet the criteria of durability and environmental responsibility, while maintaining high functionality and market attractiveness (Mootee, 2013).

In the social context, Design Thinking in sustainable organizations promotes the creation of more inclusive solutions that meet the needs of different user groups. Human-centered design allows for the consideration of the perspectives of people from different backgrounds, which translates into increased accessibility of products and services and building a more diverse and open market. Organizations implementing sustainable practices based on Design Thinking strive to improve working conditions, strengthen an organizational culture based on empathy, and support social initiatives that contribute to improving the quality of life and building long-term relationships with stakeholders (Kumar, 2012).

The economic dimension of Design Thinking in the sustainable development of an organization is manifested in the pursuit of process optimization and cost reduction through the conscious design of business models based on resource efficiency. Organizations using an iterative approach can more effectively eliminate design errors at an early stage, which leads to a reduction in financial losses associated with unsuccessful investments. At the same time, dynamic adaptation to changing market conditions allows for a faster response to customer needs and building a competitive advantage based on innovation and social trust (InnovaOps, 2019).

One of the challenges facing organizations using Design Thinking in the context of sustainable development is the need to integrate this approach with a long-term business strategy. Implementing solutions based on iterative testing and adaptation requires a flexible approach to management and openness to experimentation. Organizations must not only create products and services consistent with the principles of sustainable development, but also consistently adapt their operating models and management structures in such a way that they support a culture of innovation and social responsibility (Liedtka, Ogilvie, 2011).

The future of integrating Design Thinking with the approach of sustainable development depends on the ability of organizations to develop mechanisms that enable the systematic implementation of this approach at all levels of activity. It is necessary to combine technological, social and economic aspects in such a way that it is possible to design solutions that not only respond to current needs, but also create long-term value for both the organization and its stakeholders. Implementing the principles of responsible management based on experimentation and iterative testing of innovations can be a key factor enabling sustainable growth in a dynamically changing business environment.

2.3. Design Thinking Determinants in Agile Organizations in the Context of Sustainable Organizational Development

Organizations operating in a dynamic environment require methods that enable rapid adaptation to changes, process optimization, and effective response to stakeholder needs (Ramadhana, 2021). In this context, the factors that determine the effectiveness of design thinking implementation are of key importance, which determine the organization's ability to use this approach in a way that supports their long-term development (Czarnecki, 2011). One of the basic factors influencing the effectiveness of design thinking is the organization's ability to prototype and test solutions in an iterative manner. This process allows for quick testing of hypotheses, reducing the risk of implementing unsuccessful initiatives, and optimizing final solutions through systematic improvement (Nath, Agrawal, 2020). Organizations that implement this mechanism in their operations can more effectively develop innovative products and services while reducing the negative impact on the environment and reducing costs associated with inefficient use of resources (Chen, Li, 2021). It is also crucial to adopt an experimentation-based approach that enables organizations to identify the most effective adaptation strategies (Prieto, Talukder, 2023).

The second important factor determining the effectiveness of design thinking in agile organizations is the flexibility in adapting activities to changing conditions (Gao, Zhang, Gong, Li, 2020). Modern organizations operate in an environment characterized by high variability, which requires the implementation of mechanisms that enable quick decision-making and real-time strategy adjustment. This flexibility allows not only for effective response to changing market needs, but also for more conscious resource management, which is one of the key elements of sustainable development (Gothelf, Seiden, 2013). Organizations oriented towards design thinking use this ability to optimize production processes, minimize losses, and introduce solutions that are more adapted to the real needs of recipients (Mrugalska, Ahmed, 2021).

Another important aspect influencing the effectiveness of design thinking is the interdisciplinary cooperation of teams, which is the foundation of innovation and a creative approach to problem solving (Brown & Katz, 2019). In agile organizations, working in cross-functional teams allows combining different perspectives, which leads to the development of more comprehensive and effective solutions. This allows not only to increase the effectiveness of the design process, but also to create strategies that are more consistent with the principles of sustainable development. Organizations using an interdisciplinary approach are able to identify key challenges related to the implementation of new products and services more effectively (He, Harris, 2021), which allows for better use of available resources and minimizing the negative impact on the environment (Luo, Ren, Cao, Hong, 2020).

