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Turinys / Contents

EDITORIAL

"Journal of Management" is periodically published applied sciences journal by Lithuanian Business College. The journal is constantly publishing articles since 2002 and has gained significant experience and international recognition. This year the journal is celebrating its 23 years anniversary. It has been well renowned by foreign scientists and number of international scholars publishing continues to increase. Currently, 41th number of the journal is released to readers. Only those articles that meet thorough requirements set by the Editorial Board are being published. Authors of these articles represent various Lithuanian and foreign countries science. From Lithuania the following institutes are represented Lithuania Business College, Vilnius University, Klaipėda University and other. The following institutes from foreign countries: Multimedia University (Malaysia), Ventspils University of Applied Sciences, Alexander Dubček University of Trenčín (Slovakia), Warsaw Management School – Graduate and Postgraduate School and other.

Editorial board of "Journal of management" seeks for published academic researches to cover different economic directions and to be relevant to different industries and countries around the world. At the same time, the focus remains on ongoing changes in various industries, human resources, and governance. Based on these criterions, articles are chosen for publication in the journal. Focusing on relevant areas of change is expected to encourage further scientific discourse and development of social science ideas.

In this issue, the variety of research reflects the journal's interdisciplinary and international orientation.

First, the article by Algirdas Giedraitis, Rasa Romerytė-Šereikienė, Arturas Petrauskas, and Dalius Kurlinkas develops and tests a Cyclical Model of Readiness for Change in the context of a waste management center. The study directly addresses one of the most pressing issues in contemporary organizations: how to manage large-scale change effectively while minimizing resistance and operational disruptions. By proposing a structured six-step model—covering problem identification, communication, motivation, readiness assessment, monitoring, and adjustment—the authors provide a concrete tool that managers can use to prepare employees for transformation. The paper highlights how systematic readiness evaluation not only ensures smoother implementation of organizational change but also fosters a culture of adaptability and continuous improvement, which is increasingly essential in rapidly evolving industries such as waste management and sustainability.

Kristína Kozová, Simona Kosáková, and Martin Šrámka present an insightful study on generational and gender dimensions of workplace satisfaction with employee benefits. Their empirical analysis of Generations X, Y, and Z reveals how demographic differences shape perceptions of fairness and adequacy in benefit systems. Generation Y emerges as most satisfied, while Generation X remains more critical—insights that are vital for employers designing inclusive and effective benefit policies. The authors also identify analytically relevant gender-related differences in satisfaction levels, underscoring the importance of tailoring HR strategies to diverse workforce expectations. This research contributes not only to academic debates on motivation and job satisfaction but also to practical policymaking, where sensitivity to demographic diversity can significantly strengthen employee engagement and organizational cohesion.

Waldemar Gajda, Hanna Górska-Warsewicz, and Kinga Podleśna conduct a comprehensive bibliometric analysis of AI-based innovation management. Their study maps the field's evolution from its formative stage to its rapid expansion in recent years, identifying eight thematic clusters that span generative AI applications, digital transformation, sustainability, open innovation, and global competitiveness. By providing a structured overview of key contributors, publication trends,

and emerging research priorities, the authors demonstrate how AI has transitioned from a supportive tool to a strategic enabler of innovation and organizational change. This paper not only advances the academic understanding of AI in management but also offers valuable guidance for practitioners seeking to navigate the opportunities and risks of digital transformation.

Together, these three studies embody the mission of the Journal of Management: to publish research that is both academically rigorous and practically relevant. They address the complexities of organizational change, the dynamics of human motivation, and the transformative power of emerging technologies - all critical issues shaping management in the 21st century.

In addition to these highlighted contributions, this issue also features comparative studies on innovation performance in the Visegrad Group, analyses of the Blue Economy in EU coastal regions, and research into the role of digitization in SME competitiveness. Collectively, these articles provide a rich and multifaceted perspective on economic, social, and technological transformations.

The Journal of Management is currently in the process of being indexed in Scopus and Web of Science, a step that will further enhance its academic reach and strengthen its role in international scholarly communication.

On behalf of the Editorial Board, we warmly invite researchers to continue contributing to the journal, sharing their insights, and engaging in collaborative knowledge-building. By doing so, we collectively advance the frontiers of management science and ensure that research continues to inform practice in meaningful ways.

However, Editorial cannot review all of the researches, therefore we encourage familiarizing with them in the Journal, which currently is under the indexing process with Scopus and WoS.

We invite scientists to actively publish in the Journal, share their research results and methodological insights. We expect for close cooperation.

Prof. Dr. (H/P) Valentinas Navickas, Editor-in-Chief

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ASSESSING READINESS FOR CHANGE IN WASTE MANAGEMENT CENTERS: A CHANGE MANAGEMENT APPROACH

Algirdas Giedraitis[1,2], Rasa Romerytė-Šereikienė[1], Arturas Petrauskas[2], Dalius Kurlinkas[2]
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Abstract
Smooth readiness for change in organizations is essential for effective change management to ensure the successful implementation of new processes and technologies. Good readiness for the implementation of changes can mitigate potential risks, avoid resistance and operational disruptions, and ensure that employees are properly prepared for change. Inadequate readiness for change costs the organization more time, financial, human, and other resources. How to ensure that significant changes in organizations are properly readinessed, implemented properly, and managed effectively is a difficult problem for every organization to solve. The research goal formulated to solve the problem is to create a Cyclical Model of Readiness for Change and verify it in a waste management center. A tool was created using theoretical scientific literature analysis and practical research methods - a Cyclical Model of readiness for change, designed to prepare employees for significant changes. A quantitative study (60 respondents) was conducted using a questionnaire. The research used the created tool for change readiness - a six-step a Cyclical Model of readiness for change. The selected steps are arranged in a logical sequence to ensure smooth problem identification, introduction to the change program, determination of readiness for change, monitoring of the process progress, communication, motivation and elimination of discrepancies at each step according to the change readiness report. The change readiness report is necessary and necessary throughout the process to compare the actual implementation stages, deadlines and resource utilization with the initial change program. The conclusions obtained provide key recommendations for changing the problematic situation in the organization. By analyzing previous experience and applying the acquired new knowledge and skills, managers can accurately identify areas for improvement in the organization, improve processes, avoid employee resistance, promote best practices and foster a culture of continuous improvement. The success of the ongoing changes in this organization will depend not only on the proper identification of problems in the readiness for change, employee encouragement and timely introduction to the program of changes planned in the organization, but also on monitoring and adjusting the progress of the readiness for change. By following this research practice, it is possible to improve the readiness for change phase to the required selected level and increase the likelihood of successful and well-implemented changes in the organization. Therefore, the readiness for change phase is essential for the successful implementation of changes, as it helps to reduce operational risks, employee resistance to change, ensure appropriate employee development, and improve communication at the individual and team levels. A properly the readiness for change phase creates better conditions for faster, smoother, and more successful implementation of significant changes. By following the practice of applying the developed model, it is possible to improve the readiness for change phase and increase the likelihood of successful and well-implemented changes in the organization.
Keywords: change management, readiness for change, the cyclical model of readiness for change.
JEL classification: M12, Q28, Q53.

Introduction

Change is an integral part of various organizations, as successful change initiatives benefit organizations (Karasvirta and Teerikangas, 2022). Change is an opportunity that needs to be anticipated, prepared for, and managed. Organizations that ignore change and the importance of managing it may not only lose their competitive positions in the market, but also fail (Bubliauskaitė, 2017). With increasing competition and a rapidly changing environment, organizations that strengthen their adaptive capabilities have the opportunity to achieve significant competitive advantages (Farida and Setiawan, 2022). In addition, customers are setting ever higher standards and are less forgiving of company mistakes (Von Leipzig et al., 2017). Various changes cause uncertainty and organizational faltering (Constantino et al., 2021). Whether planned or spontaneous, change takes many forms, each requiring different actions. Research shows that change problems are most often associated with change management processes (Rafferty et al., 2013; Sonenshein, 2010). One of the main factors why some changes are successful and others are unsuccessful is readiness for change (Wang et al., (2020). Successful implementation of change depends primarily on the readiness of all members of the organization for change (Albrecht et al. (2022); Alolabi et al., 2021; Faulks, 2021; Burnes, 2020; Stouten et al., 2018). Invernizzi and Romenti (2012) argue that sometimes changes are necessary and occur against the will of organizational members, and sometimes they are welcomed and willingly pursued. Resistance to change is considered a major reason why change attempts fail (Erwin and Garman, 2010). Employees resist change initiatives, resist uncertainty and possible outcomes if they do not recognize the need for change or do not want to deviate from the status quo because they perceive change as uncertain or risky (Bierwolf, 2019; Oreg and Berson, 2019; Stouten et al., 2018). Resistance to change cannot be avoided, it is worth understanding how to reduce its impact. And the decreasing loyalty to the organization due to frequent changes makes employees reconsider that staying in this organization is not beneficial (Reiss et al., 2019). However, if there is no change, goals will not be achieved, and companies may become economically weakened in the long run (Stark, 2022). Organizations can strengthen beliefs by readiness their employees for change and solving problems related to resistance to change (Banjongprasert, 2017). Spreparadness of employees for changes, related to implementation of ISO 9001:2015 standards is achieved

by involving all employees of the company (from the top management to production employee level) (

Roberto and Bliese (2015) argue that it is necessary to be readiness for change. It is important for all employees of the organization to understand the essence of the planned changes in theoretical and practical aspects, to accumulate knowledge and improve skills before selling significant (having a noticeable impact and importance) changes. In practice, there is no one best way to successfully achieve organizational changes. Therefore, how to ensure that readiness for change in organizations are properly prepared, implemented properly and managed effectively is a difficult problem to solve in every organization.

Object – READINESS FOR CHANGE

Purpose – to create a Cyclical Model of Readiness for Change and verify it in a waste management center.

Theoretical background

Classical organizational change management primarily involves human resource management (Stark, 2022). Change management is a process that helps a person, group or organization to change (Rothwell et al. (2019). The main goal of change management is to successfully adapt to a constantly changing business environment, reduce resistance to change and maximize the effectiveness of the organization in achieving its goals during competitive market dynamics (Okolie and Memeh, 2022). In order to manage organizational change, managerial skills are very important (Jokubauskienė, 2016), affecting the perceived effectiveness of the planned action (Vaishnavi et al., 2019). The main focus must be on the added value when products are offered to customers to meet their high expectations (Lanzerstorfer, 2022). Although the term "change" itself is easy to define as replacing the old with something new, it is extremely difficult to achieve it successfully (Singh et al., 2012). In the management literature, the word "change" is used quite widely – to describe external changes – social and political factors, changes in technologies, consumers, competitors, environmental structures, etc. (Vaičekauskytė, 2010). Change is a complex phenomenon that affects the behavior of many people, there are many obstacles to change - these can be organizational obstacles, such as status, authority, lack of support and commitments or resources, various personal motives (Gigliotti et al., 2019, Vaičekauskytė, 2010). Therefore, a significant (having a noticeable impact and importance) change is perceived when it is necessary to disrupt the existing state, introduce a new one and stabilize it to achieve final results. This process includes three states (Fig. 1): CURRENT STATE; TRANSITION STATE; FUTURE STATE.

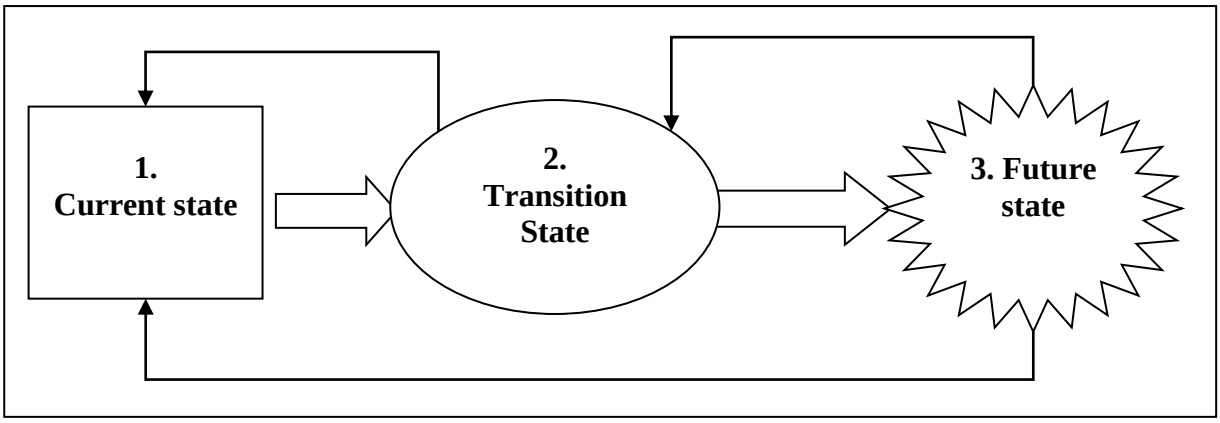

Fig. 1. Limits of the Company's

All three main states need to be understood in order to understand changes in the organization properly.

In the first state - CURRENT STATE - this is the current state of processes, systems and culture: description and diagnosis of the situation, understanding of events, setting goals for change and planning. Planned organizational changes mean conscious activities aimed at moving the organization from the current state to the desired state (Stouten et al., 2018). The created program (plans) are introduced to managers and, at the same time, employees. Even if employees know (are informed) about the upcoming changes, they may not get involved unless they see personal and/or organizational benefits. Active support from managers increases employee commitment and loyalty to the prosperity of the organization.

In the second state - TRANSITION STATE - managers must help themselves and employees change their ways of working and thinking. The purpose of these changes is to search for a new configuration of organizational components so that the organization meets the future state: generating opportunities for change, choosing the most appropriate tactics, considering what could be done. And this often leads to different behavior or doing different things. It is important that employees agree with organizational transformation (Quines and Saycon, 2023). Otherwise, uncertainty and fear can be caused among employees - who are being influenced. This process is not linear. The process is iterative, multi-stage and very dynamic.

In the third state - FUTURE STATE - in the future state, employees and managers of the organization foresee improvements in one or more areas of the organization's activities due to the introduction of changes - discussing the results of the implementation of programs (plans). This is the co-creation of the desired state. During a period of change, the future is often

uncertain and risky. Therefore, readiness for change is essential.

Having properly analyzed all three states, the organization's leaders can explain to employees the expected significant changes and their benefits. But if employees do not believe that the proposed changes have benefits, it is unlikely that they will positively assess their readiness for change.

In order to successfully carry out the activities of the organization, there is no blind pursuit of the latest trends and an attempt to adapt to them by any means, but the ability to correctly and successfully complete all steps related to the implemented changes that will lead to the required result (Ševelinskaitė, 2015). But the market is changing so quickly that long-term plans become only theoretical things that are necessary in order not to deviate from the general company policy (Ševelinskaitė, 2015). The pace of change depends on the context, nature of the organization and external events (Lozano and Barreiro-Gen, 2021; Išoraitė, 2012). Organizations with high formality are more suited to routine tasks and stable conditions, and due to their high dynamics, they cannot respond effectively to environmental changes (Jardine et al., 2022; Katsikeas et al., 2011). Fabio and Duradoni (2020) draw attention to the meaning of change: change means that more work will be required in the short term (i.e., learning and adaptation are required to adapt to new tasks). As much as possible, organizations prefer slow changes, because otherwise they would be in constant confusion (Laumenskaitė, Vasiliauskas, 2006). Slow changes are usually less resisted, because they are implemented gradually and people are more likely to accept them. However, organizations do not always "have time" for slow changes. Rapid changes, which are usually the result of a strategic initiative, cause considerable resistance even in cases where they are implemented in a rather targeted manner (Išoraitė, 2012). They are related to the implementation of a new strategy and, in particular, change the established and usual order of the organization (M. Išoraitė, 2012). Bah, Sun, Hange, and Edjoukou (2024) identified three main problems arising from organizational change: power, control, and resistance. The most common and noticeable problem that can arise when implementing change is resistance to change (Robbins & Coulter, 2021; Walk & Handy, 2018). The fact that many employees resist change makes it difficult for companies to overcome doubts arising from the fear of losing their jobs, additional tasks and responsibilities, uncertainty about how the change will affect them, and adaptation to innovations (Singh et al., 2012). When employees who will be affected do not view the change initiative favorably, they are likely to demonstrate resistance to that change (Burke, 2011). Resistance can arise from a variety of factors, including fear of uncertainty, a sense of loss of control, or concerns about negative impacts on individual responsibilities or well-being (Damawan & Azizah, 2020). K. Lewin (1951) introduced resistance as a systemic concept, suggesting that instead of trying to understand the situation by focusing on the three elements separately, we should consider them as a whole (Burnes, 2020; Cummings et al. 2016; Burnes, Cooke, 2012). Changes usually occur much earlier than they are officially announced, because most often everything starts with identifying the problem, analyzing the situation, and choosing a possible direction, and at this stage, employees are not yet involved in this process (Lee, Krayer, 2005). Resistance to change is easier to manage when the cycle is still "young" and there are many opportunities, than later, when resistance is already firmly entrenched, which is related to the maturity of groups and individuals (Lozano, 2013). Resistance to change can lead to different reactions and consequences (Lozano, 2009), including: confusion; denial; maladaptive obedience; sabotage; easy agreement; shifting from responsibilities; blaming others; silence; criticism (direct or indirect); delay; poor responsiveness to requests; unavailability; arguments about priorities in limited times and resources; making "mistakes" and doing what is ordered. All of these are the main manifestations of employee anxiety that provoke employee resistance. Resistance to change makes it difficult for companies to dispel public doubts, which arise mainly from the fear of losing their jobs (Singh et al., 2012). In addressing these issues, readiness for change reduces knowledge lag and disruption, as well as negative attitudes or passive resistance.

Therefore, these presented risks should not be seen as a necessary cause of problems, but rather as types of problems that management can largely avoid or control. Top management can help these employees to promote change, i.e., communicate them and explain their impact to employees through training or various resources (Bertsch et al., 2009). When management understands the challenges associated with the current situation, it is ready to familiarize itself with the concepts that will be used to transform the organization from the current state to the future vision. By familiarizing the management team with the key concepts of change, they can understand the challenges they will encounter during the change process and the challenges associated with the future state. Therefore, change planning allows managers to communicate the necessity of change to employees. During the planned change process, employees can understand in advance the reasons for the change and anticipate the benefits of such planned changes, which will lead to a positive attitude towards organizational change and supportive behavior (Nery et al., 2019).

In organizations, change tends to focus on achieving one of three types of outcomes: individual change, group change, or system change (Sandelands, 2010). Choi and Ruona (2011) argue that a more constructive approach is to think about an individual's readiness for change rather than their tendency to resist change. This increases employee engagement and positively impacts their perceptions of change (Faupel and Süß, 2019. Evidence suggests that the use of attribution (behavioral explanation) can influence organizational performance, decision-making, economic decisions, and learning, and can therefore be a valuable factor during organizational change (Ten Have et al., 2019). Choi (2011) notes that change will be successful and sustainable only when individuals change their work behaviors to support the change. He argues that employees must be at the center of organizational change. By providing opportunities for employee engagement, organizations can increase employee engagement and motivation, increase job

satisfaction, and strengthen management-employee relationships, thereby creating a more inclusive, collaborative, and productive work environment (Susanto et al., 2023; Caballero and Guhao, 2020). Managers need to ensure that employees perceive their fair behavior when comparing themselves to their colleagues (Ten Have et al., 2019). However, it also argues that change efforts often fail because those leading the process do not pay enough attention to the support of those who can influence the results of the change. All this means that the effectiveness of change is usually related to the participation of all employees at all levels of the organization in assessing and diagnosing the necessary changes and formulating its goals and objectives.

There are opinions that in order to overcome the reluctance to change, it is necessary to include in the management of change such developable competencies and abilities as leadership and open communication among employees. Leadership is the ability of an individual to influence, guide and inspire others to achieve specific goals (Cahyono et al., 2023). Strong leadership can create a clear vision and gain broad support from all members of the organization, turning resistance into a strong commitment to the transformation process (Steinmann et al., 2018). And proactive and visionary leadership can help organizations take the necessary actions to adapt to market changes, accelerate innovation and improve overall performance (García-Morales et al., 2012). Change management involves communicating with all members of the organization, involving employees in the change process in order to ensure their support and involvement (Errida and Lotfi, 2021). Organizations that are able to create effective communication strategies are able to clearly and convincingly convey the vision, goals, and change plans to all members of the organization (Jankelová & Joniaková, 2021). Good communication is not only an essential element but also the basis for the success of implementing change in organizations (Bucăţa & Rizescu, 2017), which includes not only transmitting accurate messages, but also ensuring good understanding by the recipients of the messages (Arjang et al., 2023). By creating a more encouraging and collaborative work atmosphere, teamwork helps to reduce the harmful psychological effects of organizational change (Ellis, Tran, Pomare, Long, Churruca, Saba, & Braithwaite, 2023). And Martono et al. (2020) pointed out that employee collaboration is very important, in which teamwork is an approach that helps the organization perform better. Also, Ellis et al. (2023) illustrated the importance of teamwork for effective organizational change, as it can improve communication, promote readiness for change, and reduce fatigue by creating a collaborative and supportive work environment. Quines and Piñero (2022) argued that teamwork fosters a sense of community, which often leads to greater positive work values, such as a sense of responsibility and ownership of the work. Therefore, each team member must be motivated and engaged. Team members will feel comfortable and autonomous when they can make decisions and disagree without external intervention. Disagreement is expected and allowed as long as the team processes it according to the norms established by the group.

Change includes anticipation, assessment, readiness to accept or initiate change, and the organization's ability to manage the impact of various changes, their positive and negative consequences (Videikienė, Šimańskienė (2013, p. 342). This means that organizational change must be more than just changes in technology or management systems, because they also require changes in culture (Lozano, 2013), in system elements (Lozano, 2020).

Often, the failure of a change intervention is due to the incompatibility between the value system of the change intervention and the members affected by the change (Burnes and Jackson, 2011). Material resources (land, budget, time, technical means, personnel, etc.) and intangible resources (management attention, brand, internal environment, employee motivation, etc.) need to be combined at each stage of change. These resources are the basis for the survival and development of an organization in creating a competitive advantage (Sadiq and Nosheen, 2020; Buckley and Graves, 2016). According to According to Edler et al. (2014), Jones (2013), Choi (2011) and Ruonos (2010), the mains key to change lies in human resources.

Organizational structures are modified for change in such a way that employees can improve their job performance, for example, moving decision-making down the organization. There is no universal organizational structure that fits every organization. Even if two organizations operate in the same business and market, and are the same size, their organizational structure may differ due to obvious differences in business goals and strategies. Rothwell (2010) indicated that the beginning of any change is when the organizational development specialist must “enter the organization, create a platform for change work with the client, and establish agreements on work, methods, relationships, and exchanges” (Rothwell, 2010). Even if the change strategy is strong, it will practically fail if people do not have the skills to prepare for the implementation of the changes. It is necessary to create conditions for preparing for a faster, smoother and more successful implementation of the changes, to unite management and employees around a common vision.

In order to ensure the smooth implementation of change in the organization and reduce employee resistance, one of the most important stages is the CHANGE READINESS STAGE. The term “readiness” refers to an orientation to the future. Herold et al. (2019) found in their study that change orientation is positively related to successful organizational change initiatives. This stage lays the foundation for success and trust.

Scholars have interpreted change readiness in various ways. Some view readiness as a combination of the psychological and behavioral readiness of organizational members to implement organizational change initiatives (Weiner et al., 2008). Change readiness is one of many factors that determine the success or failure of change initiatives. Change aspirations initiated on this basis naturally emerge in agreements and therefore encounter less resistance. Change readiness is an important driver of successful change implementation (Armenakis et al., 2007). Identifying and implementing strategies to

increase employees' readiness for change in the workplace is crucial to preparing people to embrace change in business (Peng et al., 2020; Armenakis et al., 1993). An important aspect of readiness is the ability of senior management to lead and implement change (Stouten et al., 2018). Readiness for change reflects employees' beliefs and attitudes toward change in an organization (Shea et al., 2014). As a psychological variable, readiness for change encompasses more than belief in and understanding of change; it encompasses a set of thoughts and intentions related to a specific change effort (Bernerth, 2004). This understanding is related to change and management themes such as mission, leadership, organizational culture, vision for change, and resistance to change (Ten Have et al., 2019). Employees who demonstrate higher levels of readiness tend to exhibit collaborative behaviors and efforts that facilitate effective change implementation (Alolabi et al., 2021). But employees can feel neglected or undervalued, especially if changes are expected without proper readiness.