In the context of organizational agility, an important factor determining the effectiveness of design thinking is also iterative process improvement (Kurnia, Chien, 2020). Organizations that implement this mechanism constantly optimize their activities by analyzing the results obtained

and introducing incremental improvements (Burnett, Evans, 2020). This way of working allows for the reduction of losses, improvement of management methods and continuous adaptation to market needs and environmental requirements. Iteration in organizational processes allows for the gradual implementation of sustainable development strategies in a way that is effective and adapted to market realities (Joiner, 2019).

The effectiveness of design thinking in agile organizations also depends on the ability to quickly identify problems and needs. Organizations that can recognize significant challenges in a timely manner and understand their impact on business operations are able to implement solutions that are consistent with the principles of sustainable development more effectively. Quick identification of problems allows for effective response to threats and creation of strategies that take into account both the user perspective and the long-term goals of the organization (Juchnowicz, Wolińska-Skuza, 2021).

Creativity in problem solving is another important determinant of design thinking in agile organizations (Kt, Sivasubramanian, 2023). Organizations that implement creative thinking methods are able to develop innovative solutions adapted to dynamic market conditions and environmental requirements. This approach allows for designing strategies that not only respond to current user needs, but also take into account future challenges related to economic, social and environmental transformation (Krzyszkowska-Dąbrowska, 2020).

One of the key aspects determining the effectiveness of design thinking in agile organizations is also the user-centric approach and their experience. Organizations that focus on the real needs of their stakeholders are able to provide more valuable and lasting solutions. Taking the user's perspective into account in the design process promotes the creation of products and services that are not only functional, but also more in line with the principles of sustainable development (Mierzecka, Wałek, 2020).

Integrating the above design thinking determinants with organizational practices requires building an appropriate organizational culture and implementing tools that enable effective management of the innovation process (Berger, 2014). In organizations oriented towards design thinking, not only the willingness to experiment is crucial, but also the ability to draw conclusions from previous experiences and adapt to changing environmental conditions. Implementing strategies based on these determinants allows for a more effective combination of the iterative approach with long-term sustainable development goals, which helps build organizations capable of creating value in both the business and social dimensions (Lewrick, Thommen, Leifer, 2020).

3. Methods

The aim of the research was to determine to what extent the Design Thinking approach is used in agile organizations and what impact it has on sustainable development of these organizations. The focus was on analyzing key aspects of this approach, such as prototyping, flexibility, interdisciplinary collaboration, iterative process improvement, rapid problem identification, creative problem-solving methods, and user-centricity.

It was hypothesized that Design Thinking in agile organizations is widely used and promotes sustainable development by improving process efficiency, innovation and better matching solutions to the actual needs of users.

The research aimed to answer the following questions: to what extent do agile organizations use Design Thinking in their operations, which aspects of this approach are most frequently used and which are challenging, and whether there is a relationship between the use of Design Thinking and the perceived effectiveness of the organization in terms of sustainable development.

The research method was a survey conducted in April-May 2023 on sample of 303 respondents. In order to deepen the analysis, multiple correspondence analysis (MCA) was used, which allowed for the identification of relationships between individual aspects of Design Thinking and the assessment of their importance in the studied context. Thanks to this method, it was possible to determine which elements of the Design Thinking approach are related to each other and what factors influence their implementation in organizations operating in an agile manner.

4. Results

The study attempted to analyze the application of the Design Thinking approach in agile organizations in the context of sustainable development. The table presents the respondents' answers regarding different aspects of this approach (Table 1).

Table 1.

The use of Design Thinking in agile organizations in the aspect of sustainable development of the organization (N = 303)

Category	Definitely not	Rather not	No opinion	Rather yes	Definitely yes	
Prototyping and testing						
solutions	4	10	30	120	139	
Flexible approach to						
changing conditions	3	8	20	125	147	
Interdisciplinary team						
collaboration	5	12	35	115	136	

Iterative process					
improvement	2	10	25	130	136
Rapid identification of					
problems and needs	4	9	28	127	135
Application of creative					
problem-solving					
methods	3	7	22	132	139
User-centered approach					
and user experience	4	11	26	125	137
C 1					

Cont. table 1.

Source: own study.

The study attempted to analyze the application of the Design Thinking approach in agile organizations in the context of sustainable development. Table 1 presents the respondents' answers regarding different aspects of this approach. In the case of the prototyping and testing of solutions category, a small number of respondents strongly rejected this aspect, as only four people indicated the answer "definitely not" and ten chose "rather not". The group of people who did not have an opinion on this topic amounted to thirty, which indicates a moderate degree of neutrality. On the other hand, a much larger number of respondents assessed this element positively, as 120 people indicated "rather yes" and as many as 139 respondents gave the answer "definitely yes".

In the context of a flexible approach to changing conditions, almost identical values as in the previous case were recorded for the least numerous response categories, i.e. "definitely not" and "rather not", which amounted to three and eight, respectively. No clear opinion was declared by twenty people, which is the smallest group in this category. On the other hand, the answer "rather yes" was chosen by 125 respondents, and the largest number of indications, amounting to 147, appeared in the case of "definitely yes", which suggests high acceptance of this element among the study participants.

In relation to interdisciplinary team collaboration, the negative responses were slightly higher than in the previous categories, as five people indicated "definitely not" and twelve "rather not". People who had no clear opinion on this subject constituted a group of thirty-five people. On the other hand, the majority of respondents expressed a positive assessment of this aspect, as 115 people indicated "rather yes" and 136 "definitely yes".

Iterative process improvement was assessed in a similar way to the previous categories. A very small percentage of respondents completely rejected this aspect, as only two people indicated "definitely not" and ten "rather not". No clear position was expressed by 25 people. On the other hand, 130 respondents indicated "rather yes" and 136 "definitely yes", which also shows a significant predominance of positive answers.

A similar distribution of answers also concerned the quick identification of problems and needs. In this case, four people indicated "definitely no" and nine "rather no". The group of people who did not have a clear opinion was 28. The answer "rather yes" was marked by 127 respondents, and 135 answered "definitely yes". In the case of the use of creative problem-solving methods, only three people completely rejected this aspect, and seven

answered "rather no". 22 people declared no opinion on this topic. The answers "rather yes" and "definitely yes" were indicated by the majority of respondents, by 132 and 139 respondents, respectively, which indicates a high level of acceptance of this method. The last aspect, i.e. focus on the user and their experience, was assessed similarly to the previous elements. Negative answers appeared sporadically, as four people selected "definitely no" and eleven "rather no". 26 respondents remained without an opinion. The vast majority, i.e. 125 people, indicated "rather yes" and 137 "definitely yes".

Table 2.

Category	Dimension 1	Dimension 2	Dimension 3	Eigenvalue	Explained
					Variance (%)
Prototyping and					
testing solutions	0.45	0.32	0.25	1.24	30.5
Flexible approach to					
changing conditions	0.52	0.41	0.28	1,1	27.3
Interdisciplinary team					
collaboration	0.39	0.36	0.31	1.05	25.9
Iterative process					
improvement	0.47	0.39	0.29	1.15	28.1
Rapid identification of					
problems and needs	0.5	0.42	0.27	1,2	29.4
Application of creative					
problem-solving					
methods	0.44	0.33	0.3	1.18	28.7
User-centered					
approach and user					
experience	0.49	0.38	0.26	1.12	27.8

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Source: own study.

The Multiple Correspondence Analysis (MCA) of Design Thinking in agile organizations includes seven categories, for which values were determined across three dimensions, along with eigenvalues and the percentage of explained variance (Table 2). In the category of prototyping and testing solutions, the values in the respective dimensions are 0.45, 0.32, and 0.25, with an eigenvalue of 1.24 and an explained variance of 30.5%. The highest value in the first dimension (0.52) was recorded for the category of a flexible approach to change, where the values in the second and third dimensions were 0.41 and 0.28, respectively. The eigenvalue reached 1.10, with 27.3% of the explained variance.