Readiness is considered a fundamental prerequisite for implementing and managing productive change (Bateh et al., 2013). Definitions describe change readiness as a psychological rather than a structural construct (Weiner et al., 2020). Shea et al. (2014) describe change readiness as a commitment to change and the success of change, both of which are expressed in the desire or power to change, as well as a shared belief in the organization's ability to implement this change. Readiness for change is understood as a core competency that helps to cope with constantly changing external and internal conditions (Vakola, 2013, p. 103). Readiness for change is more related to a state than a personality trait (Choi, 2011) and depends on the influence of content (specific change initiative), context (environment, organizational capacity), process (change implementation), and participants (organizational members) (Holt et al., 2007). Wang et al. (2020) argue that insufficient readiness leads to unsuccessful organizational changes. The perception and application of change itself, as an ongoing process, requires that organizations explain to employees the meaning of change and its management.

An organization's readiness for change is usually also related to sustainable organizational performance (Faulks, 2021). Deteriorating performance raises questions that need to be assessed.

Assessing an organization's readiness for change is a stage-diagnostic exercise (Stouten et al., 2018). According to researchers, readiness for change emphasizes acceptance, commitment, and support for change (Soenen et al., 2017). When preparedness is properly created, it can reflect the collective determination of organizational members to commit to implementing change (Weiner, 2009). Thus, when employees are readiness, committed, and supportive of change, implementation tends to be smooth and effective (Alolabi et al., 2021). The achievement of planned changes depends on the participation of individuals at different organizational levels (Woiceshyn et al., 2020). Readiness is equally important for different types of change (Weiner et al., 2020). Therefore, planning changes during the readiness phase, involving different levels of the organization and their perspectives, could help companies better overcome resistance to change and integrate their efforts more holistically, including technological, managerial, governance, and human change.

Employee learning helps to identify policies and strategies that can facilitate the successful implementation of change (Rupcic, 2019). Most employees exhibit behaviors that are the result of learning, consciously or unconsciously, through the influence of others. In organizations, employees copy the behavior of others (e.g., their managers, colleagues, and others). Change planners can unconsciously influence organizational members to behave in a certain way by subtly praising the desired behavior or by demonstrating it themselves. This identifies change-supportive behavior as one of the key outcomes likely to emerge from individual employees' readiness for change (Kim, Hornung, & Rousseau, 2011), which they perform to actively participate in, facilitate, and contribute to planned organizationally initiated changes" (2011: 1665). As an organization experiences a period of equilibrium, interdependence between job roles, departments, processes, technologies, customers, and suppliers increases, ideologies that dictate the best way to operate become increasingly accepted, and the fear of losing the benefits associated with the status quo strengthens resistance to change.

Companies around the world, with experienced and trained employees, are looking to AI to solve many of their problems (Liu et al., 2020). AI allows for the automation of some communication, but requires explicit algorithms and monitoring (Davenport & Ronanki, 2018). AI further improves reasoning skills, the ability to understand context, improves communication and self-organization, and develops individuals' creative thinking skills (Eriksson et al., 2020).

The increased speed of digital innovation has prompted companies to start changing their organizational structure to be more flexible and innovative in order to respond quickly to market changes (Vial, 2019). For employees, digital tools provide access to information and allow them to develop knowledge-based approaches to manage various uncertainties and contingencies (Spraggon & Bodolica, 2018). Digital technologies can change people's values, expectations and needs, which in turn drives greater digital diffusion (Matt et al., 2019). As a result, digitally transformed companies that adopt flexible working arrangements and implement team and network structures can deliver positive employee outcomes (Meske and Junglas, 2020). Technology helps people understand the impact of change, the level of commitment to take, the required actions and ensure that the right technologies are deployed (Matthysen and Harris, 2018). As the capabilities of organizations do not keep pace with the rapid development of technology, it has become a challenge for organizations to promote both technological and non-technological aspects of digitalisation (Yeow et al., 2018). Information technology not only facilitates the exchange of information, but is also the key to innovation and transformation in various aspects of human life in

this digital age (Harahap, Ausat et al., 2023), using it to collect, store, process, transmit and analyze data and information (Wahyoedi et al., 2023), used for business and personal purposes, and communication networks such as the Internet, which connect devices and people around the world (Prastyaningtyas et al., 2023). It allows for the rapid storage and access of large amounts of data, real-time communication with individuals in different locations, and the automation of various business processes and administrative tasks (Sutrisno, Kuraesin et al., 2023). Therefore, Information Technology needs to be integrated into the entire process of readiness for change.

In summary, it can be stated that employees' readiness for change is determined by their personal beliefs: that changes are necessary, that they are capable of successfully implementing changes; that changes will have positive results for the work/role. Therefore, proper readiness for change in the preparatory stage can reduce or eliminate resistance to change in the organization. Videikienė and Šimańskienė (2014) identified the reasons why readiness for change can be difficult: management inflexibility; lack of initiative and resources; weak leadership of the leader; hasty, inconsistent implementation of changes; obstacles of a socio-psychological nature (psychological microclimate of employees - emotional state, collective mood, satisfaction or opposition to the current situation, interpersonal relationships; fear of change; external socio-psychological atmosphere - unsuccessful examples of other organizations, political instability); technological deficiency. And inertia can be an important obstacle to change.

Various studies have shown that how employees experience change depends on a multitude of factors, from employee-management relationships and personality traits to the level of participation in decision-making and perceptions of job security, among other factors (Amarantou et al., 2018). This means that for the change management process to be successful, employees must be informed, supported and empowered to accept and support the change. In the readiness phase, managers must focus on helping employees recognize and understand the need for change. Providing personal narratives and feedback to employees influences the extent to which they adjust their perspective-taking, which significantly reduces the level of egocentric bias they demonstrate (Damen et al., 2021). They raise awareness of the various challenges and/or problems they face and that cause dissatisfaction with the current situation. In many organizations, dissenters are marginalized, silenced or even fired, which deprives the organization of valuable, albeit unpopular, service. (Ten Have et al., 2019). Gaining support from employees who will help implement the changes can remove resistance.

The readiness for change phase is divided into separate steps with the aim of ensuring that employees better understand the information received about the planned changes and their application in practice, in order to ensure successful application at work after the readiness have been made (Fig. 2).

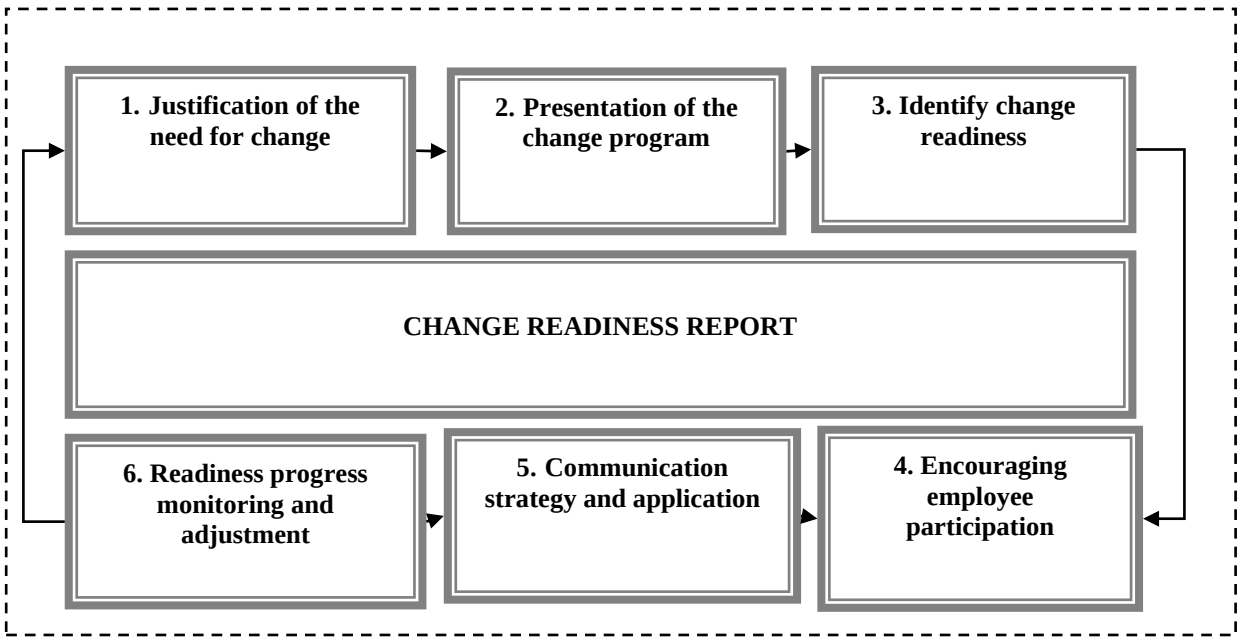

Fig. 2. Cyclical Model of Readiness for Change

The Cyclical Model of Readiness for Change includes six steps (Fig. 2), which are arranged in a logical sequence to ensure a smooth identification of problems at each step.

The first step readiness for change is JUSTIFICATION OF THE NEED FOR CHANGE. This focuses employees' attention on a meaningful perception of the changes and their understanding of the changes in the context of the processes taking place in the company. This step creates the basis for change – the development of arguments. This diagnoses the current situation related to existing and/or future problems and seeks recognition of the need for change.

The second step, PRESENTATION OF THE CHANGE PROGRAM, presents the organization's situation and its vision for the future. This step should be

broader than the presentation and focus on making the change plan understandable and relevant to employees at all levels. Announcing a specific change program for the implementation of the organization's plans guarantees that members of the organization will adapt to the new changes (Kelly et al., 2017). Change programs are presented differently to different groups - managers, engineers, employees, etc. The main reason is to avoid confusion, skepticism and resistance. Management must provide the necessary HR needs for change activities.

In the third step, IDENTIFY CHANGE READINESS. Identify skill gaps or learning needs. To assess readiness, a combination of quantitative tools and qualitative insights is needed: conduct surveys, interviews and readiness checklists. Change is prioritized by factors such as skill shortages, new technologies, safety measures, etc. Special training is offered to improve skills related to organizational change and development. When learning in the organization, employees proactively develop and strengthen their abilities and existing knowledge resources and also use such knowledge to increase organizational progress and productivity (Tan and Olaore, 2021). Learning enables an organization to understand the dynamic nature of the business environment, interact with the market, and assess important changes occurring in the business (Beus et al., 2020). Resource allocation is not just a technical issue – it reflects the organization's commitment, priorities, and strategic readiness for change. The key challenge is to understand potential resistance points and the ability to change.

In the fourth step, ENCOURAGING EMPLOYEE PARTICIPATION, management must encourage employees to embrace change in the organization. Employee attitudes toward change need to be addressed. Positive employees believe that change will have a positive impact on them and the organization as a whole (Nordin, 2011). Failure in the attempt can be attributed to the organization's failure to create a positive culture of change, which is essential to prepare the organization's stakeholders for change (Douglas et al., 2017).

The fifth step, COMMUNICATION STRATEGY AND APPLICATION, is to develop and refine a communication strategy. It is necessary to create opportunities for mutual feedback and questions. Employees may not accept changes due to their perception of their impact on the work environment (Qiao et al., 2021). It is the responsibility of management to involve employees in the change process and inform them about various changes within and outside the organization (Roos and Nilsson, 2020). Formal and informal communication is used to reduce employee resistance.

The sixth step uses READINESS PROGRESS MONITORING AND ADJUSTMENT. This step assesses the results of employees (individuals and groups) readiness for change. People change refers to "changes in the attitudes, expectations, perceptions, and behaviors of an individual or group" (Robbins et al., 2018, p. 213). Groups that balance task and relationship aspects are more likely to complete their projects on time than groups that meet only for business and no relationships (Gorse & Emmitt, 2009). This step requires greater consideration of the relationship between the ability to change and the success or failure of the change programs themselves.

The CHANGE READINESS REPORT provides data on each entity from which a structured summary of the organization's progress in preparing for change can be obtained, focusing on obtaining information about the readiness of employees, managers, systems and structures to implement the intended (planned) changes. The reports recommend changes to the initial readiness plan. The employee sentiment analysis provides their awareness, confidence, concerns, expectations, etc. The Change Readiness Report allows managers to make informed decisions about further actions, identify and manage risks before implementing changes. The report aims to ensure accountability and transparency for each participant throughout the change process.

These steps are specifically designed to prepare the human side of the organization, reduce their resistance, and ensure awareness, self-confidence, and commitment to the organization.

Ensure a smooth transition to the implementation phase To successfully move from one step to the next, organizations must focus on three key aspects of change: the structural, technological, and human resources sides of the organization. Completing each step with a tangible result increases employee commitment and understanding of the change management process, while ensuring stakeholder alignment.

While this model can be useful in helping organizational members demonstrate the desired behaviors required for change readiness, caution is warranted. For example, when assessing whether previously implemented change readiness led to desired behavioral changes in a team (or department), it is essential to accurately and impartially measure these employee behaviors in order to conduct a valid analysis. When organizational readiness is high, members are more likely to initiate change, exert more effort, demonstrate greater persistence, and cooperate more, which generally leads to more effective implementation of the proposed change (Weiner, Lewis, Linnan, 2009). Conversely, when organizational readiness is low, members are more likely to view change as undesirable and subsequently avoid or even resist planning efforts and participating in the change process. However, change planners may inadvertently direct employee behavior in a way that achieves desired outcomes, thereby impeding the validity of their analysis.

Methodology.

Considering the purpose of the study and the size of the organization, an exploratory quantitative study was chosen - a questionnaire survey.

Research instrument: questionnaire. The questionnaire was prepared after a detailed literature review and divided into 6 blocks (6 steps) according to the Cyclical Model of Readiness for Change (Figure 2): justification of the need for change; presentation of the change program; *identification of readiness; promotion of employee participation; communication strategy and application; monitoring and adjustment of the readiness process.* These blocks contain 5 statements each so that the data obtained show the current state of the

organization's change readiness. The statements are short, simple and unambiguous. And the seventh block notes the demographic data of the respondents.

Research sample: non-probability sampling - targeted group formation, which allows you to select specific groups working in the area necessary for the study.

Respondents: 60 employees of the organization. All respondents work in four main departments: administration, collection, region, service provision. Small-scale scientific research usually has several (2-5) main tasks, each of which reflects the idea of the scientific work, reveals the research aspect (Kardelis, 2017).

A quantitative study (60 respondents) was conducted at one waste management center in Lithuania. The study period was March–July 2024. The study was anonymous.

The results obtained during the study were processed using the Statistical Package for Social Sciences (SPSS-22). Descriptive statistics as an analytical process helps researchers illustrate and summarize the study.

Research Results.

According to the Cyclical Model of Readiness for Change (Figure 2), the first step JUSTIFICATION OF THE NEED FOR CHANGE helps to set realistic operational goals and define the desired results of the changes, directing time, budget and employees to where they are most needed for operational improvement. The research results obtained (Table 2) help to confirm whether the identified gaps reflect real daily challenges.

Table 1. JUSTIFICATION OF THE NEED FOR CHANGE.

Table 1. Justification of the need for change (N-60)

I. JUSTIFICATION OF THE NEED FOR CHANGE	**Administration**	**Toll Department**	**Landfill Department**	**Service Department**	**Overall Average**
1. Reasons for changes are identified	3.00	3.22	3.11	3.83	3.36
2. Technology deficiencies are revealed	3.57	3.44	**2.67**	3.5	3.3
3. Customer complaints are registered	**2.71**	3.33	3.22	3.83	3.35
4. Operational deficiencies are analyzed	2.86	**2.78**	**2.78**	3.25	**2.95**
5. Information about problems is analyzed	3.0	3.22	3.22	3.5	3.27

The worst situation is with the analysis of operational gaps - 2.95. These data reveal specific areas where current processes, technologies (tools) or behavior are not sufficiently effective. Based on the results of the gap analysis, a change readiness program is formed and readiness for these changes is identified.

In the second step, the PRESENTATION OF THE CHANGE PROGRAM. In order to successfully implement changes, it is very important to understand the relevance of the change program and its compatibility with the desired results understandable to all change participants. Inconsistency of information can lead to conflicting priorities and reduce the credibility of the change. Table 2. PRESENTATION OF THE CHANGE PROGRAM.

Table 2. Presentation of the change program (N-60)

II.PRESENTATION OF THE CHANGE PROGRAM	**Administration**	**Toll Department**	**Landfill Department**	**Service Department**	**Overall Average**
1. Every change has a plan	3.43	3.22	3.33	3.33	3.32
2.Change implementation objectives are documented	3.57	3.11	3.22	3.58	3.38
3. Change manager is known	3.14	3.44	3.0	3.67	3.35
4. An appropriate change period is planned	3.00	3.22	**2.89**	3.33	3.14
5. Change plan is aligned with the control system	**2.57**	3.67	**2.9**	3.83	3.32

According to the presented research data, Table 2 contains questions about the appropriateness of the change period (2.89). Time and budget need to be allocated according to the real progress of the changes and the expected results of the activities with the participation of employees - participants in the change process. Their participation increases the acceptance of changes and reduces resistance, because employees see that their contribution is reflected in the plan. Employees who work directly in the change process often suggest simpler, faster or more economical methods. Managers need to adapt change plans to local realities, deadlines and employee performance capabilities. Another problem in the control system that is not aligned with the change

plan: (2.57 and 2.90). Therefore, the change plan must be measurable and the expected progress tracked at any stage of implementation - it must have an appropriate structure and accountability. The progress of the changes can be measured not only in numbers but also in communication models and from the perspective of employees. In the third step, IDENTIFY CHANGE READINESS, it is necessary to learn about the readiness for change before starting any change initiative. This reveals specific areas where current processes, tools or behaviors are not effective enough.

Table 3. Identify change readiness (N-60)

III.IDENTIFY CHANGE READINESS	**Administration**	**Toll Department**	**Landfill Department**	**Service Department**	**Overall Average**
1. Methods of implementing the changes are planned	3.00	3.00	**2.70**	**2.92**	2.91
2. Qualification requirements for implementing the changes are presented	**2.57**	**2.38**	**2.53**	**2.92**	2.60
3. Learning (development) methods are determined	3.00	**2.73**	**2.63**	**2.58**	**2.56**
4. Changes in work processes are introduced	3.00	**2.33**	**2.11**	3.17	2.74
5. Changes in resource allocation are explained	3.00	**2.38**	**2.60**	**2.58**	2.64

The obtained research data revealed (Table 3) that the methods (methods) of implementing changes are not used sufficiently (2.70 and 2.92). It is necessary to ensure retraining and upgrading of qualifications of employees (2.38-2.92). Without proper training (2.56-2.73), it may be difficult for employees to use new tools (materials, tools, etc.) or comply with new requirements. The allocation of resources in the organization is not transparent and understandable (2.38-2.60). The consequences of these shortcomings in the organization can be serious - both short-term and long-term. Before starting organizational changes, it is necessary to select a variety of methods (methods) of implementing changes to adapt them to practical decisions. It is necessary to review the qualification requirements for employees so that there are no difficulties in the process of implementing changes, since without learning new skills or behavior, employees may return to their old habits. It is extremely important to make the allocation of resources transparent and understandable in any organizational change process.

The fourth step, ENCOURAGING EMPLOYEE PARTICIPATION, assesses the level of employee engagement. This is related to the human side of change – where most change initiatives either succeed or fail.

Table 4. Encouraging employee participation (N-60)

IV.ENCOURAGING EMPLOYEE PARTICIPATION	**Administration**	**Toll Department**	**Landfill Department**	**Service Department**	**Overall Average**
1. Involving employees in change planning	3.71	3.67	3.11	3.58	3.52
2. Ideas for change are encouraged	3.43	3.78	3.00	3.25	3.37
3. Monetary incentives are applied	3.14	**2.78**	**3.00**	**2.75**	**2.92**
4. Non-monetary incentives are applied	3.43	3.44	**2.78**	3.08	3.18
5. Motivation based on contribution to results	3.14	3,56	**2.89**	3.33	3.23

According to the data presented in Table 4, we see that the worst situation is due to the inappropriate application of motivational measures to implement the planned changes (2.75-3.0). Insufficient monetary incentives for the implementation of changes can cause significant organizational, psychological and performance-related problems, especially if employees expect tangible rewards for their efforts, adaptation or risk-taking. If employees do not see personal or financial benefits, they may resist new behavior or procedures - even passively. Poor or inconsistent employee motivation during changes creates many risks, the elimination of which can cost a lot of resources, especially time. Therefore, it is necessary to link performance results to measurable indicators.

Motivation achieved by employees creates trust in the changes, which helps to get better feedback and avoid misunderstandings when implementing changes.

The fifth step is to check the COMMUNICATION STRATEGY AND APPLICATION. This step builds employee trust and engagement in the changes being implemented.

Table 5. Communication strategy and application (N-60)

V.COMMUNICATION STRATEGY AND APPLICATION	Administration	Toll Department	Landfill Department	Service Department	Overall Average
1. Inform about the content of the change process	3.00	3.78	**2.89**	3.50	3.29
2. Inform about the change process in detail	3.70	3.70	3.78	**2.86**	3.51
3. Indicate interim results of the change	3.33	3.78	**2.78**	2.75	3.16
4. Employees are invited to cooperate	3.11	3.78	3.00	**2.71**	3.15
5. Respond to the lack of information	3.00	4.00	3.11	3.67	3.45

According to the data presented (Table 5), minor shortcomings in the communication strategy are visible. It is necessary to combine strategic thinking with practical implementation. Also, use recognizable language in discussions – not only company terms but also technical jargon. The goal of this effective communication strategy is to transfer information from one person to another with as little distortion as possible. Therefore, there should be no manipulation, which usually involves lies or tricks in order to agree with a certain point of view.

Step Six, MONITORING AND ADJUSTING THE PROGRESS OF READINESS, is one of the most important and relevant in this process. Monitoring the progress of employees in preparing for change – and adjusting their actions – is a structured and essential part of managing change readiness.

Table 6. Readiness progress monitoring and adjustment (N-60)

VI. READINESS PROGRESS MONITORING AND ADJUSTMENT	Administration	Toll Department	Landfill Department	Service Department	Overall Average
1. Activity change is recorded	3.14	**2.78**	**2.44**	3.25	2.90
2. Changes in abilities and skills are observed	**2.71**	**2.78**	**2.90**	3.25	2.91
3. Changes in perception are visible	3.14	**2.56**	**2.33**	**2.92**	2.73
4. Control system is in place	**2.86**	**2.67**	**2.44**	3.00	2.74
5. Program adjustment is being made	**2.71**	**2.22**	**2.44**	**2.42**	2.45

The research data (Table 6) show that this step has the most problematic questions that managers have and can answer. Managers are responsible for preparing for change and managing resistance. Preparing for change is not only technical but also emotional. Managers must organize all these activities, often in different teams (departments). Convincing employees to prepare for change aims to change their behavior, but it must be based on the weight of logic and facts, supported by trusting relationships between team members. Monitoring is most effective when there is a dialogue, and not just top-down reporting. Therefore, it is necessary to consider the different concerns and roles of change participants. Often, adjusting the actions of one department affects other departments. But constant adjustments can be unnerving for employees if they are not well explained. Therefore, managers must ensure that the implementation of changes corresponds to reality and the intended goals.

The cyclical model of preparing for change is completed by preparing a CHANGE READINESS REPORT. The report is structured - with variable indicators selected to confirm progress. The data obtained are synthesized in Table 8 which shows the discrepancies at each step (from 1 to 6) and by selected sections.

Table 7. Change readiness report (N-60)

No.	Steps according to the Model	Administration	Toll Department	Landfill Department	Service Department	Overall Average
1.	Justification of the need for change	3.03	3.20	3.00	3.58	3.20
2.	Presentation of the change program	3.14	3.33	3.07	3.55	3.27
3.	Identify change readiness	**2.95**	**2.56**	**2.51**	**2.83**	**2.71**
4.	Encouraging employee participation	3.37	3.45	**2.96**	3.20	3.25
5.	Communication strategy and application	3.22	3.81	3.11	3.10	3.31
6.	Readiness progress monitoring and adjustment	**2.91**	**2.60**	**2.51**	**2.97**	**2.75**

The data presented in the report (Table 7) shows that the most problems are in the second step - determining readiness for change (2.71) and in the sixth step - monitoring and adjusting the progress of readiness (2.75). If there are problems with employee readiness for change, this means that there is a lack of employee understanding, self-confidence, their motivation and involvement in the changes. Employees feel unprepared for change, frustrated or anxious. The organization does not define what success looks like at each stage of change. Problems related to MONITORING AND ADJUSTING THE PROGRESS OF CHANGE READINESS (2.51-2.91) often arise from an unclear management structure, insufficiently clear data or lack of management involvement. It is recommended to use simple reporting summaries or progress monitoring tools to get real-time updates. Do not forget to empower responsible managers to take responsibility for their departments, review employee roles, various systems and processes. All identified problems can be eliminated by starting the change readiness process again - from the first step until the situation reaches the desired level. Even after the change program ends, the CHANGE READINESS REPORT retains its informational value, as it becomes part of the institution's knowledge base.