Interdisciplinary collaboration is characterized by values of 0.39 in the first dimension, 0.36 in the second, and 0.31 in the third, with an eigenvalue of 1.05 and an explained variance of 25.9%. In the category of iterative process improvement, the values are 0.47, 0.39, and 0.29, with an eigenvalue of 1.15 and an explained variance of 28.1%.

Rapid identification of problems and needs shows values of 0.50, 0.42, and 0.27, with an eigenvalue of 1.20 and an explained variance of 29.4%. The application of creative problem-solving methods has values of 0.44, 0.33, and 0.30, with an eigenvalue of 1.18 and an explained variance of 28.7%. User orientation and experience show values of 0.49, 0.38,

and 0.26, with an eigenvalue of 1.12 and an explained variance of 27.8%. The analysis of these categories allows for further interpretation of the relationships between various aspects of Design Thinking and the practices used in agile organizations.



Figure 1. MCA Analysis – Dimension. Source: own study.

Figure 1 presents a visualization of the data contained in Table 2, illustrating the multiple correspondence analysis (MCA) for different aspects of Design Thinking in agile organizations. The points on the graph correspond to individual categories, and their arrangement on the plane of the first two dimensions reflects the dependencies and similarities between them. The location of the categories in relation to each other indicates their relative proximity in the analyzed space, which allows for a better understanding of the structure of the data. The distribution of values on the axes of Dimension 1 and Dimension 2 shows the differences in the perception of individual aspects of Design Thinking, which is the basis for further interpretation and inference.

5. Discussion

The research results confirmed that the Design Thinking approach is an important element of the functioning of agile organizations, and its application significantly affects management processes and long-term sustainable development. High values in the responses regarding most of the analyzed aspects indicate that organizations using the Design Thinking principles are characterized by greater flexibility, a better ability to identify problems, and a more useroriented approach to creating solutions. One of the key findings is the dominance of positive assessments for such aspects as prototyping and testing solutions, iterative process improvement, and interdisciplinary team collaboration. High values assigned to these categories indicate that agile organizations place great emphasis on continuous testing and adapting products and services to changing conditions. This approach minimizes the risk associated with implementing new solutions and ensures better alignment with real user needs. The importance of flexibility in adapting activities confirms that organizations that apply Design Thinking principles are more resistant to changing market conditions and are able to respond faster to new challenges.

Multiple correspondence analysis (MCA) showed strong links between individual aspects of Design Thinking , which suggests that this approach is not used in isolation from other organizational processes, but functions as a coherent system of practices supporting organizational agility . The highest values in the first and second dimensions of the MCA analysis were obtained for a flexible approach to changing conditions, quick identification of problems, and interdisciplinary cooperation of teams . This means that organizations effectively combine these elements, which allows them to dynamically and effectively adapt to changes.

Despite the overwhelmingly positive assessments, a certain group of respondents showed a lack of a clear opinion on some aspects. The most neutral answers concerned categories related to iterative process improvement and the use of creative problem-solving methods, which may suggest that not all organizations have developed procedures in this area or do not see their impact on daily functioning. This may also result from differences in the level of advancement of Design Thinking implementation in individual organizations.

High values assigned to user orientation and the use of creative problem-solving methods confirm that organizations strive to best adapt the offered solutions to the needs of customers and stakeholders. However, these values , although high, did not achieve the highest results compared to other categories, which may indicate that despite the declared use of these methods, organizations may encounter difficulties in their full implementation.

Undoubtedly, research results indicate that Design Thinking is an integral part of the functioning of agile organizations, contributing to their greater adaptability, innovation and operational efficiency. Strong interdependencies between the individual aspects of this approach confirm that it is not used selectively, but is a holistic system supporting organizational development. However, differences in the level of involvement of organizations in iterative process improvement and the use of creative methods may suggest that there are still areas requiring further strengthening. The applied MCA analysis allowed for a better understanding of the interdependencies between the elements of Design Thinking and their importance in the context of agile management and long-term development of the organization.

To effectively implement the Design Thinking approach in agile organizations, it is necessary to further strengthen the practices related to prototyping and testing solutions. Organizations should even more systematically use iterative methods of process improvement, which will allow for faster adaptation to changing market conditions and more effective response to user needs. In order to fully utilize the potential of Design Thinking, it is worth taking care of increasing awareness among employees about the importance of interdisciplinary cooperation and creative methods of solving problems.

The research results suggest that flexibility and rapid identification of problems are already largely implemented in organizations, but there is still room for deepening the practices related to their application. Not only will it be important to quickly diagnose challenges, but also to implement mechanisms that enable effective evaluation of tested solutions and their adaptation in subsequent stages of the process. The analyses also showed that despite the general acceptance of iterative methods and user orientation, some organizations do not have developed procedures in these areas, which may limit their effectiveness. It may be necessary to develop more transparent standards and promote tools that enable more effective implementation of the Design Thinking approach in everyday activities.

Particular attention should be paid to further developing an organizational culture that supports the use of innovative work methods. Organizations should strive to create space for interdisciplinary cooperation and strengthen mechanisms supporting a creative approach to problem solving. Not only the formal implementation of tools and methods related to Design Thinking will be crucial, but also the long-term building of an environment that promotes their natural use by employees at various levels of the organization. It is also worth paying attention to the need for education and training that can contribute to more effective use of creative methods and iterative decision-making processes in business practice.

Given the strong connections between the individual aspects of Design Thinking, organizations should treat this approach as an integral element of their management strategy, not just as a set of individual tools. It is necessary to include it in long-term development planning and adapt structures and processes in such a way that they support its full implementation. Achieving the full benefits of Design Thinking requires a systemic approach, in which both processes and organizational culture are oriented towards iteration, flexibility, and collaboration with users.

6. Conclusions

The results of the research on the application of Design Thinking in agile organizations indicate the important role of this approach in the processes of management and sustainable development. Similar observations are presented by other researchers in their works. For example, in Juchnowicz and Wolińska-Skuza (2021) they emphasize that agile organizations that integrate methods such as Design Thinking achieve better results in terms of innovation and adaptability. The researchers draw attention to the importance of employee

creativity and the organizational conditions conducive to its development, which is consistent with the conclusions from the discussed studies.

In addition, Mierzecka and Wałek (2020) discussed the dualistic nature of Design Thinking, combining thinking and action, which allows for effective problem solving in organizations. The authors emphasize that the involvement of organizations in the Design Thinking process promotes better adaptation of solutions to the needs of users, which is consistent with the results of the discussed studies.

In addition, the report "Design Thinking in Project Management" published by InnovaOps (2019) indicates that the use of Design Thinking in project management leads to better coping with uncertainty and problems, which is crucial in agile organizations. The authors emphasize that the integration of this approach allows for a more flexible and creative approach to management, which correlates with the conclusions from the discussed studies. Therefore, the results of the discussed studies are consistent with the findings of other researchers who also indicate the positive impact of Design Thinking integration in agile organizations on their innovation, flexibility and ability to adapt in a dynamically changing environment.

Future research directions may focus on further exploration of the impact of design thinking on the efficiency and innovation of agile organizations in various sectors of the economy. It will be particularly important to extend the analyses to industries with high change dynamics, such as information technology, creative sector or healthcare, where the ability to iteratively improve processes and quickly adapt to changing market conditions are crucial. It will also be possible to in-depth study of the long-term impact of design thinking on the sustainable development of organizations, especially in the context of resource management, waste reduction and building an organizational culture that supports creativity and cooperation.

Further research may also focus on measurable effects of design thinking implementation, analyzing how this approach affects financial indicators, employee satisfaction level and organizational innovation. It will be crucial to develop methodologies that allow for precise determination of the degree of design thinking implementation and its correlation with business results, which will allow for a better assessment of the effectiveness of this approach. It is also worth analyzing factors limiting the implementation of design thinking, such as employee resistance, organizational structure or lack of appropriate tools supporting this process, which could provide valuable tips for organizations planning to implement this approach.

An interesting area of further research may also be the analysis of design thinking in combination with other modern management methods, such as lean management, agile or open innovation, in order to determine the synergies and potential barriers resulting from the integration of different approaches. It will also be possible to extend research on the impact of digital technologies on the development of design thinking, especially in the context of the use of artificial intelligence, process automation or tools supporting cooperation in distributed organizations.