Summarizing the results of this research, it can be stated that the Cyclical Model of Readiness for Change must be repeated until the situation changes and employees are ready to start implementing the changes. Each change process creates new roles and responsibilities that affect the way employees work (method). The success of the changes being implemented in this organization depends not only on the proper identification readiness for change, employee encouragement and timely information (communication strategy) about the changes planned in the organization, but also on the ability to monitor the progress of changes - changing performance achievements. Continuous employee development also requires continuous changes that need to be managed effectively. This creates a new paradigm for incorporating and coordinating organizational change.

Conclusions

Proper readiness for significant changes is intended to facilitate faster, smoother and more successful implementation of changes and to ensure that employees are properly trained and have the necessary skills to work with new knowledge, technologies and processes. Readiness for change is related to the prevailing perception of employees, their willingness to accept the proposed change efforts, taking into account their readiness to abandon old norms, qualification problems, beliefs, attitudes and behaviors. Good readiness for the implementation of changes can help mitigate potential risks, avoid operational disruptions and ensure that employees are adequately prepared for future changes. It helps to manage expectations, solve problems and inform everyone during the change process.

Readiness for change alone will not make the change successful if the organization does not have the capacity to make the change happen. The change manager must play a key role in all this activity. He or she (the manager) is responsible for the process of optimizing professional service (product) performance, thematic selection of employees and the overall communication strategy. To fully exploit this opportunity, management must have planned carefully enough in advance to clearly define the main outline of the proposals and to find answers to the main questions encountered during this preparatory phase. In addition, management must resolve any disagreements in advance so that they have a strong image when the announcement is made. In cases where there are many proposed changes, prioritize them according to their urgency, importance and relevance to strategic objectives. At the same time, consider the potential benefits, risks and dependencies associated with each change. This allows for efficient allocation of resources and ensures that critical changes are implemented promptly. Effective communication is essential for successful readiness for change. Employees need clear information about the reasons for the changes, the objectives of the change program, the expected actions and results, and the potential impact on the organization, individuals or departments. It is necessary to ensure that communication channels are open,

transparent and timely. It is essential to create a structured and well-documented change control process that defines the actions, roles, and responsibilities related to change management.

Based on the analysis of scientific literature and practical research, the Cyclical Model of Readiness for Change has been developed for preparing for significant changes. The Cyclical Model of Readiness for Change includes six steps: justification of the need for change; presentation of the change program; identification of change readiness; promotion of employee participation; communication strategy and application; monitoring and adjustment of the readiness process. All these steps are connected to a common data analysis system and a change readiness report, with the help of which the progress of change readiness is monitored and recorded. The selected steps are arranged in a logical sequence in order to smoothly identify and eliminate problems at each step to the required selected level. The change readiness report is necessary and necessary to compare the actual implementation stages, deadlines and resource use with the initial change program.

After verifying the created change readiness tool – the Cyclical Model of Readiness for Change – in a quantitative study, the research data obtained can provide key recommendations for changing the problematic situation in the organization. The goals of the change program must be justified and understandable to all employees. To identify employee readiness for change, feedback from stakeholders (participants) is analyzed and lessons learned from previous change initiatives (programs) are included. Employee motivation opportunities and a development culture in the organization should be improved - empowerment-related behavior should be reinforced with appropriate reward mechanisms. Apply a continuous improvement mindset to improve change management processes and increase their effectiveness over time. Based on the decisions and skills of managers, adjust the communication strategy, taking into account the nature of the changes and the needs of employees. Proper monitoring and documentation of activities can facilitate accountability, provide historical context, and help transfer new knowledge. It is very necessary to monitor the changes implemented under the program to assess their effectiveness and ensure the achievement of the desired results. It is essential to regularly review and analyze the results of the change process with the change participants to identify opportunities for improvement and make necessary adjustments. The change readiness report should serve as a reference for future change initiatives to avoid repeating mistakes. By analyzing past experiences and applying the new knowledge and skills acquired, managers can pinpoint areas for improvement, improve processes, avoid employee resistance, promote best practices, and foster a culture of continuous improvement.

The change readiness phase is essential for the successful implementation of change, as it helps to reduce operational risks, employee resistance to change, ensure appropriate employee development, and improve communication at the individual and team levels. By following the practice of applying the developed model, it is possible to improve the change readiness phase and increase the likelihood of successful and well-implemented changes in the organization.

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EMPLOYEE ENGAGEMENT ACROSS BORDERS: A GALLUP-BASED ANALYSIS OF GLOBAL WORKFORCE

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Abstract
Employee engagement, which concept has garnered substantial scholarly attention in recent decades and has been defined in various ways, with no single leading definition, can be basically described as an employees' emotional and cognitive connection to their work, workplace and its goals. Engaged employees fulfills their job responsibilities and actively participates in the development of the organization, feels a sense of belonging and sees meaning in their work, positively influencing organizational performance. Nowadays labor market, where uncertainty, remote work and generational diversity and competition between companies and organizations are increasing, employee engagement plays a vital role in the successful operation of organizations. Literature highlights employee engagement as one of the most important factors that positively impacts employees' work performance. The benefits from engaged employees are discovered in multiple levels - individual, organizational, customer. At the individual level, employee engagement is associated with improved work performance, as mentioned before, higher employee productivity, loyalty and retention, also employee innovative behavior, initiative and creativity. At the organizational level, engagement contributes to enhanced organizational performance, operational effectiveness and innovation. At the customer level, employee engagement drives better customer experience and satisfaction. Recent research indicates that employee engagement is not only an outcome influencing various factors and performance indicators, but also a construct shaped by multiple antecedent factors that serve to foster and sustain it human resource management practices, job satisfaction, work environment and also individual state of mind as mindfulness. The empirical part of the article about global employee engagement trends is developed by secondary data from Gallup's State of the Global Workplace report (2025). Analyzed data indicates a positive trend with periodic fluctuations during the period from 2009 to 2024, but last year has been decline in employee engagement metrics, highlighting challenges in organizational human resource management practices. Globally, only 21% of employees are engaged. The situation is particularly critical among managers, where engagement is declining, with young managers (under 35) and female managers experiencing the greatest decline. A strong trend towards a higher proportion of not engaged employees has persisted and prevailed in the analyzed period, while the engaged and actively disengaged has been in similar rates. Regional analysis reveals pronounced disparities in employee engagement levels. Within the European region, employee engagement remains at its lowest (13%), accompanied by elevated stress levels and diminished emotional well-being among employees. The data of Europe show a paradox: economically stronger countries demonstrate lower levels of employee engagement, while less developed countries or countries undergoing economic change show relatively higher levels of employee engagement. From the perspective of economic analysis in region of Europe, this distribution confirms that employee engagement does not directly depend on a country's gross domestic product or level of welfare. Conversely, the highest levels of employee engagement are observed in the US, Canada and Latin America and the Caribbean (31%), and this proportion remains relatively low in absolute terms.
Keywords: employee engagement, global workforce, human resource management, employee engagement survey, Gallup.
JEL classification: J24, M54, O15

Introduction

In the era of globalization, human resources play a crucial role in ensuring the competitiveness of organizations. It is the way in which organizations employ and engage their employees that becomes a strategic advantage that determines the ability to adapt to changing market demands, innovate and maintain sustainable growth.

The concept of employee engagement has garnered substantial scholarly attention in recent decades and has been defined in various ways, with no single leading definition.

The aim of this article is to summarize the various definitions of employee engagement, analyze it and the latest studies about the factors influencing employee engagement and the factors influenced by employee engagement, and to summarize employee engagement trends at the global and regional levels, based on secondary data from Gallup (2025), and to identify connections with the literature.

Research object of the scientific article is employee engagement. The subject of the study is global employee engagement indicators.

According to the research object and subject, the scientific article is guided by the following research questions:

1. How is the concept of employee engagement defined in academic literature?
2. What are the global employee engagement indicators?
3. How does employee engagement vary across regions?

Theoretical background

The first definition of employee engagement is developed by Kahn (1990) and published in the journal article "Psychological Conditions of Personal Engagement and Disengagement at Work" of Academy of Management, where employee engagement is defined as "…harnessing of organization member's selves to their work roles: in engagement, people employ and express themselves physically, cognitively, emotionally and mentally during role performances. Individual disengagement as the uncoupling of selves from work roles; in disengagement, people withdraw and defend themselves physically, cognitively, or

emotionally during role performances" (Kahn, 1990, 694). According to Kahn, it is a state of "psychological presence" in which employed people bring their full selves, both physically and cognitively, to their work roles and is influenced by meaningfulness (work elements), security (social elements, together with management style, process and institutional norms) and accessibility (individual distractions) (Kahn, 1990).

After Kahn other definitions of employee engagement are developed. Buckingham and Coffman added the right individuals in the right role with the right leaders drives employee engagement (Buckingham, Coffman, 1999). Maslach et al. (2001) defined employee engagement as "a persistent, positive affective-motivational state of fulfillment in employees that is characterized by vigor, dedication, and absorption". In this definition vigor refers to high levels of energy and resilience and the employee's willingness to invest effort in job, the ability to not be easily fatigued, also the persistence in the face of difficulties, meanwhile dedication refers to a strong employees involvement in work, accompanied by feelings of enthusiasm and significance, and by a sense of pride and inspiration. Within this definition, absorption refers a pleasant state of total immersion in work of employee, which is characterized by fast passage of time and an inability to detach from the task (Maslach et al., 2001). Drawing on similarities with the definition of Maslach et al. (2001), Schaufeli et al. (2002) described engagement as a positive, fulfilling, work-related state of mind characterized by energy, dedication, and immersion and conceptualize engagement as a permanent, static construct (Schaufeli et al., 2002), and it slightly differs from the concept defined by Khan (1990) of employee engagement as a changing construct. As stated by Gallup (2002), which is the only major global measure of employee engagement today, engaged workers are like a builder who time after time endeavor to offer quality when it comes to discharging their responsibilities, and there are three engagement levels: engaged workers, disengaged workers and actively disengaged workers (Gallup, 2002).

Similar to Kahn's (1990) definition, Saks (2006) stated the engagement consists of "cognitive, emotional and behavioral components that are associated with individual role performance", but Saks differentiated employee engagement as follows: 1) job engagement, which is related to performing the specific task role; 2) organizational engagement, which is related to performing the role as a member of the organization) (Saks, 2006). Fleming and Asplund (2007) explained employee engagement as employer responsibility - the capability to arrest the heads, hearts, and souls of your employees to infuse an intrinsic desire and enthusiasm for excellence (Fleming, Asplund, 2006). Czarnowsky (2008) stated that "employees who are mentally and emotionally invested in their work and in contributing to their employer's success" are defined as engaged (Czarnowsky, 2008, 6). Shuck and Wollard (2010) defined the concept of employee engagement as "an individual employee's cognitive, emotional, and behavioral state directed toward desired organizational outcomes." (Shuck, Wollard, 2010, 103). The main idea of the definition of engagement is very similar to Kahn (1990) and Saks (2006). Balakrishnan and Masthan (2013) argued that employee engagement is related to an employee's emotional and intellectual commitment to the organization. Engaged employees speak positively about their organization and strive to do more than the minimum requirements for their organization and they are more likely to be retained in the organization (Balakrishnan, Masthan, 2013). "Engaged employees are not just committed but passionate about their work" (Balakrishnan, Masthan, 2013, 2). One year later, employee engagement is defined as a positive attitude held by employees towards the organization (Bhuvanaiah, Raya, 2014). In a recent report, Gallup (2025) stated that "employee engagement reflects the involvement and enthusiasm of employees in their work and workplace" (Gallup, 2025, 138). According to Gallup, the engagement state can be achieved when employees' basic needs are met and they have the opportunity to contribute at workplace, learn and grow and have a sense of belonging (Gallup, 2025).

Summarizing these definitions, the employee engagement is most often associated with positive state of mind (Maslach et al., 2001; Schaufeli et al., 2002) and disposition (Balakrishnan, Masthan, 2013; Bhuvanaiah, Raya, 2014) towards the organization, enthusiasm (Maslach et al., 2001; Fleming, Asplund, 2006; Gallup, 2025) and involvement in work (Maslach et al., 2001; Gallup, 2025), cognitive contribution (Kahn, 1990; Saks, 2006; Shuck, Wollard, 2010), and also mental (Kahn, 1990; Czarnowsky, 2008), which includes both intellectual (Balakrishnan, Masthan, 2013) and emotional (Kahn, 1990; Saks, 2006; Czarnowsky, 2008; Shuck, Wollard, 2010; Balakrishnan, Masthan, 2013) input to the workplace.

Drawing upon the reviewed definitions, employee engagement can be described as employees' positive attitude, interest and enthusiasm to invest individual resources as time, energy and abilities in their workplace.

Numerous studies have demonstrated a growing scholarly interest in the topic of employee engagement from 90's to nowadays. In recent years, employee engagement and it's role, impact, influential factors, correlation with other aspects has been studied in various sectors: banking (Nguyen, 2021; Zeeshan et al., 2021; Abdullahi et al., 2022; Ahmad et al., 2022; Lee et al., 2022; Ngobeni et al., 2022; Mandira, 2023; Alzoraiki, 2024; Bešić et al., 2025; Hamid et al., 2025; Thomas et al., 2025), education (Bailey, 2022; Ooi et al., 2022; Shirina et al., 2022; Agyei et al., 2023; Nguyen, Ha, 2023; Davis, Southey, 2024; Gede, Huluka, 2024; Mehta, Kaur, 2024; Tiwari et al., 2024; Akanmu et al., 2025; Alenezi et al., 2025), manufacturing (Siswanto et al., 2021; Hurtienne et al., 2022; Zahoor et al., 2022; Abeje, Luo, 2023; Burawat, 2023; Ghani et al., 2023; Kumprang, Suriyankietkaew, 2024; Tortorella, 2024); hospitality (Bhardwaj, Kalia, 2021; Hassanein, Özgit, 2022; Liu et al., 2022; Arwab et al., 2023; Rabiul et al., 2023; Naveed, Qamar Zia, 2024), healthcare (Quek et al., 2021; Scott et al., 2022;

Giallouros et al., 2024; Jose et al., 2024; Kwarteng et al., 2024) and others.

In the above-mentioned studies, employee engagement is analyzed in the context of communication (Nguyen et al., 2023), job satisfaction (Hamid et al., 2025), leadership style (Giallouros et al., 2024**;** Quek et al., 2021; Zeeshan et al., 2021), employee performance (Alenezi et al., 2025; Naveed, Qamar Zia, 2024; Arwab et al., 2023; Abdullahi et al, 2022; Bhardwaj, Kalia, 2021; Siswanto et al., 2021), employee loyalty (Nguyen, 2021; Nguyen et al., 2023), motivation (Siswanto et al., 2021), talent management (Zahoor, 2022; Hassanein, Özgit, 2022), job resources (Giallouros et al., 2024; Naveed, Qamar, 2024), human resource management practices (Ooi et al., 2022; Rabiul et al., 2023; Jose et al., 2024) and other factors.

The findings of the latest studies suggested that employee engagement is positively influenced by human resource management practices directly (Jose et al., 2024; Ooi et al., 2022) or indirectly (Rabiul et al., 2023). Furthermore, other studies highlight the importance of specific human resource management functions in promoting employee engagement - strategic recruitment and hiring practices (Alzoraiki, 2024) and training opportunities and financial rewards (Akanmu et al., 2025).

According to studies, the employee engagement is positively influenced by employee job satisfaction (Hamid et al., 2025; Shirina et al., 2022), leadership factors (Giallouros et al., 2024; Liu et al., 2022; Shirina et al., 2022), as servant leadership (Zeeshan et al., 2021) and distributed leadership in other study (Quek et al., 2021), internal communication (Nguyen, Ha, 2023), workplaces corporate social responsibility (Ahmad et al., 2022), organizational support (Mehta, Kaur, 2024), collaborative work environment (Hurtienne et al., 2022; Shirina et al., 2022), whereas other study added that supportive work environment reduces employee disengagement (Mehta, Kaur, 2024).

Other study noted that important role has a psychological contract (Ngobeni et al., 2022), that represents the mutual beliefs, perceptions, expectations and informal obligations between an employer and an employee (Saurombe, Barkhuizen, 2020).

The empirical study in the banking sector in Bosnia and Herzegovina (2025) showed that banks strengthened employee engagement through fostering community and leveraging their company culture through care provision and communication by keeping their employees informed (Bešić et al., 2025), and other analyzed study of 306 Cambodian bank employees and 37 direct supervisors showed the importance of competitive psychological climate paired with contingent reward, that encourages exploratory learning, which boosts employee engagement (Lee et al., 2022).

There are employee's engagement influenceable internal individual factors found, as individual conscientiousness (Mandira, 2023) and cultivation of mindfulness (Kumprang, Suriyankietkaew, 2024). One of the studies showed that an individual's perception of rewards and recognition, distributive justice and procedural justice significantly affected employee engagement (Liu et al., 2022).

Prior studies provide strong evidence that the employee engagement positive impact to performance – firstly, employee work performance (Akanmu et al., 2025; Jindain, Gilitwala, 2024; Hendrik et al., 2021; Obuobisa-Darko, 2020; Liu et al., 2022; Mustaqim et al., 2022), also specific contextual performace (Bhardwaj, Kalia, 2021), secondly, organizational performance directly (Gede, Huluka, 2024; Liu et al., 2022) and indirectly through employee performance (Mustaqim et al., 2022). The latest studies highlighted that employee engagement promotes innovation directly **(**Deepalakshmi et al., 2024; Shkurti, Mustafa, 2024; Ghani et al., 2023), innovational employee behavior directly (Alateeg, Alhammadi, 2024**;** Amin et al., 2024; Ghani et al., 2023), indirectly (Lee at al., 2024), through mediation of human capital (Ali Ababneh, 2025) and supervisor's practices (recognition, empowerment and development) (Almazrouei, Hilmi, 2024).

Also, employee engagement has a positive influence on productivity (Celestin et al., 2024; Deepalakshmi et al., 2024; Kwarteng et al., 2024; Abdelwahed et al., 2023; Abdulrahman et al., 2022**;** Vogel et al., 2022), loyalty (Hamid et al., 2025; Nguyen, Ha, 2023) and retention (Hamid et al., 2025; Deepalakshmi et al., 2024). Other research results showed that employee engagement is positively related to employee initiative (Hassanein, Özgit, 2022) and creativity (Gonlepa et al., 2023; Joo et al., 2022), whereas it plays a mediating role in the relationship between organizational engagement and creativity (Kang et al., 2021). Specific studies founded employee engagement influence on operational effectiveness (Juma et al., 2022; Zahoor et al., 2022), customers experience (Hassanein, Özgit, 2022) and their satisfaction (Alabi et al., 2024; Deepalakshmi et al., 2024; Kwaya, Yang, 2022).

In summary, employee engagement is shaped by a range of factors who can directly or indirectly affect it, furthermore, the level of employee engagement can be contingent upon the employee's sociodemographic profile.

At the same time, employee engagement exerted positive effects at multiple levels - individual, organizational, customer. At the individual level, employee engagement is associated with improved work performance, higher employee productivity, loyalty and retention, also employee innovative behavior, initiative and creativity. At the organizational level, engagement contributes to enhanced organizational performance, operational effectiveness and innovation. Finally, at the customer level, engagement has been linked to better customer experience and satisfaction.

Recent scientific publications lack comprehensive global data analyses that substantiates the novelty of the present study.

Research methodology

The theoretical part of the study synthesizes insights from 74 scientific articles. The empirical study is based on secondary data, and sufficient information has been provided to ensure transparency. The data is conducted by Gallup, the largest global measure of employee engagement, published on the report "State of the Global Workplace. Understanding Employees, Informing Leaders" (2025), and ensure both academic rigor and practical relevance. Gallup identifies three levels of employee engagement: 1) engaged; 2) not engaged; 3) actively disengaged (see Table 1).

Table 1. Employee engagement levels by Gallup

Engagement level	Explanation
engaged	- employees are highly involved and enthusiastic about their work and workplace. Psychologically acts as an owner, drives performance, innovation and fosters organizational development.
not engaged	- employees are psychologically unattached to their work and company. As their engagement needs are not fully met, they are doing work duties by investing time, not passion and energy.
actively disengaged	- unhappy and resentful employees, because their needs are not being met, acting out their unhappiness and influence others. They "potentially undermine what their engaged coworkers accomplish" (Gallup, 2025, 138).

The relationship between the results of the study and employee engagement level is measurable through 12 basic statements, known as Gallup's Q12, developed by Gallup scientists, based on more than 30 years of accumulated quantitative and qualitative research (Harter et al., 2024).

The Gallup's Q12 survey begins with general question (0) about overall satisfaction at work - How satisfied are you with your company as a place to work? Respondents provide their rating on a 5-point scale, where 5 means extremely satisfied and 1 means extremely dissatisfied. Following the response to the general question, the survey statements are presented:

1. I know what is expected of me at work.
2. I have the materials and equipment I need to do my work right.
3. At work, I have the opportunity to do what I do best every day.
4. In the last seven days, I have received recognition or praise for doing good work.
5. My supervisor, or someone at work, seems to care about me as a person.
6. There is someone at work who encourages my development.
7. At work, my opinions seem to count.
8. The mission or purpose of my company makes me feel my job is important.
9. My associates or fellow employees are committed to doing quality work.
10. I have a best friend at work.
11. In the last six months, someone at work has talked to me about my progress.
12. This last year, I have had opportunities at work to learn and grow.

In the survey respondents rate the Q12 statements using six response options, from 5 = strongly agree to 1 = strongly disagree, and the sixth response option — don't know/does not apply — is unscored (Gallup, 2025).

According to Gallup (2025), the total number of global employed respondents included in the full trend of data for this report (2009 through 2024) is 5,490,517; for the 2024 data, the total is 227,347. 2024 data included in this report were obtained from April 2024 to December 2024. Typically, the number of respondents is 1,000 in each country or area using a standard set of core questions. These questions are translated into the respective country's major languages (Gallup, 2025)

Results

Secondary data from Gallup shows a positive trend – percentage of engagement employees globally has increased from 12% in 2009 to 21% in 2024 (see Fig. 1). There was a slow increase in the period from 2009 to 2012, while there was a gradual and sustained growth from 2012 to 2019. There was a sharp decline in 2020, which could be related to external economic factors (e.g. the Covid-19 crisis), followed by a recovery in 2021–2023 and the indicators returned to a higher level (23%). However, a slight decline is observed again in 2024. Overall, the data dynamics can be described as an upward long-term trend with periodic fluctuations.

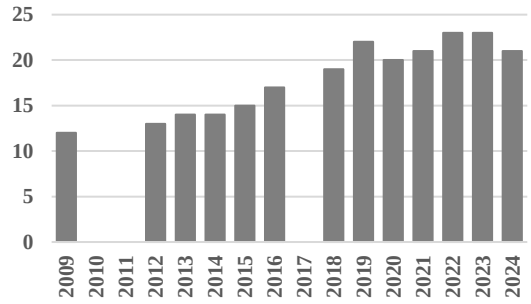

Fig. 1. Engaged employees (%): Global data by Gallup

Analyzing the structure of employee engagement levels, it is identified that the proportion of disengaged employees fluctuates over time in a relatively narrow range — 61% in 2009, the peak - 68% (2014), the lowest point - 59% (2022). The last two years the proportion of disengaged employees is 62%. The proportion of actively disengaged employees has decreased from 27% in 2009 to 15% in 2023, but in 2024 it increased to 17%, which indicates a slight reversal. Overall, there is a convergence of proportions, where the polarization between engaged and actively disengaged has decreased. A strong proportional trend of disengaged employees persisted and dominated during the period (See Fig. 2).