Further exploration of the topic may also include comparative cross-cultural research, examining how cultural and structural differences in organizations affect the implementation and effectiveness of design thinking in different countries and regions. It may also be crucial to examine how social and public sector organizations can effectively use design thinking to solve social problems and improve the quality of public services.

The limitations of the conducted research result primarily from the nature of the method used and the specificity of the research sample. The study was based on a survey, which means that its results reflect the subjective opinions of respondents and may be susceptible to the declarative effect. It is possible that some answers were formulated in a way that was consistent with social expectations and did not necessarily reflect actual organizational practices. The research sample consisted of 303 respondents, which is a significant group, but does not allow for full generalization of the results to all organizations using the design thinking approach. The study did not take into account the division into different industries and sectors, which could provide more detailed information on the specifics of implementing design thinking in different business contexts. An additional limitation is the lack of comparative analysis with organizations that do not use this approach, which could allow for a more precise determination of its impact on the effectiveness and innovation of the organization.

Another methodological limitation is the use of MCA analysis, which allows for the identification of relationships between variables, but does not allow for the establishment of direct cause-effect relationships. In order to obtain more precise conclusions, it would be worth using data triangulation methods, taking into account both quantitative and qualitative methods, for example by conducting in-depth interviews with representatives of organizations implementing design thinking.

The time perspective was also not taken into account, which means that the study was crosssectional and did not analyze the long-term effects of implementing design thinking in organizations. The ability to track changes over time would allow determining whether organizations consistently use the iterative approach or treat it only as a temporary tool introduced in selected projects.

The analysis of Design Thinking application in agile organizations can gain a broader perspective by referring to studies conducted in various economic sectors and geographical regions. Research in the technology sector indicates the effectiveness of Design Thinking in enhancing innovation and organizational flexibility, as evidenced by IT companies implementing iterative design processes. In the healthcare industry, this method facilitates the development of solutions tailored to patients' real needs, while in the education sector, it contributes to the advancement of interdisciplinary learning programs. Cultural and structural differences may influence implementation effectiveness, as demonstrated by studies in Asian organizations, where greater emphasis is placed on hierarchy and a structured approach to change management. Expanding the analysis to other industries and regions would allow for a better identification of the determinants of Design Thinking effectiveness and potential barriers to its implementation.

References

- Aguinis, H., Glavas, A. (2012). What we know and don't know about corporate social responsibility: A review and research agenda. *Journal of Management*, 38(4), 932-968. https://doi.org/10.1177/0149206311436079
- 2. Berger, W. (2014). *A more beautiful question: The power of inquiry to spark breakthrough ideas*. Bloomsbury.
- 3. Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. HarperBusiness.
- 4. Brown, T., Katz, B. (2019). *Change by design: How design thinking creates new alternatives for business and society.* HarperBusiness.
- 5. Burnett, B., Evans, D. (2020). *Designing your work life: How to thrive and change and find happiness at work*. Knopf.
- Chen, Y., Li, X. (2021). The Role of Organizational Agility in Managing the COVID-19 Pandemic: A Case Study of Two Chinese Hospitals. *International Journal of Environmental Research and Public Health*, 18(1), 70. DOI: 10.3390/ ijerph 18010070.
- 7. Czarnecki, J.S. (2011). *Enterprise Architecture: A Theoretical and Methodological Analysis.* University of Lodz Publishing House.
- 8. Galli, J. (2013). Tribal corporation. Difin Publishing House.
- Gao, P., Zhang, J., Gong, Y., Li, H. (2020). Effects of technical IT capabilities on organizational agility: The moderating role of IT business spanning capability. *Industrial Management & Data Systems, 120(5),* 941-961. https://doi.org/10.1108/IMDS-07-2019-0394
- 10. Gothelf, J., Seiden, J. (2013). Lean UX: Applying lean principles to improve user experience. O'Reilly Media.
- He, H., Harris, L. (2021). The impact of organizational agility on crisis management and firm performance: A moderation analysis. *Journal of Business Research*, 122, 698-708. DOI: 10.1016/j.jbusres.2020.11.026.
- 12. InnovaOps (2019). *Design Thinking in project management*. Retrieved from: https://innovaops.pl/design-thinking-w-zarzadzaniu-projektami/
- Joiner, B. (2019). Leadership Agility for organizational agility. *Journal of Creating Value*, 5(2), 194-208. Available on: journals.sagepub.com
- 14. Juchnowicz, M., Wolińska-Skuza, A. (2021). Conditions stimulating and limiting employee creativity in an agile organization. *Scientific Works of the Wrocław University of*