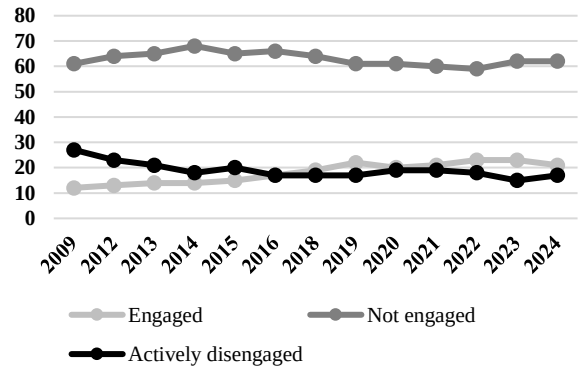

Fig. 2. Trends of the employee engagement level proportions (%): Global data by Gallup

Regional data of employee engagement shows that the highest levels of employee engagement (31%) are in United States and Canada, Latin America and Carrabean. The lowest levels of employee engagement are found in Europe (13%) and the Middle East and North Africa (14%). These figures potentially indicate deeper challenges in the workplace and human resource management practices, such a limited employee autonomy or insufficient recognition for work that requires improvement, also a low trust in management. The data both highlighted regional differences and the necessity for contextually tailored approaches to foster employee engagement.

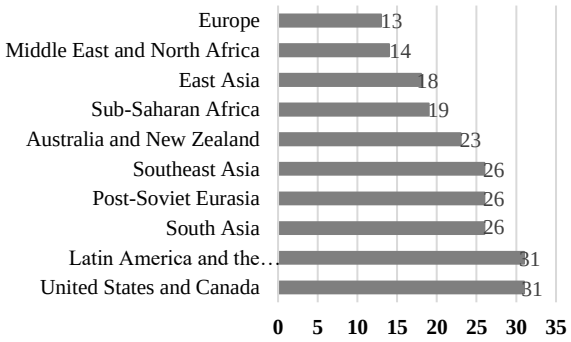

Fig. 3. Engaged employees (%): Regional data by Gallup

Analyzing the indicators (see Table 2) of engaged employees in European countries, it is identified in countries with relatively lower income levels and experience of transformation economies, such as Romania (35%), Albania (29%) and Kosovo (25%), the level of employee engagement is higher than in many more economically developed countries. This trend can potentially be explained by the relatively greater motivation of employees to maintain employment.

Meanwhile, in Western European countries, where the labor market is mature and employee rights are strengthened, employee engagement is significantly lower. For example, in Germany and Italy it reaches only 10%, and in the United Kingdom – 9%. In this context, there is a potential for a “saturation effect”, that is, the higher level of well-being and quality of life of employees has reduced engagement.

The Baltic countries deserve special attention. In Estonia, the level of employee engagement reaches 24%, in Latvia – 22%, while in Lithuania - 19%. These indicators exceed the level of several Western European countries, which can be interpreted as a consequence of the active transformation of the labor market, in which employees still have the motivation to prove their relevance and adapt to changing economic conditions.

Overall, the data show a paradoxical situation: economically stronger countries demonstrate lower levels of employee engagement, while less developed countries or countries undergoing economic change show relatively higher levels of employee engagement. From the perspective of economic analysis, this distribution confirms that employee engagement does not directly depend on a country's gross domestic product or level of welfare.

Europe is the region with the lowest employee engagement rate; however, eight countries (Romania, Albania, Kosovo, Sweden, Iceland, Estonia, Malta, Latvia) exceeded the global average, and Romania (35%) exceeded the highest regional rates (31%) - of the United States, Canada, Latin America, and the Caribbean employees.

Table 2. Engaged employees: Europe data by Gallup

Country	%	Country	%	Country	%
Romania	35	Portugal	18	Germany	10
Albania	29	Cyprus	17	Italy	10
Kosovo	25	Bosnia and Herzegovina	17	Belgium	10
Sweden	24	Slovenia	17	United Kingdom	9
Iceland	24	Bulgaria	17	Austria	9
Estonia	24	Serbia	16	Ireland	9
Malta	22	Montenegro	16	Spain	9
Latvia	22	Czech Republic	16	Luxemburg	8
Norway	21	Netherlands	15	Poland	8
Denmark	21	Finland	14	France	8
Hungary	20	Northern Cyprus	14	Switzerland	8
North Macedonia	20	Slovakia	13	Croatia	7
Lithuania	19	Greece	12		

According to Gallup's 2025 State of the Global Workplace report, the situation is particularly critical among managers - employee engagement level is declining, with the biggest declines being seen among young managers (under 35) and female managers. From 2023 to 2024, engagement among young managers (under 35) has decreased by five percentage points; engagement

among female managers has decreased by seven percentage points. Gallup and reviewed literature highlight the importance of leadership and its influence on employee engagement, indicating the risk of a snowball effect affecting the subordinate employee engagement level.

According to Gallup estimates, global employee engagement declined last year, costing the global economy $438 billion in lost productivity (Gallup, 2025), which confirms that employee engagement influences productivity, as mentioned in the section of literature review (Celestin et al., 2024; Deepalakshmi et al., 2024; Kwarteng et al., 2024; Abdelwahed et al., 2023; Abdulrahman et al., 2022**;** Vogel et al., 2022).

Conclusions

During the period from 2009 to 2024, the most substantial proportion each year has been made up of not engaged employees, who are not psychologically attached to their job and company, while the proportion of engaged and actively disengaged employees has been similar.

The proportion of globally engaged employees is low almost a fifth (21%) of employees have been engaged in 2024, and the indicator has decreased by 2 percentage points over the year.

Assessing regional indicators, the top regions with the highest indicators in 2024 - USA, Canada, Latin America and the Caribbean - have a less than a third (31%).

These data indicate the need to implement human resource management practices focused on promotion of employee engagement, as literature and Gallup empirical studies confirm its importance in individual and institutional levels, that potentially influences the rates nationally, regionally and globally.

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ALIGNING ESG, SDGS, AND FIRM PERFORMANCE: LESSONS FROM PRACTICE

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Abstract

Sustainability has become a defining element of contemporary business agendas, with governments, investors, and consumers increasingly demanding that organizations contribute to solving global challenges. Yet, despite the prominence of sustainability discourse and the adoption of international frameworks such as the United Nations Sustainable Development Goals (SDGs), progress remains alarmingly slow. As of 2023, none of the 17 SDGs have been fully achieved globally, underscoring the persistent gap between ambitious global commitments and their practical realization at the organizational level. Firms are therefore confronted with the dual challenge of aligning with international sustainability imperatives while simultaneously addressing pressing issues such as resource scarcity, the need for innovation, and the management of human capital. This article seeks to examine how sustainability principles are concretely translated into firm-level strategies and practices, focusing on the adoption of sustainability frameworks, the measurement of outcomes, and the implications for both organizational performance and long-term competitiveness.

The study employs a twofold methodological approach: a systematic literature review to synthesize theoretical perspectives and empirical findings across diverse contexts, and expert interviews with representatives of the tourism and hospitality industry, a sector uniquely exposed to environmental, social, and economic pressures. This dual perspective allows the research to uncover how sustainability is operationalized, which practices and innovations are most effective, and what barriers hinder progress. The findings reveal that sustainability is not only a strategic necessity imposed by external pressures but also an emerging source of innovation, efficiency, and value creation. Smaller firms tend to rely on community-based initiatives and incremental improvements, whereas larger organizations adopt structured ESG (Environmental, Social, and Governance) platforms supported by technology and global benchmarks. At the same time, the research highlights persistent challenges, including fragmented measurement systems, behavioural barriers, and the need for greater stakeholder engagement.

By bringing together theoretical insights and practical examples, this study contributes to bridging the gap between global sustainability principles and firm-level realities. It provides evidence-based recommendations and practical pathways for organizations that aspire to embed sustainability into their strategic core, demonstrating how firms can simultaneously strengthen competitiveness, ensure resilience, and contribute to the achievement of global sustainability goals.

Keywords: sustainability practises, global goals, innovation, firm level sustainability, sustainability application.
JEL classification: Q56, L25, M14

Introduction

Global sustainability challenges are reshaping the way firms operate, with growing pressure from international frameworks such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement. Adopted by all UN member states in 2015, the SDGs constitute a 15-year global agenda to balance economic growth, social inclusion, and environmental protection. Yet, progress remains alarmingly slow: according to the Sustainable Development Report (2022), as of 2023 none of the 17 goals have been fully achieved. This gap between global commitments and real-world outcomes highlights the need for more effective translation of sustainability principles into business practice (Hickel, 2020).

Businesses are central to this transformation. Beyond compliance with regulations, firms are increasingly expected to act as drivers of innovation, responsible resource management, and stakeholder engagement (Lo & Kwan, 2017; Bansal & Song, 2017). Governments, investors, and consumers demand accountability, creating an urgent need for clear strategies and measurement tools that link sustainability with firm performance (Eccles et al., 2014; Christensen et al., 2017). However, the fragmented adoption of corporate sustainability frameworks such as Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) reveals persistent gaps in conceptualization, operationalization, and measurement at the firm level (Montiel & Delgado-Ceballos, 2014; García-Sánchez et al, 2020).

The tourism and hospitality industry provide a particularly relevant case for studying these dynamics. As a sector highly dependent on natural and cultural resources, it faces unique pressures to integrate sustainability while maintaining competitiveness (Font & McCabe, 2017; Jones et al., 2016). The industry also illustrates the tension between local, community-driven initiatives and global corporate ESG strategies. Bridging this divide requires not only managerial innovation but also empirical insights into how firms adopt, measure, and communicate sustainability practices (Rivera, 2004; Martínez-Martínez et al., 2019).

This paper responds to these challenges by examining the integration of sustainable development principles into firm-level strategies.

The object of this research is sustainability application at the firm level, with a specific focus on enterprises within the tourism and hospitality industry. This sector provides a particularly relevant field of study as it is highly dependent on natural and cultural resources and must balance sustainability imperatives with competitiveness (Font & McCabe, 2017; Jones et al., 2016). The industry also illustrates tensions between community-driven, localized initiatives and global corporate ESG frameworks.

The purpose of the paper is to explore how sustainable development principles are adopted, measured, and embedded into organizational strategies, and to assess the extent to which these practices contribute to both firm performance and broader sustainability objectives. By doing so, the paper seeks to bridge the gap between global aspirations and firm-level realities, offering insights relevant to both academic debate and managerial practice.

To achieve this aim, the paper employs a combination of systematic literature review and expert interviews with professionals from the tourism and hospitality sector. This mixed approach enables the identification of best practices, barriers, and emerging opportunities in the application of sustainability principles. The literature review synthesizes theoretical insights and empirical findings, while the interviews provide practical perspectives on adoption, measurement, and strategic integration.

In this way, the study contributes to understanding sustainability not only as a global imperative but also as a practical and strategic pathway for firms to enhance long-term resilience, competitiveness.

Literature review

Sustainable development is now a very widely used concept in management. The definition was created in the United Nations report "Our Common Future", there Brundtland et al. (1987) defined that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." It is a well-known definition of sustainable development. Sustainable development has three main dimensions: economic, environmental and social aspects – it's often referred to as the triple bottom line of Sustainable development (Wolniak, R., 2022). Global development is not just about economic data and sustainable development cannot be achieved in the long term without social and environmental development (Fettahoğlu, A., 2021).

Sustainable development principles classification varies in different sources. Despite that, the most popular opinion is to recognise 17 Sustainable Development Goals as its Principles. Behind 17 goals there are 169 targets - sustainability performance is calculated over them. Therefore, this type of SD principles provides the widest perspective on SD management. The 2nd classification of Sustainable development Principles found in scientific literature named the "4 Cs": Community, Connectivity, Climate, and Character - Morrison, N., & Honegger, L. (2022) focus on it in their research. Harja, I. G. (2020) presents and uses the 3rd typology of SD Principles:

1. Ensuring equal opportunities for future generations;
2. Economic and social inequalities policy;
3. Diversity of biological and spiritual – cultural life;
4. Population sovereignty;
5. Mutual responsibility.

4th version of SDGs' principles: universal, global and integrated development, analysed by Rothe, F.-F., Van Audenhove, L., & Loisen, J. (2022). The last version – the UN Millenium Declaration (2000) specified fundamental values for the 21st century: freedom, equality, solidarity, tolerance, respect for nature and shared responsibility, which was later used as a set of SD principles in research of Bodescu, D., et al. (2019).

Finally, Sustainable development and a triple bottom-line itself could be applied as a guiding principle. After presenting the most common classification of SD principles the question remains which option to choose for further topic development, because there is not one widely used and recognised set of Sustainable development principles. This is also a research gap because different strategies are used for understanding and applying Sustainable development principles in scientific papers and researches.

Sustainable business management

The concept of Sustainable development has become a permanent element of the long-term strategy of private and public sector organizations. Sustainable development went through various stages and transformations from 1950 until now (Lo, K. Y., & Kwan, C. L., 2017). It also has many names: Corporate social responsibility (CSR), Environment, social and corporate governance (ESG), responsible business, corporate ethics, organizational responsibility, etc. Further, the most common and widely used perspectives will be presented.

CSR is considered to be an integral part of sustainable development by business to behave ethically and contribute to all kinds of development (World Business Council for Sustainable Development, 2000). Carroll, A.B. (1999) notices that the first author identifying the idea of CSR was Bowen in 1953. His definition of CSR is: "obligations of businessmen to pursue those policies, to make those decisions, or to follow those lines of action which are desirable in terms of the objectives and values of our society X". In the recent development, it was noticed that CSR indicates the positive impacts of businesses on their stakeholders (Turker, D. 2009). CSR can be understood as a corporate concept of SD, and by integrating the spirit of SD into the business strategy. (Zhang, D., Lu, S., Morse, S., & Liu, L. (2022))

According to Behringer, K. & Szegedi, K. (2016) CSR relates to SD because it creates a balance between economic interests, social expectations and environmental demands at the firm level.

Meanwhile, the term ESG was officially introduced in 2004 with the report "Who Cares Wins" by the UN Global Compact Initiative (UN, 2004). It set the goal to regroup three of the most important pillars: environmental, social, and governance. All of them cover different issues and present a specific assessment target for the business enterprise (Billio, M. et al., 2021):

-Environmental pillar: evaluates the efforts of a company in terms of energy efficiency, greenhouse gas emissions, air and water pollution, waste, water and resource management, etc.

-The social pillar includes aspects affecting employees, suppliers, customers, communities like gender policies, data security, protection of human rights, working conditions, workplace and product safety, public health and income distribution, etc.

-Governance pillar is related to the shareholders' rights, anticorruption, code of ethics, managers' pay rate, control and quality procedures, risk management, as well as the respect for the law (Johnson, Ch. 2020, Billio, M. et al., 2021).

Companies are already acting in different ways and according to Bloomberg, various forms of ESG and impact investing have risen to almost US$40tn in 2021.

Governments are also taking an important role in facilitating sustainable development implementation in business from a policies and funding perspective. A good example is shown by European Commission, which introduced a Green Deal with the objective to transform the EU into a modern, resource-efficient and competitive economy – a first climate neutral continent. For that third of the €1.8 trillion investment from the NextGenerationEU Recovery Plan, and the EU's seven-year budget will finance the European Green Deal (European Green Deal, 2023). It consists of many featured activities, 55 achievement trackers which are being checked and progress is being presented officially. Business will need to adapt to the new legislation and policies that are leading Green Transformation in the EU.

CSR (or ESG) is not about ticking boxes anymore, it's about making an impact. As global risks and challenges continue to grow the next decade represents a final window of opportunity to correct our course into better (World Business Council for Sustainable Development Vision 2050). Consequently, management tools, measurement models and strategies are required and needed now more than ever.

Measurement of Sustainability/ CSR/ ESG

Active work, research and practice are still ongoing to develop assessment methods and metrics for sustainability from various perspectives. For further topic development, there is a need to understand what strategies were used in scientific literature to measure Sustainable development's influence on business.

According to Turker, D. (2009), there are four main methods to measure CSR that are:

1) Reputation indices and databases that classify firms on the grounds of the direction of CSR achievement (like the Fortune reputation index).

2) Content analysis of corporate publications.

3) Single or multiple issue indicators.

4) Survey method by using a questionnaire.

These are commonly used methods for analysing CSR but there are also different ways how to adopt it in research work. Alshannag, F., Ali Basah, M. Y., & Khairi, K. F. (2017) analysed relation between CSR and Corporate Financial Performance (CFP), whether it is negative, positive or neutral in order to understand if the more responsible and sustainable firms also increase market value.

Thompson, P., & Zakaria, Z. (2004) classified and analysed CSR activities by six focus areas: employees, energy, product, community involvement, human rights, and environment protection. Koh, K., Li, H., & Tong, Y. H. (2023) analysed CSR and stakeholder engagement.

CSR relation with competitiveness was the focus of López, G. M. D., Molina, A. J. F., Pereira, M. J., & Pertusa, O. E. M. (2023) research where researchers analysed agility, innovation, environmental management and competitiveness relation. A lot of attention is given to CSR and performance measurement systems in Asiaei, K., O'Connor, N. G., Moghaddam, M., Bontis, N., & Sidhu, J. (2023) and Boulhaga, M., Bouri, A., Elamer, A. A., & Ibrahim, B. A. (2023) research papers. Direct and indirect effects between economic, social and environmental dimensions in business practices were analysed by Andersson et al (2022). The list could be continued further as every year scientists strive to develop new strategies and scenarios for measuring sustainability.

Companies are already investing their money in CSR (or ESG), searching for new specialists as Sustainability managers and are ready to act – now the new managerial models need to step in and support this global change. Further research could continue on analysing this opportunity.

Research methodology

This study adopts a qualitative research approach, focusing on an in-depth exploration of sustainable business management principles through a systematic literature review, case study analysis, and expert interviews. By synthesizing theoretical insights and real-world applications, the research aims to identify best practices, challenges, and gaps in the implementation of sustainability strategies at the firm level.

Data Collection Methods

2.1 Systematic Literature Review

A systematic literature review will be conducted to analyse existing academic research, industry reports, and white papers related to sustainable business management, ESG (Environmental, Social, and Governance) frameworks, and corporate sustainability measurement. The review will follow a structured approach to ensure comprehensive coverage of relevant materials like peer-reviewed journal articles, conference proceedings, sustainability reports, and publications from organizations such as the United Nations (UN), the World Economic Forum (WEF) and others.

2.2 Expert Interviews

To gain first-hand insights into sustainability implementation, semi-structured interviews will be conducted with sustainability managers or general managers from tourism and hospitality sectors (e.g. travel agencies, tour operators, hotels) to compare sustainability approaches. The objectives of these interviews include:

Understanding how businesses adopt and integrate sustainability principles.

Identifying challenges in implementing and measuring sustainability.

Exploring the perceived benefits and trade-offs of sustainable business strategies.

Interview Methodology:

Participant Selection: Experts are selected based on their roles, industry experience, and involvement in sustainability initiatives. Efforts will be made to ensure diversity across industries and organization sizes.

Interview Format: Interviews are semi-structured, allowing for guided discussions while enabling interviewees to provide deeper insights.

Key Question Areas:

Drivers and barriers to sustainability adoption.

The role of ESG frameworks in business decision-making.

Best practices in sustainability performance measurement.

Data Collection & Analysis: Interviews are recorded (with consent) and transcribed. A thematic analysis will be conducted to identify recurring patterns and expert perspectives. Responses are coded and categorized to extract key insights and trends.

Research results

This section presents the key findings from the study, offering insights into how tourism enterprises integrate sustainability into their operations. The results cover organisational commitment, strategic focus areas, practices, challenges, monitoring, and future goals, highlighting both local and international approaches to sustainable tourism.

Table 1 presents the respondents included in this study. The research sample consisted of representatives from various tourism-related enterprises, ensuring a diverse perspective on sustainability practices.

Table 1. Respondent identification table

Respondent code	Description
Q1	Small independent hotel
Q2	Mid-size hotel
Q3	Tour Operator
Q4	Travel Agency – Vilnius-based.
Q5	International Chain Hotel

The following sections present an analysis of key themes drawn from these respondents. Each theme reflects how the participating enterprises integrate sustainability principles into their operations and strategies, providing both local and international perspectives on best practices and challenges

Table 2. Organisational commitment. Source: own research

Category	Subcategory	Key points synthesized
Organizational commitment	Integration of sustainability	Sustainability is integrated into branding and operational strategies across all respondents, with strong commitments observed especially in Q5.
	Familiarity with SDGs	All respondents show awareness of SDGs, with Q5 demonstrating structured alignment through corporate ESG platforms.

All respondents demonstrated clear organisational commitment to sustainability. Sustainability is integrated into both branding and operational strategies across all cases. Local enterprises (Q1–Q4) approach sustainability organically through daily practices, while Q5 adopts a formalised corporate framework under its "Travel with Purpose" ESG platform. Awareness of the United Nations Sustainable Development Goals (SDGs) was universal; Q1–Q4 referenced specific goals such as SDG 12 (Responsible Consumption) and SDG 13 (Climate Action). Q5 showcased structured alignment through corporate ESG benchmarking systems.

Table 3. Strategic focus areas. Source: own research

Category	Subcategory	Key points synthesized
Strategic Focus Areas	Environmental Sustainability	Energy and resource efficiency, waste reduction, and responsible travel were universal priorities across all interviews.
	Social Responsibility	Emphasis on community support, local partnerships, and fair labor standards was evident, with broader impact scope seen in Q5.
	Economic Considerations	Respondents consistently link sustainability with operational efficiency, reporting cost savings and value enhancement.

Across all cases, environmental sustainability emerged as a priority, with initiatives including energy efficiency, water conservation, waste reduction, and responsible travel. Q1–Q4 reported the use of solar panels, reusable amenities, and local supplier networks, reflecting strong community ties. Q5 applied advanced strategies involving data analytics and performance dashboards to monitor and improve outcomes. Social responsibility was emphasised through community engagement and fair labour practices, with Q5 extending these globally. Economic considerations were uniformly seen as complementary to sustainability, with participants reporting cost savings and enhanced brand value.

Table 4. Key practices and innovations. Source: own research.

Category	Subcategory	Key points synthesized
Key Practices and Innovations	Sustainability Actions	Common actions include waste sorting, reduced plastic use, eco-certified partners, and client education.
	Technology and Innovation	All respondents used some technology, ranging from drones and mobile apps (Q1–Q4) to proprietary platforms and AI goals (Q5).

Common practices included waste sorting, reduced plastic use, eco-certified partnerships, and guest education. Q1–Q4 utilised technologies such as mobile apps, GPS, and drones to enhance eco-efficiency. Q5 implemented a proprietary platform (LightStay) for comprehensive data monitoring and planned to integrate AI-based tools for further optimisation.

Table 5. Challenges and Responses. Source: own research

Category	Subcategory	Key points synthesized
Challenges and Responses	Challenges Faced	Main challenges were behavioral or logistical; Q1–Q4 struggled more with guest and supplier cooperation, while Q5 faced none.
	Handling Trade-Offs	None reported serious trade-offs; strong internal communication and strategic alignment helped maintain balance.

Q1–Q4 reported behavioural and logistical challenges, particularly related to guest cooperation and supplier limitations. Q5, leveraging institutional resources and proactive systems, reported minimal challenges. None of the respondents experienced significant trade-offs between sustainability and profitability, citing effective internal communication and strategic alignment as key enablers.

Table 6. Monitoring and evaluation. Source: own research.

Category	Subcategory	Key points synthesized
Monitoring and Evaluation	Data Collection	Data tracking varied from manual (Q1–Q4) to advanced digital systems (Q5) with daily input and trend analysis.
	Reporting and Management	Formal and informal reporting exist; Hilton and other chain hotels uses a central ESG platform, others report internally.

Monitoring practices varied, with Q1–Q4 relying on manual or semi-digital data collection, while Q5 employed advanced digital systems with daily input and trend analysis. Reporting was informal among local enterprises, whereas Q5 provided structured, externally validated ESG reporting.

Table 7. Best Practices and Future Goals. Source: own research.

Category	Subcategory	Key points synthesized
Best Practices and Future Goals	Best Practices	Best practices include early education, eco-packages, and sustainability integrated services.
	Future Goals	Future goals include carbon neutrality, electric vehicles, and AI-based management tools, particularly noted by Q5.

Best practices highlighted included early guest education, eco-friendly packages, and integrating sustainability into core services. Q1–Q4 aimed to expand eco-certifications and reduce carbon footprints. Q5 set ambitious goals, including carbon neutrality, electric vehicle adoption, and AI-based management tools.

The study demonstrates that sustainability is becoming a foundational principle within the tourism sector. Local enterprises illustrate flexibility and community-centred approaches, while international chains offer structured, technology-driven models. Together, these findings provide a comprehensive view of how tourism businesses are addressing environmental and social challenges through innovative and strategic commitments.

Conclusions

The analysis of sustainable development principles at the firm level demonstrates that sustainability has evolved from a peripheral concern into a core dimension of business strategy. Findings from the tourism and hospitality sector show that enterprises, regardless of size, increasingly view sustainability not as a cost but as an investment in long-term viability, competitiveness, and social legitimacy. Smaller firms illustrate the strength of community-based practices and incremental innovations, while international chains highlight the potential of structured ESG frameworks, advanced technologies, and global benchmarks. Together, these approaches underscore that there is no single pathway to sustainability; rather, firms adapt principles in ways that reflect their resources, contexts, and strategic ambitions.

Nevertheless, the study also reveals persistent challenges. Measurement remains fragmented, with smaller firms relying on informal systems and larger corporations grappling with complex reporting requirements. Behavioural barriers – whether from employees, guests, or suppliers – continue to hinder progress, emphasising the importance of education and stakeholder engagement. These findings suggest that the success of sustainability strategies depends not only on technical tools and frameworks but also on cultivating shared values, communication, and trust within and beyond the firm.

In this sense, sustainable development principles operate both as a compass and as a catalyst. They orient firms towards practices that respect environmental limits and social equity, while simultaneously stimulating innovation and organisational renewal. Bridging the gap between global sustainability commitments and firm-level realities requires continued integration of sustainability into decision-making, supported by transparent metrics and cross-sectoral collaboration. By embracing this dual role, firms do more than contribute to the achievement of the Sustainable Development Goals - they secure their own resilience and relevance in an increasingly complex and uncertain world.

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ENHANCING DATA-DRIVEN SUSTAINABILITY THROUGH DIGITAL QUALITY MANAGEMENT IN AUTOMOTIVE MANUFACTURING

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Abstract
The transformation to sustainable manufacturing requires more than isolated environmental initiatives; it is also necessary to integrate smart, data-driven systems that both improve operational efficiency and minimize waste. With increasing global competition and stricter environmental regulations, industrial companies are increasingly turning to digital transformation as a way to balance quality management with sustainability goals. This study examines how the digitization of quality management processes—through the deployment of modern tools such as CAQ (Computer-Aided Quality) systems, digital platforms can directly lead to environmental and operational sustainability in the automotive industry. The research is based on data collected at an automotive component manufacturing company that transitioned from a paper-based documentation system to a fully digital quality management workflow. The analysis compares process performance indicators before and after digitization, focusing on error rate development and response speed to problems. The results show consistent improvement in all areas monitored. Most notably, the average release time of the production decreased from 1:23:44 in the paper-based system to 00:46:01 in the digital system, representing a 45% reduction. Digital tools not only speed up problem identification but also enable more detailed traceability of production across the entire value chain. Furthermore, the number of administrative steps in the release process was reduced from 14 to 11, simplifying the workflow and minimizing unnecessary handling. In addition to operational benefits, the transition to a paperless and fully traceable environment has also brought clear environmental advantages. The reduction of waste caused by errors, the optimization of raw material usage, and the reduced energy intensity of repair processes have supported the fulfilment of the company's environmental commitments. In addition, the availability of real-time data has enabled the development of predictive and preventive strategies, gradually reducing the environmental footprint of production. The article presents a reference module that links digital quality management tools with sustainability indicators and shows how continuous data collection, advanced analytics, and feedback can serve as inputs for continuous process optimization. The findings underscore the strategic role of digitalization in achieving operational excellence and fulfilling business goals. The study concludes with practical recommendations for organizations that want to integrate traceability metrics into their quality management systems and ensure long-term competitiveness in the face of growing pressure for efficient and environmentally friendly management.
Keywords: digital quality management, CAQ systems, sustainability, Industry 4.0.
JEL classification: M11, O33, Q55

Introduction

In this digital transformation era, there appears to be a trend favouring the adoption of new technologies and the refinement of operational procedures. However, one must realize that the effectiveness of any digital transformation initiative is mostly determined by supporting the human side-the personnel working within these digital settings. Therefore, manufacturers must pay close attention to addressing human factors in digital transformation, so the transition runs smoothly and efficiently (Abdallag et al., 2021). Digitalization has introduced a new phase of modern challenges across multiple industries. The creation of smart factories is highly influencing the lifestyles of workers in manufacturing sectors. Many companies are embracing digitalization with the expectation that it will bring a paper-independent ecosystem and all processes will become completely digital (Pandey et al., 2023). Manual quality data control performed by quality controllers and operators is becoming increasingly complex, which greatly complicates the requirements of modernised production. The use of computer-aided quality management systems currently plays a significant role in the development of final quality in various manufacturing organisations with the aim of improving overall efficiency and standardising control. Digitalization leads not only to innovation of the products themselves, but also to the innovation of individual production technologies, the development of the manufacturing industry in the integration of digitalization and the improvement of the level of product design, processing and management (Zhou, 2013). However, many companies are constantly struggling to define and set effective digital strategies, as a systematic approach plays a significant role in the implementation process (Chirumalla et al., 2025). An additional challenge is the adaptation of the workforce. The transition to a data-driven architecture requires the improvement of employee skills so that they can effectively understand and utilize the knowledge gained from data. Employee aversion to change can slow down the implementation process, highlighting the need for comprehensive training programs and management strategies (Areo, 2023). The digitalization of manufacturing processes has a high impact on the manufacturing sector, an important part of the economy, as the results of such a transformation contribute to sustaining competitiveness and the survival of the organization itself (Sharma, 2024). Also, it's creating significant changes in how manufacturers and providers deliver products and services to the market, which is really supported by government environmental regulations (Albert et al., 2021). It is very likely that many industries, including the automotive industry, will be forced to abandon outdated procedures and gradually

begin to automate their processes in order to reduce wasted working time and improve data quality (McKnight 2024 et al., 2024). In the constant competitive struggle, only those companies that can analyse their business operations based on an increasing amount of data and predict optimal process conditions based on this obtained data can succeed in this kind of environment (Krumeich et al., 2014).

Based on these trends, this paper focuses on the transformation from traditional quality management practices to a fully digitized system within the automotive industry. The traditional production release process, consisting of manual form filling, signing and archiving, has often proven to be time-consuming, error-prone and highly inefficient in meeting the requirements of modernized production. Digital solutions based on CAQ platforms and mobile devices enable real-time data entry, automatic record validation and traceability across the entire production chain. The results presented in this research show how digitization can significantly reduce administrative burdens, shorten response times and increase process reliability. At the same time, the transition to a paperless system contributes to environmental sustainability by reducing paper consumption and waste associated with process errors. The research therefore not only highlights the operational and environmental benefits of digitization in quality management but also emphasizes its role as a strategic tool for ensuring long-term competitiveness in the automotive sector.

Theoretical background

Smart technologies have enabled the rapid development of digital manufacturing along with CAM, CAD and CAPP systems, thereby significantly increasing the performance, functionality and overall level of automation of the manufacturing system. These integrations enable the creation of flexible manufacturing cells, digital factories and the production floor, resulting in the evolution to an intelligent manufacturing system that is characterized by information, decision making and execution (Zhou, 2013). Digital transformation is the transition of common manual operations in quality management to digital form. There are many activities that require significant human resources, such as: collecting and analysing data on products, processes and systems, monitoring and controlling processes or making decisions and adapting quality system requirements to changing requirements (Idigova et al., 2022). Computer aided quality (CAQ) management systems facilitate continuous monitoring of production processes, which means real-time quality assessment and if it's necessary, early intervention in these processes (Salcher et al., 2023). With the constantly growing amount of data generated, there is an increasing demand for efficient and effective forms of data analysis. Having a huge amount of data available is not enough to make data driven decisions, as these data sets can no longer be easily analysed (Chong & Shi, 2015). Using the extensive data analysis capabilities of these systems, manufacturers can obtain useful findings from production data, which facilitates subsequent process optimization (Golubeva & Pogorelova, 2020). The data obtained through various analyses represents an important part of monitoring and continuously improving production processes in order to maintain the competitiveness of the manufacturing organisation. By providing access to relevant information and tools for its simple and quick processing, the CAQ management systems enable a clear analysis of production data and the distribution of statistical results. The user can select the scope of data at any time based on input parameters (e.g. time, production line type, etc.) and therefore obtain relevant information for a specific product or production area (Wiecha & Ćwikła, 2019). In developing the concept of FOF (Factories of the Future), it is necessary to identify potential application principles, technologies and tools in the process of creating and implementing Industry 4.0 approaches (Rakyta et al., 2019). The Industry 4.0 concept refers to new production models incorporating new technologies, production factors and workforce organization (Tambare et al., 2021). Combining quality management with the concept of Industry 4.0 creates the Quality 4.0 model, which is based on the use of traditional quality management methods to facilitate them and thus improve overall performance, efficiency and bring new innovations to traditional approaches (Sony et al., 2020). The combination of lean management and Industry 4.0 leads to the creation of a manufacturing environment in which data can be transmitted in real time (Schäfer et al. 2018). It should be noted that the quality management system in digital production includes intellectual methods that can only be applied if the company is equipped with modern digital technologies (Chesalin et al., 2020). This model uses technologies such as CPS (Cyber-physical systems), Cloud computing and IoT (Internet of Things) to ensure that quality requirements are met by collecting and analysing key components (Sony et al., 2020). The first step is the need to link and collect data from manual paper-based inspections to an automated data collection system that improves data quality and reduces the amount and time required for these processes. IoT manufacturing monitoring adds to the variety of data and parameters that can be tracked. The data collected and aggregated in real-time creates a comprehensive picture of the system being monitored, which is used to create a comprehensive picture of the current status and faster process management (Rakyta et al., 2019). Quality 4.0 places great value on real-time data analysis using machine learning to minimize process variability, find and stop problems and improve overall manufacturing processes. By implementing this model, a manufacturing organization can improve operational efficiency, final product quality and overall customer satisfaction (Tague, 2023). Despite these advantages, the successful implementation rate of Quality 4.0 remains quite low, with empirical studies estimating the successful implementation rate at between 13% and 20% (Escobar et al., 2023). The challenges of data security and workforce adaptation arise in such a system, but the benefits of improved quality control, predictive maintenance and optimized supply chains underscore its strategic importance (Asimiyu, 2024). The complexity of approaches to basic control is reflected in the metrics and performance standards used in modern control systems.

Until now, these metrics have only included traditional quality indicators, but now they also include the effectiveness of the system's learning, the accuracy of its predictions and its ability to adapt (Jain, 2024). Fact-based decision making represents a significant change in automotive manufacturing and opens opportunities for improvement in efficiency, innovation and sustainability (Asimiyu, 2024). The study results from Eversberg and Lambrecht (2023) have demonstrated that the use of digital assistance systems in the manual repair process represents a high potential for reducing costs, errors and mental workload. The proposed digital assistance system uses digital work instructions that are displayed in an augmented reality environment. By observing the set parameters in terms of task completion time, workload and usability of the assistive system, it is shown that manual repairs can be completed 21% faster with 26% less perceived workload using the proposed system. The digital quality management system has contributed significantly to the reduction of internal PPMs and has helped to reduce the number of PPMs from 11 800 to around 6 800. This means that the number of PPMs in the quality area has been reduced by around 60% thanks to digital support (Varela, 2025).

Research methods

The aim of this research was to compare the performance parameters of the traditional paper-based system with the new optimized digital system. These parameters mainly include their efficiency, reliability and contribution to sustainability. The research was carried out in a manufacturing company operating in the automotive industry, focusing on the process of releasing the production. Before the optimization, this process was managed using only paper documentation. Operators were manually filling out, signing and archiving all control forms. This kind of system presented a high risk of large numbers of administrative errors and time-consuming activities. In order to increase efficiency and reduce the number of errors, a digital system based on the CAQ platform and mobile devices (tablets) was implemented and optimized for the process. Process data were collected in two phases. The first phase represented reference measurements using the paper-based system. The second phase represented measurements after the implementation and optimization of the digital system. Each phase lasted for a certain period, because it was necessary to cover variability and ensure the statistical reliability of the collected data. Ten measurements were carried out for each system. Individual measurements were performed repeatedly for different operators and shifts. The start of the measurement was defined as the start of the inspection of the first piece, while the end was defined as approval (signature or confirmation in the digital system).The data were then processed and evaluated. For statistical analysis, all data were first verified for normality of distribution using the Ryan–Joiner test. Since the data from the paper-based system did not necessarily show a normal distribution, the non-parametric Mann–Whitney U test, which is suitable for small samples and abnormal data distribution, was used to compare the two systems. A significance level of 95% was used. The descriptive statistics – means, medians, and standard deviations – were also calculated. Data processing and visualization were performed using Minitab 22 Statistical Software and Microsoft Excel. To supplement the quantitative measurements, a structured questionnaire was distributed among the persons involved in the release process. These individuals include respondents from three different levels. A total of three production supervisors, three quality engineers and eight GAP leaders participated in the survey. The questionnaire contained closed questions (Likert scale and multiple choice) as well as open questions. Data from the questionnaire were processed in Microsoft Forms.

The main areas monitored were:

1. ease of use of the paper and digital systems,
2. perceived reliability and reduction of errors,
3. speed and efficiency compared to the paper-based process,
4. reduction of administrative burden,
5. overall satisfaction and suggestions for improvement.

Results

Paper-based production release system

Before the implementation of the digital production release system, the process in the monitored organization was carried out exclusively through paper documentation. This system was based on paper control sheets, in which it was necessary to manually enter data from the release process. Before each release, the first pieces of a given production batch must be manufactured while checking the individual parameters listed in the control sheet and at the same time, each first piece must be physically measured in accordance with the measurement requirements. After these documents were completed and signed by several responsible people, the document was stored in a designated place at the workplace, which allowed production to continue. This procedure was time-consuming, prone to errors in the form of missing or illegible data and limited the rapid availability of data for operational decisions. In addition, the long-term archiving of paper documentation required considerable space and material costs.

The flowchart of the paper-based production release process (Fig. 1) clearly shows the high amount of manual, administrative and manipulation activities, which significantly extend the time needed for production release and increase the risk of formal errors. Each step of the process requires the operator to manually fill out multiple paper documents, physically submit them for review, and wait for signatures or approvals from responsible persons. This not only causes delays, but also frequent interruptions in the workflow. In addition, the handling and archiving of paper forms represents an additional burden, as documents must be physically stored and searched for.

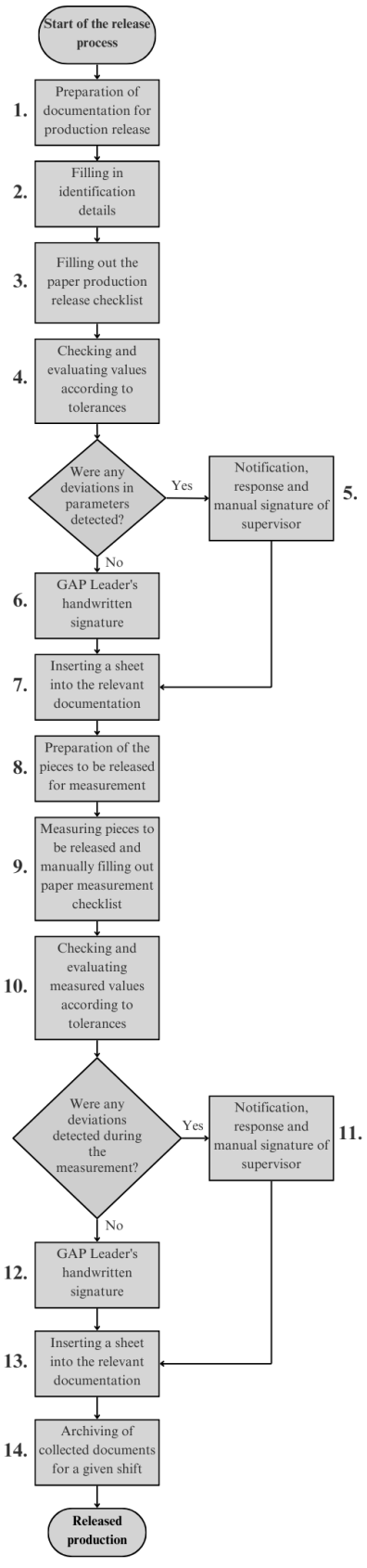

Fig. 1. Flowchart of the paper-based production release process

Source: compiled by the authors

According to the Pareto principle (80/20), we can conclude that most problems associated with paper documentation are caused by one type of error (missing data). This points to the greatest potential for improvement in digitization, as electronic forms use a system of mandatory fields and ongoing automatic checks, which leads to validation and prevents missing or incomplete data. By reducing the presence of this single error, the quality and reliability of documentation can be dramatically improved.

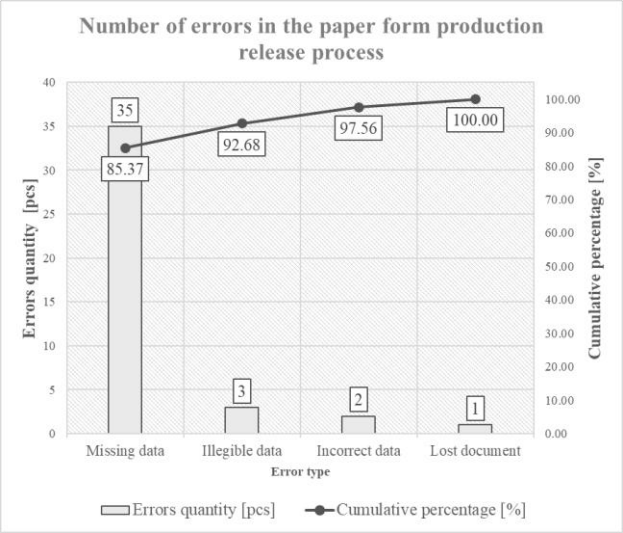

Fig. 2. Number of errors in the paper-based production release process expressed in using Pareto analysis

Source: compiled by the authors

From Table 1, we can see the results of measuring the times of individual steps in the production release process of a paper-based system. Each step was measured ten times. All measurements were taken during different shifts and by different operators to capture the variability of the process. The table shows the measured values in minutes and seconds, their sums and their average values. The total production release time was ranged from 4653 s to 5187 s, with an average value of 5024 s (1 hour 23 minutes and 44 seconds). The paper-based system is time-consuming and consists of several administrative steps that prolong the release time.

Table 1. Time required for individual steps in production releasing using the paper-based system

Step number	Measurement number										$\bar{x}$
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
1.	0:04:24	0:04:40	0:04:32	0:05:02	0:04:41	0:05:20	0:04:48	0:06:01	0:05:15	0:04:42	**0:04:57**
2.	0:00:17	0:00:19	0:00:16	0:00:17	0:00:18	0:00:16	0:00:15	0:00:16	0:00:17	0:00:16	**0:00:17**
3.	0:17:12	0:16:25	0:17:06	0:16:42	0:17:04	0:17:32	0:16:36	0:17:29	0:17:13	0:17:33	**0:17:05**
4.	0:02:26	0:01:36	0:01:55	0:01:49	0:02:11	0:02:21	0:02:34	0:02:46	0:00:00	0:02:25	**0:02:00**
5.	0:00:40	0:00:00	0:00:00	0:00:00	0:00:00	0:00:42	0:00:00	0:00:00	0:00:23	0:00:00	**0:00:11**
6.	0:00:11	0:00:15	0:00:14	0:00:11	0:00:13	0:00:15	0:00:15	0:00:13	0:00:14	0:00:15	**0:00:14**
7.	0:01:53	0:02:02	0:01:42	0:02:01	0:01:56	0:01:59	0:01:58	0:02:02	0:02:05	0:02:14	**0:01:59**
8.	0:27:04	0:23:18	0:24:40	0:26:04	0:23:48	0:25:24	0:26:17	0:24:47	0:27:02	0:25:56	**0:25:26**
9.	0:22:20	0:20:28	0:22:48	0:23:48	0:26:05	0:23:42	0:24:17	0:22:51	0:26:14	0:22:46	**0:23:32**
10.	0:01:08	0:02:36	0:02:48	0:03:16	0:02:28	0:02:00	0:01:45	0:02:10	0:01:39	0:01:55	**0:02:11**
11.	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	**0:00:00**
12.	0:00:12	0:00:11	0:00:12	0:00:13	0:00:11	0:00:10	0:00:12	0:00:10	0:00:09	0:00:11	**0:00:11**
13.	0:00:35	0:00:41	0:00:37	0:00:49	0:00:50	0:00:44	0:00:51	0:00:37	0:00:41	0:00:39	**0:00:42**
14.	0:05:20	0:05:02	0:05:31	0:04:49	0:04:59	0:05:01	0:04:38	0:04:51	0:05:15	0:04:31	**0:05:00**
Σ	**1:23:42**	**1:17:33**	**1:22:21**	**1:25:01**	**1:24:44**	**1:25:26**	**1:24:26**	**1:24:13**	**1:26:27**	**1:23:23**	**1:23:44**
[s]	5022	4653	4941	5101	5084	5126	5066	5053	5187	5003	5024

Source: compiled by the authors

A significant amount of time was spent on preparing, evaluating, checking and archiving documentation, which indicates that the administrative part of the process is the most significant factor prolonging the release process. These results provide a baseline for comparison with the digital system, where a significant reduction in administrative time and overall process duration is expected. Before comparing these two systems, it was necessary to verify the statistical assumptions for the use of appropriate tests. Many parametric tests, including, for example, the two-sample t-test, assume that the data are normally distributed. If this assumption is not met, the test results may not be reliable. In these cases, it is preferable to use non-parametric alternatives, such as the Mann–Whitney U test. For these reasons, we performed a normality test for the measured release times of the first piece in the paper system. The result is shown in the probability graph (Fig. 3).

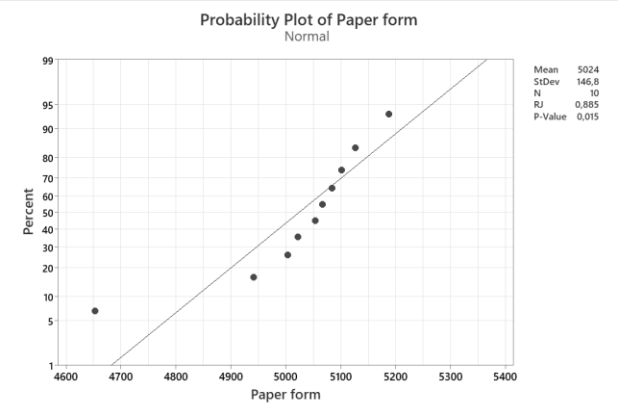

Fig. 3. Probability plot of paper-based system data

Source: compiled by the authors

Based on the plot, we can conclude that the individual points deviate significantly from the ideal straight line, with the resulting p-value of the test ($p = 0.015$) being less than 0.05. This means that the data are statistically significantly different from the normal distribution. In practice, this points to the variability and unpredictability of the paper-based system. Such a process is not stable and is sensitive to various influences. The result further suggests that when comparing paper and digital forms, the use of non-parametric methods of statistical evaluation should be considered.

Digital production release system

The implemented digital system was realized using CAQ platform, into which the original paper-based production release system was transferred. The system works based on electronic checklists, which are available directly on tablets located in the production area. The operators gradually fill in the individual items and without completing them, it is not possible to proceed to the next step or complete the process. This approach acts as an "error-proof" mechanism that ensures data completeness and eliminates the risk of errors that are typical for paper forms (Fig. 6). In terms of process management quality, this is a fundamental change, as the paper-based system relied purely on the operator's reliability, while the digital system includes a control mechanism that significantly increases the consistency and reliability of records.