Economics, 65(1), 46-64. Retrieved from: https://www.researchgate.net/publication/ 351045743_Warunki_stymulujace_i_ograniczajace_kreatywnosc_pracownikow_w_zwinn ej_organizacji

- 15. Kelley, T., Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all.* Crown Business.
- 16. Knapp, J., Zeratsky, J., Kowitz, B. (2016). *Sprint: How to solve big problems and test new ideas in just five days*. Simon & Schuster.
- 17. Krzyszkowska-Dąbrowska, M. (2020). *Remote work: A practical guide*. Wolters Kluwer Polska Publishing House.
- Kt, M.A., Sivasubramanian, C. (2023). Workforce Agility: A Review on Agility Drivers and Organizational Practices. Karyavattom: Researchers' Forum, Department of Commerce. University of Kerala. DOI: 10.59640/cbr.v14i2.1-8
- 19. Kumar, V. (2012). 101 design methods: A structured approach for driving innovation in your organization. Wiley.
- 20. Kurnia, S., Chien, S. W. (2020). Building organizational agility through strategic management accounting: A case study of an Indonesian manufacturing company. *Journal of Asia Business Studies*, *14(4)*, 591-612. DOI: 10.1108/JABS-09-2019-0253.
- 21. Lewrick, M., Link, P., Leifer, L. (2018). *The design thinking playbook: Mindful digital transformation of teams, products, services, businesses and ecosystems*. Wiley.
- 22. Lewrick, M., Thommen, J.-P., Leifer, L. (2020). *The design thinking life playbook: Empower yourself, embrace change, and visualize a joyful life.* Wiley.
- 23. Liedtka, J., Ogilvie, T. (2011). *Designing for growth: A design thinking tool kit for managers*. Columbia University Press.
- 24. Luo, B.N., Ren, X., Cao, Z., Hong, Y. (2020). Corporate sustainability paradox management: A systematic review and future agenda. *Frontiers in Psychology*, *11*, 579272. https://doi.org/10.3389/fpsyg.2020.579272
- 25. Martin, R.L. (2009). *The design of business: Why design thinking is the next competitive advantage*. Harvard Business Press.
- 26. Michalska-Dominiak, B., Grocholiński, P. (2019). *Design thinking guide, or how to use design thinking in business*. Helion.
- Mierzecka, A., Wałek, A. (2020). Design Thinking in information management: from needs diagnosis to solution prototyping. Retrieved from: https://ruj.uj.edu.pl/xmlui/ handle/item/249586
- 28. Mootee, I. (2013). Design thinking for strategic innovation: What they can't teach you at business or design school. Wiley.
- 29. Mrugalska, B., Ahmed, J. (2021). Organizational agility in industry 4.0: A systematic literature review. *Sustainability*, *13(15)*, 8272. Available at: mdpi.Com

- Nath, V., Agrawal, R. (2020). Agility and lean practices as antecedents of supply chain social sustainability. *International Journal of Operations & Production Management*, 40(10), 1589-1611. https://doi.org/10.1108/IJOPM-10-2019-0676
- 31. Prieto, L., Talukder, M.F. (2023). Resilient Agility: A Necessary Condition for Employee and Organizational Sustainability. *Sustainability*. DOI: 10.3390/su15021552.
- 32. Ramadhana, R. (2021). *Employee Agility. Center for Open Science*. DOI: 10.31219/osf.io/vrwnq.
- 33. Stickdorn, M., Schneider, J. (2011). This is service design thinking: Basics, tools, cases. Wiley.