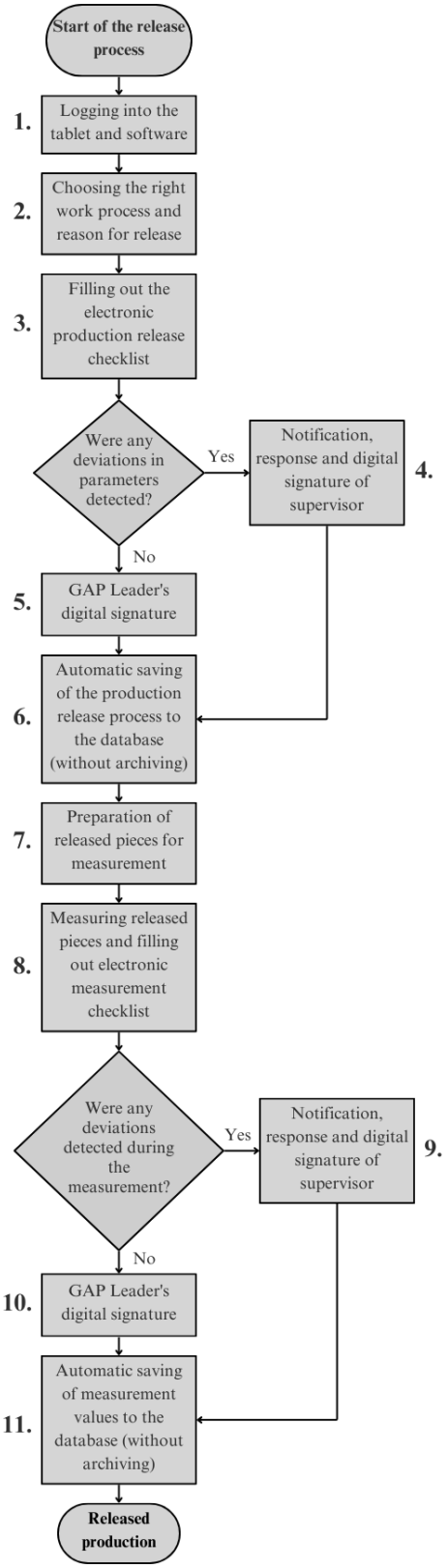

Fig. 4. Flowchart of the digital production release process
Source: compiled by the authors

The digitized process (Fig. 4) is significantly more linear and simpler than the paper-based one. Most handling and administrative tasks are eliminated, which has led to a reduction in response times.

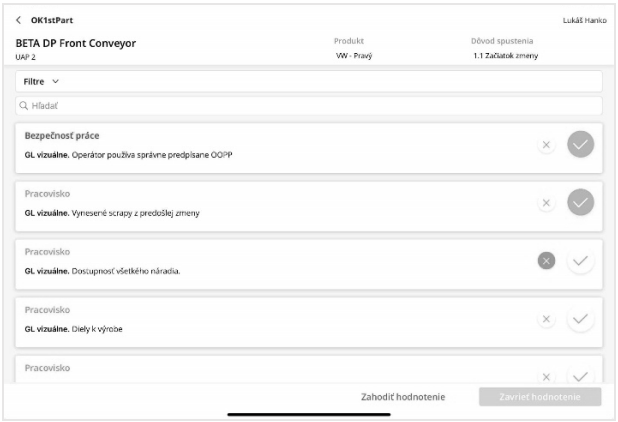

Fig. 5. Digital checklist for production releasing

Source: compiled by the authors

From Table 2, we can see the results of measuring the times of individual steps in the production release process after the implementation and optimization of the digital system in the CAQ platform environment and the electronic checklist system (Fig. 5). As in the paper version, each step was measured ten times during different shifts and by different operators. The results clearly show that digitization significantly reduced the overall process time. The total release time was in the range of 2677 s to 2866 s, with an average value of only 2761 s (46 minutes and 1 second). Compared to the paper-based system, this represents a reduction in process time of approximately 45%. The results confirm that digitization not only improves the efficiency of the release process but also increases its reliability and quality by eliminating the most common sources of errors identified in the paper-based system (Fig. 2). A comparison of process maps confirms the measurement results, as the reduction in the number of steps in the digital system is directly related to the reduction in release time and the elimination of the most common errors that occurred in the paper-based system.

Table 2. Time required for individual steps in production releasing using the digital system

Step number	Measurement number										$\bar{x}$
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	
1.	0:01:30	0:01:39	0:01:37	0:01:37	0:01:35	0:01:38	0:01:34	0:01:31	0:01:38	0:01:33	**0:01:35**
2.	0:00:54	0:01:17	0:01:21	0:01:13	0:01:16	0:01:02	0:01:13	0:01:21	0:01:25	0:01:23	**0:01:15**
3.	0:07:17	0:06:49	0:08:02	0:07:37	0:08:14	0:08:03	0:07:58	0:08:09	0:07:34	0:07:52	**0:07:45**
4.	0:00:46	0:00:35	0:00:56	0:01:02	0:00:50	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	**0:00:25**
5.	0:00:16	0:00:19	0:00:19	0:00:16	0:00:16	0:00:16	0:00:17	0:00:17	0:00:17	0:00:17	**0:00:17**
6.	0:00:10	0:00:12	0:00:11	0:00:12	0:00:12	0:00:10	0:00:11	0:00:11	0:00:10	0:00:13	**0:00:11**
7.	0:16:40	0:16:20	0:16:43	0:17:35	0:17:20	0:16:20	0:16:49	0:17:01	0:15:59	0:16:31	**0:16:44**
8.	0:18:20	0:18:48	0:17:23	0:17:20	0:17:40	0:17:01	0:17:39	0:18:21	0:16:20	0:16:31	**0:17:32**
9.	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:00	0:00:15	0:00:00	0:00:00	0:00:00	**0:00:02**
10.	0:00:04	0:00:06	0:00:04	0:00:05	0:00:07	0:00:05	0:00:06	0:00:05	0:00:05	0:00:06	**0:00:05**
11.	0:00:04	0:00:10	0:00:13	0:00:11	0:00:10	0:00:11	0:00:06	0:00:11	0:00:10	0:00:11	**0:00:10**
Σ	**0:46:01**	**0:46:15**	**0:46:49**	**0:47:08**	**0:47:40**	**0:44:46**	**0:46:08**	**0:47:07**	**0:43:38**	**0:44:37**	**0:46:01**
[s]	2761	2775	2809	2828	2860	2686	2768	2827	2618	2677	2761

Source: compiled by the authors

A probability plot (Fig. 6) verifies the normality of the distribution of measured release times for the first piece after implementation of the digital system. Ten measurements were performed again. The data obtained had an average value of 2761 seconds with a standard deviation of 77.69 seconds. The value $p > 0.100$ indicates that the hypothesis of normality cannot be denied, which means that the measured data follow a normal distribution. The plot also shows that the individual points are close to the reference line. This distribution confirms good compliance with normal distribution.

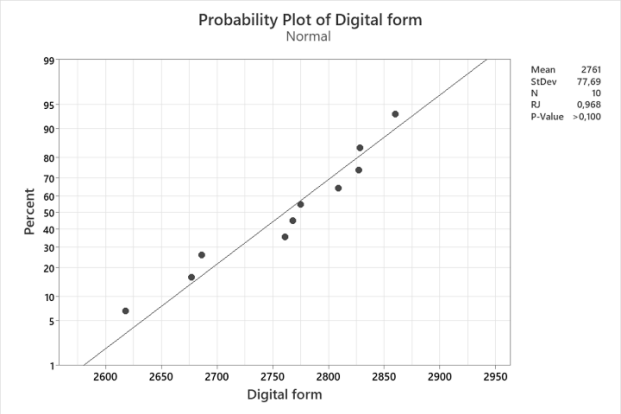

Fig. 6. Probability plot digital system data

Source: compiled by the authors

Comparing it to the original system, which showed higher variability, the results of the new system are way more stable and less scattered. The interpretation of these results directly confirms that the implementation of the digital system has not only contributed to a reduction in production release time but also increased the consistency and reliability of the entire process.

WORKSHEET 1

Mann-Whitney: Paper form; Digital form

Method

η_1: median of Paper form
η_2: median of Digital form
Difference: $\eta_1 - \eta_2$

Descriptive Statistics

Sample	N	Median
Paper form	10	5059,5
Digital form	10	2771,5

Estimation for Difference

Difference	CI for Difference	Achieved Confidence
2281,5	(2194; 2367)	95,48%

Test

Null hypothesis H_0: $\eta_1 - \eta_2 = 0$
Alternative hypothesis H_1: $\eta_1 - \eta_2 \neq 0$

W-Value	P-Value
155,00	0,00018

Fig. 7. Statistical evaluation of both systems using the Mann-Whitney test

Source: compiled by the authors

We also used Mann–Whitney test (Fig. 7) to verify the differences between the paper and digital systems for releasing the first piece of production, as the paper form data did not meet the assumption of normality. The test results confirmed a statistically significant difference between the systems. The median time for the paper form was 5059.5 s, while for the digital form it was only 2771.5 s. The difference between the two systems was 2281.5 s (95% CI: 2194–2367). The p-value (0.00018) is significantly lower than the significance level $\alpha = 0.05$, which means that the null hypothesis (equal distribution of times) was rejected.

These results were supplemented by a graphical representation using an interval plot (Fig. 8). This representation visually compares the distribution of times in individual systems and clearly shows that the digital system has a lower median, a narrower distribution of values and lower variability compared to the paper system.

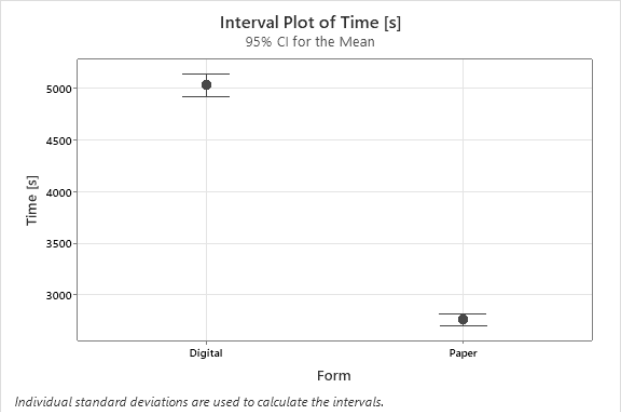

Fig. 8. Interval plot of mean production release time (Paper vs. Digital System)

Source: compiled by the authors

The digital production release system statistically significantly reduces the time required to release the first piece and at the same time provides a more stable and consistent process.

Perception and acceptance of digitization from the perspective of employees

In order to assess not only the quantitative results of the measurements performed, but also the perception of changes and the degree of acceptance of the new system by employees, an anonymous questionnaire survey was carried out among the various job positions involved in the production release process. The questionnaire was structured on a rating scale from 1 (low benefit) to 4 (high benefit) and focused on five main areas: simplicity of use and speed of work compared to paper forms, reliability and accuracy of records, accessibility and searchability of data, reduction of administrative overload and overall satisfaction with the system.

Readability of paper vs. digital systems

Most respondents considered paper forms to be *relatively simple* but also reported *frequent or occasional problems* (e.g. lost papers and illegible data). The digital system was rated significantly more positively, most often as *very simple*, which confirms the reduction in cognitive and administrative burden when releasing production.

Speed and efficiency

The responses showed that the time required to release production is *significantly shorter* or *slightly shorter* with the digital system. This result is consistent with the process data, which showed a real reduction in the time required to release the first piece.

Reliability and number of errors

Most respondents rated the digital system as *very reliable* or *rather reliable*. In terms of errors, the vast majority said that the number of formal errors had *decreased significantly*.

User comfort and overview

When asked whether the digital system simplifies their work, most of the respondents answered, "*I completely agree*." Most employees also confirmed that digitization has given them a *better overview of the process* and records, although there were a few individuals who were more *sceptical*.

Administrative burden

Most responses indicate that the digital system has *significantly reduced* the need for paperwork and archiving.

Open responses

The most frequently mentioned advantages included: data clarity, easier archiving and environmental benefits (paper savings). The problems mentioned included: occasional internet outages, system update and application crashes. Suggestions for improvement: provide more tablets in production, speed up the login process.

Based on the results obtained from the questionnaire, it can be concluded that the feedback from respondents highly reflects their satisfaction with the transition to the digital system. This is also a valuable source of information for further improvement and optimization of this system. The organisation has stated that the comments and suggestions will be considered in the upcoming optimization of processes, with the aim of further simplifying the use of the system, increasing its efficiency and ensuring the highest possible level of user satisfaction.

Conclusions

The results of the study clearly confirm the benefits of digitizing production processes. A comparison of paper and digital systems showed that the implementation of digital tools significantly contributed to reducing the time needed to release production, with the difference being statistically significant. In addition to reducing time, there was also a confirmed reduction in the number of formal errors in documentation and an increase in the consistency of records. The results achieved are also linked to the principles of sustainability, as the digitization of processes leads to the almost complete elimination of paper documentation, thereby directly reducing paper consumption and the associated environmental impact (e.g. printing, archiving, waste, etc.). Faster and more accurate production release reduces the risk of non-compliant products and the associated material waste or additional energy consumption during repairs and downtime. From an organisation's perspective, the transformation to a digital system not only means increased productivity and simplified work for operators, but also a shift towards intelligent and data-driven manufacturing. The results directly lead to recommendations that organisations in the automotive industry, as well as in other manufacturing sectors, should gradually convert their traditional systems to digital solutions such as mobile applications, tablets and CAQ systems. We can conclude that the digitization of processes not only has economic and operational benefits, but also a significant impact on the environmental sustainability of production through waste reduction, resource consumption and production process optimization.

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THE SILENT WEIGHT OF BENEFITS: GENERATIONAL AND GENDER DIMENSIONS OF WORKPLACE SATISFACTION

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Abstract
The study focuses on examining differences in respondents' attitudes toward satisfaction with employee benefits based on their generational affiliation and gender. The aim was to explore the relationship between generational affiliation, gender, and respondents' attitudes toward satisfaction with employee benefits provided by their employers. The research was conducted in the form of a quantitative questionnaire, involving 203 employed respondents belonging to Generations X, Y, and Z. The data were analyzed using statistical methods, with the Chi-square test and Cramer's V applied to verify the statistical significance of the differences. The results showed that generational affiliation has a statistically significant influence on attitudes toward benefits – Generation Y expressed the highest level of satisfaction, while Generation X was considerably more critical. In the case of gender, statistical significance was close to the conventional threshold; however, the identified differences (higher satisfaction among men compared to women) were evaluated as analytically relevant. The findings suggest that both generational and gender factors may influence the perception of benefits and should therefore be taken into account when designing effective and inclusive employee benefit policies. The study also offers recommendations for further research, which should reflect a broader sectoral context and combine quantitative and qualitative approaches.
Keywords: employee benefits, job satisfaction, generational differences, gender differences, employee motivation.
JEL classification: J28, J16, M52, J11

Introduction

The work environment is increasingly influenced by generational diversity, as Baby Boomers, Generation X, Millennials, and Generation Z operate together within a single labor market. Four distinct generational groups work within organizations, which brings not only new challenges but also numerous opportunities for human resource management (HRM). Each generation has been shaped by different social, economic, and technological conditions, which have influenced their work attitudes, expectations from leadership, and preferred methods of communication (Lima & Rahman, 2025).

The individual groups also bring specific strengths to work teams – Baby Boomers possess extensive experience and knowledge of organizations, Generation X is characterized by an analytical and systematic approach to problem-solving, people from Generation Y are strong in collaboration and flexibility, and Generation Z contributes with digital innovativeness (Pawar, 2025). On the other hand, differences in communication styles, motivational benefits, expectations towards leadership, or attitudes toward technology may lead to conflicts. Therefore, it is essential for organizations to apply adaptable management strategies that can transform this generational diversity into a competitive advantage.

This unique generational diversity brings opportunities for innovation and better collaboration, but at the same time also challenging tasks for the practice of human resource management (Lima & Rahman, 2025). In this context, sustainable human resource management plays a key role, supporting the long-term work ability, health, and well-being of all employees regardless of age (Wu, O'Dare & Greene, 2025). It also plays an important role in eliminating ageism and in building an inclusive work environment that promotes intergenerational cooperation and knowledge sharing. Effective management of generational differences is essential for maintaining high organizational performance and harmonious workplace relationships. Employee benefits also play a significant role, as they can be a source of intergenerational tension. Older workers generally value pension and health benefits more, while younger employees place greater emphasis on salary levels, which is related to their higher living costs (Stareček et al., 2021).

In addition to generational differences, another crucial factor influencing workplace satisfaction is gender diversity. Despite extensive research and legislative measures, gender inequality still persists, especially in countries with a lower level of equal opportunity (Basuil et al., 2025). Perceived gender inequality, meaning the belief that employees are rewarded or evaluated differently based on gender rather than actual performance, is of fundamental importance for HRM research and practice, as it significantly shapes employees' attitudes, motivation, and behavior. Considering the complex influence of generational and gender factors, examining satisfaction with employee benefits is essential for a better understanding of organizational dynamics and effective human resource management (Smerek, Bodiová, 2023). This study focuses on analyzing differences in respondents' attitudes toward satisfaction with benefits depending on generational affiliation and gender, while reflecting the importance of these dimensions for the creation of fair and inclusive HR policies. The research results show that benefits are not perceived uniformly – generational groups and genders have different preferences, which are reflected in their overall workplace satisfaction. These findings suggest the need for a differentiated approach to

setting benefits that would support engagement, fairness, and sustainability in the work environment.

Literature review

Current challenges in human resource management are marked by turbulent changes in the business environment, which require continuous examination of employee motivation and satisfaction across various demographic groups. Understanding generational and gender differences is important for effectively motivating employees and creating a satisfying and productive work environment.

Several authors emphasize that in order to maintain competitiveness and implement effective HR policies, it is essential to anticipate and understand the specific needs and expectations of different generations (Sharma & Pandit, 2021). Research confirms that members of different generations (X, Y, Z) differ in their perception of material and non-material motivational factors, as well as motivational barriers (Czerwińska-Lubszczyk & Jankowiak, 2025). Stiglbauer et al. (2022) and Malik and Musah (2024) show that generational differences are most evident in the areas of career, development, stimulation, and rewards, while basic work values and needs remain similar across generations, which is important for creating effective reward and benefit strategies. Research by Andrade et al. (2024) confirms the existence of generational differences in job satisfaction, stating that overall job satisfaction and engagement decline from older to younger generations. Mahmoud and colleagues (2021) add that Generation Z is more sensitive to a lack of motivation and is most influenced by material rewards. Generation X values social recognition and appreciation, while Generation Y is more motivated by an internal sense of duty. Older Baby Boomer employees assign higher value to status and external rewards compared to younger generations X and Y (Kinger & Kumar, 2023). These generational differences also appear in the perception of the work atmosphere, where Reissová and colleagues (2019) identified statistically significant differences between Generation X and Y, indicating the need to respect these differences when designing motivational schemes. For younger generations, such as Generation Z and Y, opportunities for career advancement, professional development, and work-life balance are also key (Bajkai-Tóth et al., 2022). Lassleben and Hofmann (2023) add that Generation Z talents primarily expect a fun work environment, a positive team atmosphere, and supportive relationships with colleagues and supervisors.

In addition to generational specifics, it is equally important to take gender differences into account. This approach is important for understanding how the perception of benefits, motivators, and overall satisfaction differs between men and women (Kováčová & Drahotský, 2022). Artz (2021) examined the impact of job satisfaction on voluntary turnover and noted that although women's response to dissatisfaction was more sensitive in the past, this gender difference has diminished over time. Muskat and Reitsamer (2019) found that gender and type of organization moderate the relationship between quality of work life and job satisfaction among Generation Y. For example, a high level of job security negatively affects men's satisfaction, while it does not change women's satisfaction. Lassleben and Hofmann (2023) further revealed that Generation Z's expectations toward employers differ significantly between genders, indicating persistent traditional gender assumptions in their work values. On the contrary, Frederick and Lazzara (2020) found more similarities than differences in satisfaction and well-being between men and women, where these factors were more influenced by leadership position than by gender. The complexity of fairness perception is underscored by research from Basuil and colleagues (2025), who examined gender differences in the perception of gender inequality in HRM practices, finding that women, paradoxically, perceived less inequality than men.

These individual preferences are embedded in a broader organizational context. Borisov and Vinogradov (2022) demonstrated that organizational social capital, including managerial support, trust, and fairness, has a significant impact on employee job satisfaction. The dynamics of this social capital can also be influenced by demographic factors. In response to these findings, strategic approaches such as employee empowerment are key to increasing motivation and productivity (Giedraitis, Romeryte-Sereikiene & Vaiksnoras, 2024), creating an environment of equal opportunities and support. In a similar vein, Valantiejiene and Girdauskiene (2025) emphasize that gamification represents a strategic tool for HRM, which can create a more engaging work environment by satisfying basic psychological needs such as autonomy and competence.

Methodology

The aim of this study is to explore the relationship between generational affiliation, gender, and respondents' attitudes toward satisfaction with employee benefits provided by their employers. Emphasis was placed on identifying potential differences in the level of subjectively perceived satisfaction among different generational groups and between genders, as well as on assessing whether benefits play a significant role in overall job satisfaction.

To fulfill the research objective, a quantitative questionnaire was chosen, which made it possible to statistically evaluate the differences and relationships between the observed variables. The main research instrument used was a questionnaire entitled "The Impact of Employee Benefits on Job Satisfaction and Employee Retention." The questionnaire was developed by the authors specifically for the purpose of collecting relevant data from employed respondents, and its content reflected three core areas: (1) subjective satisfaction with employee benefits, (2) the perceived impact of benefits on overall job satisfaction, (3) the influence of benefits on the decision to remain in the current job.

The items in the questionnaire were formulated as statement-based claims, which the respondents evaluated using a 5-point Likert scale. The scale values ranged from 1 (strongly disagree) to 5 (strongly agree), allowing for the quantification of the participants' subjective attitudes.

The research sample consisted of 203 respondents who were employed in various sectors of the economy at the time of the study. The selection of respondents was carried out through random sampling, and the data were collected via an online questionnaire and also distributed by email. The respondents came from different age categories, making it possible to classify them into one of three generational groups: Generation X, Generation Y, and Generation Z. This categorization enabled the analysis of whether attitudes toward employee benefits differ depending on the generational context. The data were collected during April 2025, ensuring a consistent time frame for data collection within a single month.

The obtained data were subsequently processed using the statistical software SPSS and Microsoft Excel. Within the analysis, descriptive statistical methods were applied to summarize the basic characteristics of the dataset, along with methods that enabled testing relationships between variables. To test the hypotheses concerning statistically significant differences between the observed variables, the Chi-square test was used to assess the association between the variables in question (e.g., generational affiliation, gender, and attitudes toward benefits). To measure the strength of these associations, Cramer's V coefficient was subsequently applied, allowing for the interpretation of the intensity of the relationship between the observed variables.

Following research question was formulated:

"What differences in attitudes toward satisfaction with employee benefits exist between different generational groups and genders?"

Based on this question, two hypotheses were formulated and statistically tested:

H_1: There is a statistically significant difference in attitudes toward the subjective perception of the impact of employee benefits on job satisfaction between different generational groups.

H_2: There is a statistically significant difference in attitudes toward satisfaction with employee benefits provided by the employer between men and women.

The chosen methodological approach made it possible not only to identify statistically significant differences between the observed groups but also to analyze their intensity. The results represent an empirical contribution to a better understanding of how various socio-demographic factors influence the subjective perception of satisfaction with employee benefits, which may have practical implications in the field of human resource management and the development of organizational personnel strategies.

Findings

The presented chart shows the distribution of responses from three generational groups – Gen X, Gen Y, and Gen Z – expressing their attitudes toward the subjective perception of the impact of employee benefits on job satisfaction. The recorded percentage data reflect the levels of agreement, disagreement, and neutral attitudes within each generation.

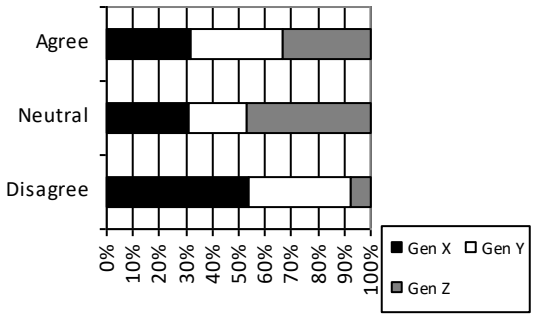

Fig. 1 The Impact of Employee Benefits on Job Satisfaction
(source: own elaboration)

The results indicate a high level of agreement across all observed generational groups that employee benefits have a positive impact on their job satisfaction. The highest share of agreement was recorded in Generation Y (80%), followed by Generation Z (77%) and Generation X (73%). This trend suggests that younger employees, represented by Generations Y and Z, perceive benefits as an important factor influencing their job satisfaction.

Interesting differences can also be observed in the neutral responses. Generation Z had the highest proportion of respondents who took a neutral stance on the question (21%), which may indicate a certain level of uncertainty or variability in how younger employees assess the direct impact of benefits on their satisfaction. In contrast, Generation Y showed the lowest proportion of neutral responses (10%), which may suggest a stronger opinion formation and a lower degree of ambivalence within this group.

Regarding disagreement with the statement that benefits contribute to job satisfaction, the highest proportion of disagreeing responses was recorded in Generation X (14%), while it was 10% in Generation Y and only 2% in the youngest group, Generation Z. These figures may reflect generational differences in expectations or value frameworks – while older. Employees (Gen X) may perceive benefits as less essential, younger workers may attach greater importance to these aspects in the context of overall job satisfaction.

Overall, it can be concluded that employee benefits are perceived as an important factor influencing employee satisfaction across generations, with generational differences manifesting primarily in the intensity of agreement, the level of ambivalence, and the proportion of disagreeing attitudes.

Table 1. The Impact of Employee Benefits on Job Satisfaction by Generation (χ^2 test), source: own elaboration

	Value	*df*	*Asymptotic Significance (2-sided)*
Pearson Chi-Square	10,052a	4	0,04
Likelihood Ratio	10,637	4	0,031
Linear-by-Linear Association	1,186	1	0,276
N of Valid Cases	200		

In order to verify the statistical significance of differences in the attitudes of individual generations toward the subjective perception of the impact of employee benefits on job satisfaction, testing was conducted using the Chi-square test. The results of the test showed that there is a statistically significant relationship between the examined variables ($\chi^2 = 10.052$; df = 4; p = 0.04), indicating that the distribution of respondents' attitudes differs significantly among the individual generational groups.

Table 2. The Impact of Employee Benefits on Job Satisfaction by Generation (Cramer's V), source: own elaboration

		Value	*Approximate Significance*
Nominal by Nominal	Phi	0,224	0,04
	Cramer's V	0,159	0,04
N of Valid Cases		200	

The strength of this relationship was assessed using Cramer's V, with the resulting value of V = 0.159 and p = 0.04 indicating a weak but statistically significant relationship between the respondent's generation and their attitude toward the perceived impact of benefits on job satisfaction. This value suggests that although there are differences in attitudes between generations, the intensity of this difference is not substantial.

To verify the presence of statistically significant differences in attitudes among generations, the following hypotheses were defined:

H0: There is no statistically significant difference in attitudes toward the subjective perception of the impact of employee benefits on job satisfaction between different generational groups.

H1: There is a statistically significant difference in attitudes toward the subjective perception of the impact of employee benefits on job satisfaction between different generational groups.

Based on the results of the Chi-square test, which demonstrated a statistically significant difference in attitudes between generational groups (p = 0.04), and taking into account the value of Cramer's V (V = 0.159; p = 0.04), it can be concluded that the null hypothesis was rejected. On the contrary, the alternative hypothesis was confirmed, stating that there is a statistically significant difference between generations in attitudes toward the subjective perception of the impact of employee benefits on job satisfaction. Although the identified relationship shows only weak intensity, its existence indicates the relevance of the generational factor in evaluating the importance of benefits from the perspective of job satisfaction.

In figure 2, we can see the distribution of respondents' attitudes toward satisfaction with employee benefits provided by their employer, depending on gender. The percentage values reflect the proportions of men and women who expressed agreement, disagreement, or a neutral attitude.

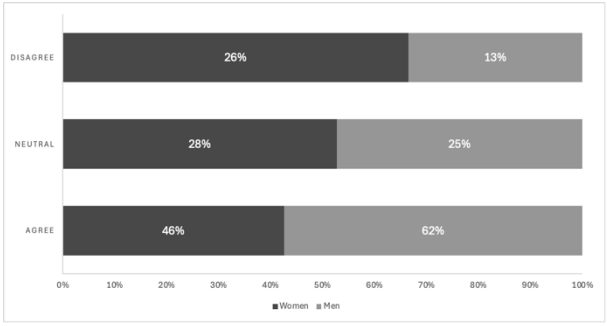

Fig. 2 Satisfaction with Provided Benefits (source: own elaboration)

The results clearly show that there are differences between men and women in the evaluation of satisfaction with employee benefits. The highest proportion of agreement was recorded among men (62%), which is significantly higher compared to women (46%). This difference suggests that men exhibit a higher level of satisfaction with the provided benefits than women.

At the same time, women expressed disagreement with satisfaction more often than men (26% among women compared to 13% among men), which indicates a higher level of dissatisfaction among female respondents. A relatively similar portion of respondents of both genders adopted a neutral stance – 28% of women and 25% of men – suggesting that a certain group, regardless

of gender, perceives employee benefits rather indifferently or with detachment.

These differences may reflect varying expectations, experiences, or levels of satisfaction with specific forms of benefits provided by the employer. The findings also highlight the need for a more differentiated approach to benefit policies that would better reflect the preferences and needs of different groups of employees based on gender.

Table 3. The Impact of Employee Benefits on Job Satisfaction by Gender (χ^2 test), source: own elaboration

	Value	***df***	***Asymptotic Significance (2-sided)***
Pearson Chi-Square	5,444a	2	0,066
Likelihood Ratio	5,705	2	0,058
Linear-by-Linear Association	5,411	1	0,02
N of Valid Cases	200		

Although the value of the Chi-square test ($\chi^2 = 5.444$; df = 2; p = 0.066) did not exceed the threshold of statistical significance set at 0.05, its proximity to this threshold, as well as the supportive result of the linear-by-linear association (p = 0.02), suggest that there may be a more meaningful relationship between the gender of respondents and their attitudes toward satisfaction with employee benefits than the p-value alone would indicate. In this case, the test lies "on the edge" of statistical significance, and the observed trend holds analytical value.

Table. 4: The Impact of Employee Benefits on Job Satisfaction by Gender (Cramer's V), source: own elaboration

		Value	***Approximate Significance***
Nominal by Nominal	Phi	0,165	0,066
	Cramer's V	0,165	0,066
N of Valid Cases		200	

The same interpretation can be applied to the result of Cramer's V (V = 0.165; p = 0.066), which indicates a weak but potentially relevant relationship between gender and attitudes toward benefits. Although the result technically does not meet the conventional criterion for statistical significance, considering the nature of the issue under investigation, the sample size, and the direction of the findings, this difference was decided to be interpreted as significant and worthy of further attention. Such an approach reflects not only the quantitative data but also the contextual interpretation, which is particularly justified in applied social science research.

To verify the presence of statistically significant differences in attitudes between men and women, the following hypotheses were defined:

H0: There is no statistically significant difference in attitudes toward satisfaction with employee benefits provided by the employer between men and women.

H1: There is a statistically significant difference in attitudes toward satisfaction with employee benefits provided by the employer between men and women.

Based on the results of the Chi-square test, the value of which approached the threshold of statistical significance (p = 0.066), and taking into account the result of the linear-by-linear association (p = 0.02), as well as the value of Cramer's V (V = 0.165; p = 0.066), it can be concluded that the null hypothesis was rejected. Although the p-value exceeded the traditional significance level of 0.05, it was decided to interpret these results as significant due to the direction of the data and the strength of the observed trend. Thus, the alternative hypothesis was confirmed, stating that there is a statistically significant difference in attitudes toward satisfaction with employee benefits between men and women. The identified relationship shows weak intensity but points to possible gender-based differences in the evaluation of employee benefits, which may require a differentiated approach in employer practice.

In order to examine differences in the evaluation of satisfaction with employee benefits from the perspective of respondents' age and gender, the following research question was formulated: *"What differences in attitudes toward satisfaction with employee benefits exist between different generational groups and genders?"* The results of the analysis showed that, in the case of generational affiliation, the differences are statistically significant. When comparing the attitudes of men and women, similarly notable differences emerged – men reported higher satisfaction, while women more frequently expressed disagreement. These findings suggest that both generational and gender factors may represent significant variables influencing the subjective evaluation of employee benefits, which has potential implications for designing fairer and more targeted benefit policies within organizations.

Conclusions

The results of the conducted research pointed to the existence of differences in respondents' attitudes toward satisfaction with employee benefits, which are conditioned by generational affiliation and gender. The analysis demonstrated a statistically significant relationship between generational group and the subjective perception of the impact of benefits on job satisfaction. The highest level of agreement was expressed by Generation Y, indicating that younger employees perceive benefits as an important factor influencing their job satisfaction. In contrast, Generation X exhibited the highest proportion of disagreeing attitudes, which may reflect different work expectations or value preferences.

Regarding gender, although the results of the Chi-square test did not exceed the threshold of traditional statistical significance ($p < 0.05$), due to the proximity to this threshold and the supportive results of the linear-by-linear association, it was decided to interpret the findings as analytically significant. Men generally reported a higher level of satisfaction with benefits than women, who more frequently expressed disagreement. These differences may be related to diverse expectations from the employer, the actual availability of benefits, or their practical applicability depending on gender and life circumstances.

Based on these findings, it can be concluded that both generational and gender factors play an important role in the subjective evaluation of employee benefits. In practice, organizations should therefore take these differences into account when designing personnel strategies and benefit programs. A multi-layered approach that considers the individual needs of employees may contribute to higher satisfaction, engagement, and ultimately to the sustainability of the workforce.

Although the study provided relevant insights, it represents only a partial view of the complex phenomenon of satisfaction with employee benefits. Further research could broaden the thematic focus by differentiating specific types of benefits and evaluating them across various employee groups. It would also be beneficial to supplement the quantitative investigation with qualitative methods, which would allow for a deeper understanding of employees' attitudes, expectations, and experiences related to benefits. Prospectively, it appears valuable to explore differences across various economic sectors, where benefit policies may differ significantly. Last but not least, longitudinal studies could prove beneficial in capturing the development of attitudes over time and their connection to current social and labor law changes.

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PECULIARITIES OF THE APPLICATION OF TEMPORARY PROTECTIVE MEASURES IN CIVIL AND ADMINISTRATIVE PROCEEDINGS

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Abstract
Under the Constitution of the Republic of Lithuania, justice is administered by the courts. It is the court's decision that is the act of administering justice, which is adopted after a full and complete assessment of the evidence gathered and examined in the case, providing a reasoned response to the arguments of the parties, and resolving the legal dispute that arose. However, a considerable period may elapse before a judgment is given in a case, and it is therefore necessary to provide for the interim measures in court proceedings in order to ensure that the future execution of the judgment is not impeded. These interim measures are intended to temporarily regulate or "freeze" the situation to ensure that the future judgment (and thus justice) is actually carried out. One of the fundamental principles of civil procedure - access to justice and the right to due process of law - establishes not only the State's obligation to ensure the protection of the subject's substantive rights and access to justice, but also to guarantee the enforcement of the judgment rendered in civil proceedings, as the defence of a person's violated rights must be not only effective but also realistic. Interim measures of protection and measures to secure claims are, in their essence, a temporary mechanism for the settlement of a disputed situation, which is applied on the legal grounds laid down by law in order to ensure that a future judgment can be enforced in practice. They are not to be understood as a remedy for the protection of a substantive legal relationship, since they merely provide procedural protection of a temporary nature, normally lasting until the judgment is enforced. They are 'provisional' in nature, as they can be modified or revoked and normally expire once the judicial dispute has been finally settled. The principles of legal equality, economy of proceedings, fairness and other principles of judicial procedure are important in deciding whether to grant interim measures of protection or interim measures of security or not.
The article presents the grounds for the application of interim measures of protection (security measures) both in civil and administrative court proceedings, the specifics, the main procedural peculiarities and problems of this type of procedural issues in both civil and administrative court proceedings, as well as conclusions.
KEY WORDS: interim measures of protection, security measures, judicial proceedings, civil proceedings, administrative proceedings
JEL classification: K1, K10, K19

Introduction

The aim of every legal proceeding is to provide the justice during court trial. The Constitution of the Republic of Lithuania and the provisions of the laws of the Republic of Lithuania establish the validity and immutability of a final judgment, which ensures the stability of the relations resulting from the judgment and the protection of human rights and fundamental freedoms. However, after a case has been heard and the judgment has become final, various circumstances may arise which may prevent the justice which has been done by the judgment from being achieved, and which may even call into question the adequacy of the court proceedings and the protection of the rights of persons who have been involved by the court's decision.

In 2023, a total of 189,922 cases were received and 190,789 cases were heard in Lithuanian district, regional (first instance) and regional administrative courts (in 2022 193,001 cases were received and 191,729 cases were heard; in 2021 188,767 cases were received and 190,888 cases were heard). Of these, 143 893 civil cases were heard in district courts, 3 779 civil cases were heard in regional courts, 2121 civil cases were heard in the Court of Appeal of Lithuania and 330 civil cases were heard in the Supreme Court of Lithuania in the same calendar year. Meanwhile, 22 453 administrative cases were heard in district administrative courts in 2023, and 3 199 administrative cases were heard in the Supreme Administrative Court of Lithuania. As regards the applications for interim measures (applications for security measures) which are the subject of the study, it should be noted that it is rather difficult to find statistical data on the application of the institution of interim measures (security measures) in courts, as it is a procedural matter, usually decided by interim procedural decisions (court rulings), and the court rulings are not distinguishable from the outcome of the case. However, the court data available in LITEKO (Lithuanian courts' information system) shows that, for example, in 2023, the Supreme Administrative Court of Lithuania heard on appeal approximately 140 administrative cases, where the legality and reasonableness of the application or non-application of measures to secure claims, as well as other relevant circumstances and principles related to the application of this institute, were essentially analysed. Meanwhile, one of the five regional courts of general competence, the Vilnius Regional Court, in 2023 heard on appeal about 200 civil cases, which essentially dealt with the application or non-application of interim measures of protection and the legality and validity of the rulings on this matter made by the district courts within its area of jurisdiction.

It has been repeatedly held in case law that an application for interim measures is not an independent remedy for the protection of rights and interests infringed. Interim measures are not intended to satisfy the interests

of the parties to a dispute and are intended only to ensure the enforcement of a future judgment and to guarantee the binding force of that judgment only to the extent necessary, while limiting the rights and interests of the opposing party. The purpose of interim measures is to prevent the impossibility or impediment of the execution of a future judgment and they may be applied only if it is established that there is a threat to the execution of the judgment (Court of Appeal of Lithuania decision 17th August, 2017 in civil case No e2-1037-516/2017; Decision of 23rd September, 2021 in civil case No e2-872-302/2021).

The aim of this article is to analyse the main peculiarities of the legal regulation of interim measures of protection (measures securing claims) in both civil and administrative court proceedings by means of a comparative method and to provide the following conclusions from this. The object of the study is important, since the timely or proper application of the institute of interim measures of protection (measures of security of claims) in court proceedings may (not) disturb the stability and immutability of the final judgment and, in general, the possibility of achieving real justice, protecting the rights or legitimate interests of persons infringed or protected from imminent danger.

The object of the article is the peculiarities of the legal regulation of interim measures of protection (security measures) as an institute of procedural law, both in civil and administrative proceedings.

The article uses the methods of analysis of legal acts, analysis of legal doctrine, synthesis, comparison and generalisation. The method of quantitative and qualitative analysis of the examined cases was used in the analysis of the case law.

Theoretical Background

The provisions of Article 30(1) of the Constitution of the Republic of Lithuania, Article 6(1) of the Convention for the Protection of Human Rights and Fundamental Freedoms, Article 8 of the Universal Declaration of Human Rights, and Article 47 of the Charter of Fundamental Rights of the European Union establish that every person may have access to a court, while at the same time ensuring that the protection of the subjective rights violated or contested by him or her, and the effective implementation of a decision of the court are guaranteed. At the same time, one of the fundamental principles of the judicial process - access to justice and the right to a fair trial - establishes not only the State's obligation to ensure the protection of the subject's substantive subjective rights and access to justice, but also to guarantee the enforcement of the judgment rendered during the proceedings. The protection of a person's rights must not only be effective but also realistic. Only when a person's violated subjective right is protected by a court decision and the court‘s decision is actually enforced, it can be considered that the legal defence of the State has fulfilled its function of guaranteeing a person's right to a judicial remedy.

Various reasons and circumstances that may arise before the judgment becomes final may make it impossible or difficult to enforce the judgment in practice. For these reasons, procedural law provides for an interim mechanism (usually pending a judgment on the merits of the dispute or the execution of the judgment) for the protection of the subject-matter of the dispute in order to guarantee the enforcement of a future judgment.

Accordingly, both interim measures and measures to secure claims are, by their very nature, a temporary mechanism for the settlement of a dispute, applied on the basis of the legal grounds laid down by law, in order to ensure that a future court decision can be enforced in practice. The effective execution of the judgment is also one of the aspects of due process of law according to the jurisprudence of the European Court of Human Rights (JGK Statyba and Guselnikovas v. Lithuania, Judgment of 27 January 2015, Case No 3330/12; Delta Perkany v. the Czech Republic, Judgment of 10 February 2014, Case No. No. 97/11; Manik v. Lithuania, 13 January 2015. No 46600/11; Micallef v. Malta, 15 October 2009. No 17056/06). According to the Glossary of International Law and Arbitration Terminology, provisional interim measures are defined as temporary measures of a conservative nature, granted in exceptional circumstances, at any time during the proceedings, prior to the final award. In the case law of the European Court of Human Rights ("ECHR"), interim measures are temporary and urgent measures granted when there is a risk of imminent and irreparable harm. According to legal scholars W. Herman, R. Ragulskytė-Markovienė and I. Žvaigždinienė, interim measures are understood as measures of a procedural nature which allow individuals to protect their rights while a case is pending. The objectives of interim measures derive from the need to temporarily regulate the relationship between the parties so that neither party suffers further losses, and their interests are not prejudiced during the pendency of the proceedings or before the action is brought. Interim measures of interim relief are thus not to be understood as a remedy for the protection of substantive legal relations, since they merely provide procedural protection of a temporary nature, normally lasting until the judgment is enforced. They are 'provisional' in nature, since they can be modified or revoked and normally expire once the legal dispute has been finally settled. The purpose of these interim measures is to protect the judge's ability to determine the merits of the case, rather than to decide in advance on the substantive rights and obligations of the parties.

One of the most important principles in court proceedings is the right to be heard. This principle requires the court to ensure that, in reaching its decision, it has heard both sides of the dispute, and that it can only reach its conclusions after a proper assessment of the evidence presented by both sides. This principle is also relevant in the application of interim measures. Each party against whom a measure is sought must have had equal opportunities and means not only to bring a claim but also to defend against it. However, the application of interim measures has certain procedural aspects, which are essentially due to the need to settle the situation urgently, but also to the possibility for the other party to the dispute to challenge the interim measures granted by the court, either by lodging a separate appeal against the court's order or by requesting that the defendant be granted security for any loss it may incur (which is a

remedy available only in the context of the civil procedure).

Also considers the principles of legal equality, economy of proceedings, fairness and other principles of judicial procedure and their observance in deciding whether interim measures or measures to secure claims should be granted.

Research analysis results

Grounds for interim measures (security measures)

Civil proceedings are governed by the Code of Civil Procedure of the Republic of Lithuania (hereinafter - CPC). The provisions of Part I "General Provisions", Chapter XI "Procedure", Section 5 "Interim Measures of Provisional Injunction" of Part I "Provisions of General Provisions" of the Civil Procedure Code regulate the institute of application of interim measures of protection as a means of securing a claim. It should be noted that the 1964 CPC, which was in force until 1 July 2001, provided for interim measures as a provisional mechanism for the protection of a dispute as well. Administrative proceedings are governed by the Law on Administrative Proceedings of the Republic of Lithuania (hereinafter referred to as 'LAP'), of which, in fact, one article is devoted to the regulation of measures for securing claims in administrative proceedings (LAP Article 70).

It should be noted that interim measures in civil proceedings may be applied either in the absence of an application or at any stage of the civil proceedings in accordance with the procedure laid down in the procedure. In administrative proceedings, however, the application of interim measures is only possible after a complaint (application, petition) has been lodged with the court and has been admitted for examination. Although the concept of this procedural legal institute differs in civil and administrative proceedings, its purpose in both proceedings retain a similar function, namely, to ensure the reality of the enforcement of a future judgment or the elimination of obstacles to the enforcement of a future judgment. However, there are certain nuances in the application of interim measures in each of these proceedings.

The grounds for interim measures are governed by the provisions of Article 144 of the CPC, which states that the court may, at the request of the parties to the proceedings or of other interested parties, grant interim measures if those parties have plausible grounds to support their claim and, in the absence of such measures, the execution of the judgment may be more difficult or impossible. Thus, the court may, at the request of the parties to the proceedings or of other interested parties, grant interim measures if it finds that two conditions are met, namely: (1) that the claims in the action are likely to be well-founded; and (2) that there is a risk that the enforcement of a judgment which might be favourable to the applicant may be rendered more difficult or impossible. In the absence of at least one of the above conditions, the institution of interim measures is inapplicable.

In administrative proceedings, the court or judge may, at the reasoned request of the parties to the proceedings or on his or her own initiative, take measures to enforce a claim. A claim may be secured at any stage of the proceedings if the party to the proceedings plausibly substantiates the validity of the claim and if the failure to take measures to secure the claim would result in irreparable or seriously irreparable damage (Article 70(1) of the LAP). Where the grounds referred to in this paragraph are present, interim relief may also be granted in cases where it is necessary to settle temporarily a situation relating to a disputed legal relationship. Accordingly, in administrative proceedings, the court may, on a reasoned application or on its own initiative, take measures to secure a claim if two necessary conditions are met: (1) the party to the proceedings is able to substantiate the validity of the claim on the basis of a prima facie case, and (2) the failure to take precautionary measures is likely to result in irreparable damage which is irreversible or serious and difficult to repair. Moreover, the administrative procedure provides an additional legal basis for the imposition of interim measures where the grounds set out in this paragraph are present, by providing that interim measures may also be imposed where it is necessary to settle temporarily a situation relating to a disputed legal relationship.

It should also be noted that an administrative court or a judge may not impose security measures if this is provided for in other laws regulating the application of impact measures or measures to strengthen financial stability and soundness of financial institutions (Article 70(2) of the LAP). The administrative court shall not grant interim relief if the specific legislation provides for the suspension of the validity of the contested administrative decision in the event of an appeal to court. For example, Article 139(1) of the Law on the Legal Status of Aliens in its current version provides that the execution of the appealed administrative decision shall be suspended when the application for asylum of an alien who has entered the Republic of Lithuania from a safe third country is not examined and the alien is returned or expelled from the Republic of Lithuania to a safe third country; or when the appealed decision refuses to grant asylum to an alien, unless the decision was taken after an examination of the application for asylum in principle in an urgent manner; etc.t.

As can be seen, in both civil and administrative proceedings, the first prerequisite for the imposition of interim measures of protection (security measures) is a preliminary assessment of the validity of the claims and a determination of the probable validity of the claims. Whereas the second necessary condition for the application of interim measures is the difficulty of enforcing a future judgment which may be favourable to the applicant, in administrative proceedings the second necessary condition for the application of interim measures is the establishment of irreparable or irreparable serious damage.

In addition to the necessary conditions for the application of interim measures, the case-law also emphasises other principles relevant for the application of interim measures, such as the principles of reasonableness, proportionality and fairness.

Firstly, it should be noted that a preliminary assessment of the claim brought by the claimant, where the procedural question of the need for interim measures in a particular case is at issue, cannot be equated with the

conclusions reached by the court after the dispute has been examined on the merits. The condition of *prima facie* plausibility of the claim means that, when applying interim measures, the court does not and must not examine the merits of the claim, nor must it examine and assess the factual and legal arguments of the claim and/or the evidence supporting them, but the court determines, on a purely preliminary basis, the likelihood of a judgment in favour of the claimant being given in respect of the claims brought on the basis of the totality of the evidence presented (Court of Appeal of Lithuania decision of 30th September 2021 in civil case No e2-891-553/2021).

The Court of Appeal of Lithuania has already formulated the rule that a *prima facie* (preliminary) assessment of the merits of a claim allows the court to refuse to apply interim measures only in cases where the claimant's claim is manifestly unfounded, for example, where the claimant has chosen an unauthorised or manifestly impossible method of defence of its civil rights, or where interim measures are requested to secure a claim which is not based on the facts set out in the claim, etc., i.e. only when it can be assumed already at the stage of acceptance of the claim that the claim raised cannot be satisfied by the court due to the rather obvious groundlessness of the claim (Court of Appeal of Lithuania decision of 22nd April 2021 in civil case No. e2-307-370/2021 ; decision of 2nd May, 2024 in civil case No. e2-246-464/2024).

It should be noted that the threat to the enforcement of the judgment is linked to the defendants' behaviour, i.e. the intention to reduce the value of their assets in order to avoid the enforcement of a future judgment. In the context of the application of interim measures, dishonesty of a person is not presumed, and the person seeking interim measures must therefore provide specific evidence (information) of the actions already carried out, being carried out or intended to be carried out by the defendants, which are incompatible with the standard of honesty of conduct (concealment of assets, transfer of assets to other persons in any form whatsoever, pledging or encumbering them in any form whatsoever, and the like). A party's actions both before the commencement of the proceedings and during the pendency of the proceedings may be assessed from the point of view of fairness (Court of Appeal of Lithuania decision of 4th June 2018 in civil case No. e2-673-943/2018; decision of 3rd June 2021 in civil case No. e2-494-516/2021). A credible threat, as one of the necessary conditions for the imposition of interim measures, can only be confirmed by evidence of (possible) dishonesty of the defendants and/or their intentions to conceal, dispose of, pledge or otherwise encumber their assets with a view to avoiding the execution of a judgment in favour of the claimant, e.g. i.e. interim measures may only be granted where a person has provided concrete evidence of at least plausible grounds to prove that the defendants deliberately intend to worsen their financial situation in order to avoid the enforcement of the judgment. Therefore, it is important to establish not the financial situation of the person against whom the restrictions are sought and the significance of the amount of the claim brought against him, but his conduct in good faith (Court of Appeal of Lithuania decision of 28th January 2019 in civil case No. e2-90-464/2019; decision of 29th September 2022 in civil case No. e2-949-1120/2022).

In the practice of the Supreme Administrative Court of Lithuania it has been stated that the court, when deciding on the request of a participant in the proceedings for the application of measures to secure a claim, must take into account whether the request for the application of a measure to secure a claim is directly related to the claims brought in the case, which the court has accepted by the order for consideration, or whether the request is within the boundaries of the arising administrative dispute (Supreme Administrative Court decision of 4th April 2012 in Administrative Case No. AS[858] -310/2012 , decision of 18th May 2012 in Administrative Case No. AS -227/2012[492] , decision of 17th July 2018 in administrative case No eAS-516-525/2018, decision of 15th January 2020 in administrative case No eAS-22-492/2020). In an administrative case, only such security measures may be applied as are necessary to secure the specific claim brought in the case, and not to resolve and secure the legal relations between the parties to the proceedings in general (Supreme Administrative Court of Lithuania decision of 19th September 2019 in Administrative Case No. eAS-603-520/2019). When deciding on the application of the measures of securing a claim referred to in Article 70 (3) of LAP, the court must establish that there is a real threat of irreparable or irremediable serious damage, if the measures are not applied, and that the measures of securing a claim may be applied, if there are *prima facie* (prima facie) arguments as to the validity of the contested act and the execution of the administrative act will cause serious damage which would be difficult to remedy/compensate for (Supreme Administrative Court of Lithuania decision in administrative case No AS-899-575/2016).

According to the practice formed by the Supreme Administrative Court of Lithuania, a possible certain negative impact on the applicant's financial situation is usually not considered to be an extraordinary (exceptional) circumstance, indicating that the execution of the court decision may be complicated or become impossible (Supreme Administrative Court of Lithuania decision of 23rd January 2009 in administrative case No. AS -103/2009[822] etc.). Accordingly, the circumstance that the applicant may suffer certain negative consequences of a pecuniary nature does not *per se* (automatically) constitute a ground for the imposition of measures to secure a claim in accordance with the procedure laid down in Article 70 of the LAP, unless the applicant proves that, if the court adopts a decision in favour of the applicant, the removal of such negative consequences would be impossible or difficult (Supreme Administrative Court of Lithuania decision of 20th April 2012 in Administrative Case No. AS -149/2012[146] and others).

In summary, it can be reasonably concluded that the legal bases for the application of interim measures of protection (security measures) are not the same in civil proceedings and administrative proceedings, and that the composition of the conditions necessary for the application of such measures differs. Moreover, as is apparent from the rules of both proceedings, the institution of interim measures (measures to secure

claims) performs one and the same essential function, i.e. securing the claims brought by a party to the proceedings, but it is only in the civil proceedings that the application of interim measures is possible before the application is lodged before the court. This exceptional condition is influenced by the specific nature of civil proceedings. Moreover, the administrative procedure also provides an additional legal basis for the application of interim measures, by providing that interim measures may also be applied in cases where it is necessary to provisionally settle a situation relating to a disputed legal relationship, which is not the case in civil proceedings. Administrative proceedings may also provide for the imposition of measures on the initiative of the court, which is not the case during court proceedings in civil cases pending before the Court of First Instance, which do not have the characteristics of public interest.

Types of interim measures, their application and liability for injunctions

In civil proceedings, interim measures of protection may be of several types, depending on the nature and scope of the claims brought, including: (1) seizure of the defendant's immovable property; (2) record in the public register prohibiting the transfer of ownership; (3) seizure of movable property, funds or property rights belonging to the defendant and held by the defendant or by third parties; (4) the detention of property belonging to the defendant; (5) the appointment of an administrator of the defendant's property; (6) the prohibition of the defendant from engaging in certain transactions or actions; (7) the prohibition of the transfer of property to, or the performance of other obligations by, other persons; (8) in exceptional cases, a prohibition on the defendant's departure from his/her habitual residence and/or a prohibition on the removal of a child from his/her habitual residence without the authorisation of the court; (9) suspension of the realisation of assets in the event of an action for the lifting of the attachment of those assets; (10) suspension of recovery proceedings; 11) the ordering of temporary maintenance or the imposition of temporary restrictions; 12) the order to perform acts to prevent the occurrence or aggravation of damage; 13) any other measure provided for by law or ordered by a court, failing which the execution of the judgment may be rendered more difficult or impossible. It should be noted that the list of types of interim measures referred to in the provisions of Article 145 of the CPC is not exhaustive, which means that the court, taking into account the nature and scope of the claims or counterclaims specifically brought in the civil proceedings, may also apply other effective and specific interim measures, the non-imposition of which may make it more difficult or impossible to enforce the judgment. It should also be noted that in certain categories of civil proceedings the law may provide for the application of specific interim measures. In cases where there is a temporary restraint of ownership of a property belonging to the community of property, only the part of the property belonging to the person subject to the provisional measures may be seized. Where the share of the property in the community property has not been established, the whole of the property may be seized temporarily, pending the establishment of the person's share in the community property.

In addition, the court may grant several interim measures, but the total amount of the interim measures must not be substantially higher than the amount of the claim. The interim measures shall be chosen in accordance with the principle of economy, but the court may not, at the request of the parties to the proceedings or of other interested persons or on its own initiative, impose the measures provided for in Article 145(1)(6), (7) and (12) of the CPC or any other interim measures which would limit the resolution of the financial sector entities in the procedure laid down by the Law on Financial Sustainability of the Republic of Lithuania, if provided for by any other law regulating the imposition of measures of impact on, or the imposition of measures aimed at enhancing the financial stability or the reliability of financial institutions.

In administrative proceedings, measures for securing a claim may be: 1) prohibition to perform certain actions; 2) suspension of recovery under an enforcement document; 3) suspension of the validity of a contested individual legal act, including one conferring subjective rights on a person other than the applicant; 4) any other measures imposed by a court or a judge (Art.70(3) of the LAP).

In both civil and administrative proceedings, the persons requesting the application of a measure to secure a claim must specify the circumstances constituting the grounds for securing the claim and provide evidence to support such circumstances (Supreme Administrative Court of Lithuania decision of 19th October 2016 in Administrative Case No eAS-900-662/2016). Moreover, the burden of proof for the application of interim measures of protection is always on the claimant or the applicant, i.e. the person who applies for such measures. It should also be noted that, in administrative proceedings, only such interim measures may be granted as are necessary to secure the specific claim brought in the proceedings, and not to resolve and secure the legal relationship between the parties to the proceedings.

The person whose property is attached shall be liable for the breach of the restrictions imposed from the moment of notification of the attachment order to him or her, or, in the absence of such notification, and in cases where the order for interim relief is made in the absence of the person concerned, from the moment of registration of the order in the register of seizure of assets.

In civil proceedings, a fine of up to 300 EUR per day may be imposed by a court order on the guilty party for breaching of the restrictions laid down in Article 145(1)(6), (7), (8) and (12) of the CPC. In addition, the claimant shall be entitled to recover from those persons the damages resulting from the non-compliance with the court's order for interim measures.

In administrative proceedings, if the prohibitions set out in the administrative court's order on the application of precautionary measures are infringed, the guilty parties may be fined up to 300 EUR by a court order. This decision can be appealed (Article 70(12) of the LAP).

In summary, it can be reasonably concluded that, given the fundamental differences between civil and administrative proceedings, different types of interim measures are also provided for in the law. As can be seen,

the number of types of interim measures in civil proceedings is considerably higher than in administrative proceedings, and the list of interim measures is not exhaustive, which means that the court may, at the request of the parties or on its own initiative, apply different types of interim measures in a particular civil case. In contrast, the list of possible interim measures in administrative proceedings is shorter, but it is also not exhaustive. The court may also, at the request of the parties or on its own initiative, grant other interim measures necessary in a particular administrative case. It can be reasonably concluded that such differences in the types of interim measures are influenced by the specific nature of the proceedings themselves and the fundamental differences in those proceedings. It should also be noted that in administrative proceedings the court is more active and may grant interim measures on its own initiative.

Examination of applications for interim measures of protection (precautionary measures)

The law on civil procedure regulates the application for interim measures in considerable detail.

Pursuant to the provisions of Article 147 of the CPC, applications for interim measures of protection shall be heard by the court of first instance and, in cases provided for in the Law on Commercial Arbitration, by the Vilnius Regional Court. Where the application for interim measures is contained in the application, the question of interim measures shall be decided only after the admissibility of the application for interim measures has been resolved. The court shall decide on the application for interim measures by written procedure as soon as possible, but at the latest within three working days of receipt of the application. In exceptional cases, where it is necessary to gather additional data necessary for the adoption of a decision on the application for interim measures, the court shall decide on the application for interim measures within seven working days of receipt of the application. Where the court considers it necessary, the defendant shall be notified of the hearing of the application for interim measures.

The parties to the proceedings have the right to submit applications for interim measures to the Court of Appeal and the Court of Cassation, where the merits of the dispute are before those courts.

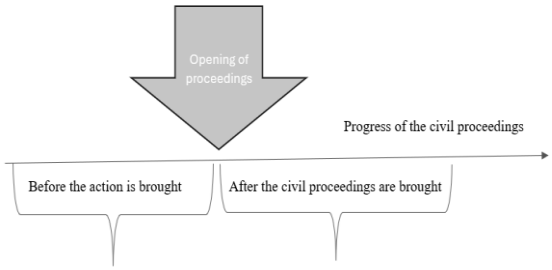

Fig. 1. Application of interim measures in civil proceedings

The court may grant interim measures on the basis of a reasoned written application for interim measures by an interested party, until the date on which the application is lodged with the court. When lodging such an application, the applicant shall state the reasons why the action was not brought together with the application, provide evidence of the threat to the applicant's interests and pay the fixed amount of stamp duty prescribed in Article 80(5) of the CPC and a security deposit of half the amount of the stamp duty prescribed in Article 80(1) of the CPC. In the case of an application for interim measures relating to proceedings pending before national or foreign arbitrators or foreign courts, a deposit of 300 EUR shall be required. The court may, by order, reduce the amount of the deposit by the reasoned and substantiated request of the applicant on the ground of the applicant's serious pecuniary circumstances. The court shall, when granting interim measures, fix a time-limit within which the action must be brought. That time-limit may not exceed fourteen days. If the action is to be brought before a foreign court or arbitral tribunal, the time limit shall not exceed thirty days. Where compulsory mediation is compulsory before an action may be brought before a court in cases provided for by law, the period within which the action must be brought shall run from the date on which the compulsory mediation is completed. In that case, the applicant must submit, together with the application for interim measures, the details of the request for compulsory mediation and, at the end of the compulsory mediation, must notify the court of the termination of the compulsory mediation without delay. Failure to lodge an application within the time limit set by the court shall result in the lifting of the interim measures. Where the failure to bring an action is due to the fault of the person concerned, the security shall be forfeited. The application for interim measures referred to in this paragraph must be made to the court which, in accordance with the rules of jurisdiction, is required to hear the action itself. An application for interim measures relating to a case pending before a foreign court or a foreign or national arbitration shall be made to the Vilnius Regional Court.

Where the application for interim measures does not comply with the requirements as to the content and form of the pleading, but the applicant has paid at least half of the stamp duty provided for in Article 80 of the CPC, the court shall fix a time-limit within which to remedy the deficiencies in the application and shall immediately notify the applicant thereof. If the applicant, having received the court's order for the application to be discharged, applies for interim measures even if the application is defective, the court shall decide on the application for interim measures *mutatis mutandis* by applying the provisions of Article 147(3) of the CPC.

In administrative proceedings, the main procedural aspects of an application for interim measures are regulated in Article 70(4) to (5) of the LAP.

The application for interim relief shall be examined by the judge or the court of the administrative court within three working days of its receipt at the latest, without notice to the defendant or the other parties to the proceedings. If such an application is lodged together with a complaint (application, petition), it shall be dealt with no later than three working days after the receipt of the complaint (application, petition). Where the court or the judge considers that it is necessary to obtain the views of the defendant and/or the other parties to the proceedings on an application for interim relief, the

application shall be dealt with within ten working days of its receipt or of the lodging of the complaint/application. In that case, the defendant and/or the other parties to the proceedings shall be notified of the examination of the application for interim measures and shall be given a time limit within which the defendant and/or the other parties to the proceedings shall be required to submit their observations. The court or the judge shall make an order on the enforcement of the claim, specifying the procedure and the manner in which it shall be effected. The person to whom the measures are granted shall be notified of the adoption of the order granting the precautionary measures and shall be made aware of his liability for breach of the restrictions imposed.

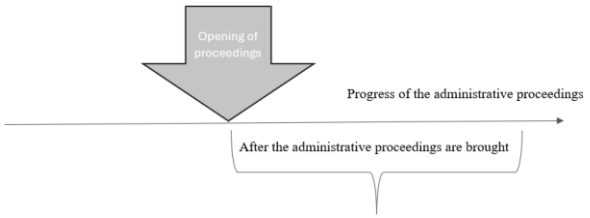

Fig. 2. Application of interim measures in administrative proceedings

Court orders granting interim measures (security measures) include: (1) the time and place of adoption of the order; (2) the name and composition of the court that adopted the order; (3) the reasons for the adoption of the order and the grounds for the interim measures; (4) the person to whom the interim measures are applied (name, surname, personal identification number (if known), place of residence of the natural person; name, registered office address, and business identification number of a legal person); 5) the person whose claims are secured by the interim measures (name, surname, personal identification number, place of residence of the natural person; name, registered office address, code of the legal person); 6) a description of the interim measures applied (where the interim measures relate to property, the name of the property, the asset code (if the property is registered in the asset register), a brief description of the property, the location and any other data identifying the property shall be provided);) where the interim measures relate to property, the owner (co-owners) of the property (name, surname, personal identification number, place of residence of a natural person; name, registered office address, code of a legal person); 8) the extent of the interim measures, the methods of enforcement, the order of satisfaction of the claims and the time-limit for the application of the interim measures (if any), defined by calendar date; 9) any other limitations of rights (if any) relating to the interim measures of protection; 10) where the interim measures of protection relate to property, the custodian or administrator of the property (name, surname, personal identification number, place of residence of a natural person; name, registered office address, code number of a legal person), if appointed by the court; 11) the procedure for the execution of the order; 12) the procedure for appealing against the order.

It should be noted that, where provisional measures relating to property are imposed, the details of the property may be omitted from the order if the property seized is a movable object which is not registered in the property register or if, at the date of adoption of the order, the court does not know how much and what kind of property the defendant has. In such cases, the person at whose request the provisional measures are imposed must, within 14 days, apply to a bailiff for the purpose of locating and describing the defendant's assets. The bailiff shall make an initial adjustment of the details of the seized assets within 14 days of the date of enforcement of the order. After the initial adjustment, the details of the seized property shall be amended or supplemented in accordance with the procedure laid down in the Instructions for the Execution of Judgments. If the order is not submitted to the bailiff for execution within 14 days or if the bailiff does not make an initial adjustment of the data of the attached property within 14 days, the provisional measures shall cease to be valid.

It should be noted that applications for interim measures of protection (security measures) and other applications relating to interim measures of protection are dealt with in accordance with the time-limits and procedures laid down in the General Provisions at the other stages of the proceedings (appeal, reopening of the proceedings, etc.). Moreover, unlike in administrative proceedings, interim measures may also be applied in summary proceedings in civil proceedings (documentary proceedings, court order proceedings), whereas interim measures are not applicable in administrative summary proceedings (Art. 131-1(4) of the LAP Court order proceedings).

In summary, it can be reasonably concluded that the importance of interim measures of protection in cases also determines their prompt and expeditious application, i.e. the general three working day time-limit for their application (or refusal to apply them) provided for by the statutory provisions in both civil and administrative proceedings. This general short procedural time limit is considered to be an extremely short procedural time limit, which reflects the particular importance of the institute of interim measures in both civil and administrative proceedings, but the legislator has also provided a longer procedural time limit for the application of interim measures in both civil and administrative proceedings (seven working days in civil proceedings, ten working days in administrative proceedings), in case of complexity of the matter and the need to take into account more circumstances or collect more information. This freedom of the court or judge to choose the procedural time limit reflects the fact that the court or judge who applies the interim measures in a particular case, whether civil or administrative, has full discretion, i.e. the right to choose the time limit (shorter or longer) for the application of interim measures in a particular case. An application for interim measures in civil proceedings is subject to a fixed stamp duty, whereas in administrative proceedings there is no cost to the parties for lodging the application for interim measures before the court. In civil proceedings, interim measures may be granted before an action has been brought before a court or after the dispute has been arbitrated, which is not the case in administrative proceedings.

Validity of interim measures (security measures)

In administrative proceedings, it is provided that measures securing a claim may be amended or revoked on the initiative of the court hearing the case on the merits or upon a reasoned request submitted to that court by the parties to the proceedings (Article 70(6) of the Administrative Procedure Law). Where the measures taken by the court to secure a claim restrict, infringe or restrict the rights of persons who are not parties to the proceedings, those persons shall have the right to apply to the court hearing the case on the merits to modify or lift the measures to secure a claim against them. The measures shall be varied or revoked by order of the court hearing the main proceedings.

In civil proceedings, in accordance with the provisions of Article 148 of the CPC, the court may, at the reasoned request of the persons involved in the proceedings or of other interested parties, replace one interim measure with another. The court must notify the persons involved in the proceedings or other interested parties, who shall have the right to object to such an application, of the application for replacement of one interim measure. The court may dispense with interim measures if the defendant pays the amount claimed to the account of the court or if the defendant provides a guarantee. In addition, the defendant may pledge his assets for the benefit of the applicant. After the acts referred to in Article 148(2) of the CPC have been carried out after the interim measure has been granted, the court may, by order, modify or revoke the interim measure granted. The prohibition on the defendant's departure from the place of residence may be lifted by payment of the amount claimed to the account of the court or by the provision of a guarantee for the defendant.

Provisional measures of interim protection may be lifted by order of the court hearing the case on its merits, at the reasoned request of the persons involved in the proceedings or of any other interested party (Article 149 of the CPC). The court shall, on its own initiative, revoke interim measures where the person who applied for interim measures fails to bring an action within the time limit set by the court. No appeal shall lie against that order. Where the interim measures imposed by the court restrict, infringe or frustrate the rights of persons who are not parties to the proceedings, those persons shall have the right to apply to the court hearing the substance of the case for the interim measures to be lifted.

In administrative proceedings, if the court rejects the claim (complaint), the interim measures (measures to secure claims) that have been imposed are maintained until the court's decision enters into force. The court must decide on the question of lifting the interim measures (measures securing claims) by a decision (Article 70(9) of the LAP).

If the claim is upheld, the interim measures of protection (measures securing claims) shall remain in force until the judgment is enforced, except as provided for in Article 147(6) of the CPC. A similar provision is laid down in Article 70(10) of the LAP. If the complaint (application, petition) is partially upheld, the question of the validity of the security measures shall be resolved in the court’s decision.

In summary, it can be stated that, given the nature of interim measures, the validity of interim measures is identical in both civil and administrative proceedings, i.e. interim measures remain in force until the legal basis for their validity ceases to exist. Moreover, in both proceedings it is also possible to lift or modify interim measures during the proceedings.

Appealing against and enforcing interim measures (security measures)

In civil proceedings, pursuant to the provisions of Article 151 of the CPC, all orders of the court of first instance on interim measures adopted in accordance with the established procedure may be appealed by the parties to the proceedings against the orders of the court of first instance by way of a separate appeal to a court of a higher instance, except for the cases provided for in the CPC. Persons not taking part in the proceedings may lodge an appeal only against orders of the court of first instance refusing to grant their applications for interim measures of protection. The lodging of an appeal does not stay the proceedings. Orders of the court granting interim relief are not subject to cassation proceedings.

In administrative proceedings, a separate appeal may be lodged against the administrative court's orders on matters relating to the securing of a claim (Article 70(7) of the LAP). The lodging of an appeal against an order securing a claim does not suspend the execution of the order and the hearing of the case.

Both in civil proceedings and in administrative proceedings, court orders to secure a claim or to apply interim measures are enforceable urgently, i.e. they are enforceable without waiting for the entry into force of the court order (Art. 152 of the CPC; Art. 70(8) of the LAP).

It should be noted that an order replacing one precautionary measure with another or lifting the precautionary measure shall be executed after the expiry of the time-limit for appealing against those orders, or, in the case of an individual appeal, after the adoption of an order rejecting the individual appeal. In addition, the rules of the CPC further provide that the court may authorise the immediate execution of an order replacing one interim measure with another or lifting an interim measure.

Court orders on the application of interim measures of protection or measures to secure claims shall be enforced in accordance with the procedure laid down for the enforcement of court judgments (Article 70(8) of the LAP). In accordance with the rules laid down in Part VI of the CPC, judgments, decisions, rulings and orders of the court and arbitration tribunals in civil cases, as well as in cases relating to administrative legal relations, shall be enforceable, among other documents (Art. 584 (1) of the CPC). Court judgments and decisions of authorities and officials on the application of interim measures of protection shall be enforceable documents (Article 587(1)(4) of the CPC). Judgments, sentences, rulings, decisions and orders shall be enforceable after they become final, unless the court decides to enforce them urgently (Art. 588 CPC).

The bailiff shall, upon execution of the judgment, notify the keeper of the relevant public register of the

termination of the application of interim measures in the case (Art. 150 of the CPK).

Moreover, the application of interim measures of protection (security measures) prohibits the seizure of the assets referred to in Articles 668 and 739 of the CPC. The attachment of funds held in the accounts of credit, payment and/or electronic money institutions shall be limited to the transactions specified in the court order. In authorising certain operations, the court shall instruct the bailiff to determine the specific amount of funds that may be used for operations during a calendar month. The seizure of the funds referred to in this paragraph, the authorisation of transactions with the seized funds in the order of the court, or the specific amount which the bailiff has determined may be used for transactions within one calendar month shall not suspend the enforcement of the same or a preceding order of priority of claims. In this case, recovery from seized funds held in accounts with credit, payment and/or electronic money institutions shall be carried out in accordance with the procedure laid down in the Instruction on the Enforcement of Decisions.

Article 146 of the CPC provides that, at the request of a party, the court may, by order, require the claimant or any other person applying for interim measures to provide, within a time limit to be determined by the court, security for the defendant's damages which may result from the application of interim measures. If the claimant fails to pay the money intended to secure the damages or to provide a bank guarantee within the time limit set, the court shall, within three working days of the expiry of the time limit, be obliged to revoke the interim measures imposed. There is no appeal against this order. The administrative procedure does not provide for such a remedy for the defendant.

In summary, the issues relating to the appeal and enforcement of interim measures are similar. The administrative procedure refers to the provisions of the law on civil procedure for the enforcement of orders.

Conclusions

In order to ensure that the individual's right to a judicial remedy, as declared by various international and national legal acts, which includes not only the standard of an effective and efficient civil procedure, but also the guarantee of proper implementation of the court decision, is realised, a procedural protection mechanism of a temporary nature has been established in procedural law - interim measures of protection (measures to secure claims).

Interim measures are understood in court proceedings as a set of prohibitions and restrictions on the right to property, as well as obligations to behave in a certain way, laid down in procedural laws, one or more of which may be imposed by the court at the same time to prevent the enforcement of a judgment from becoming difficult or impossible. It should be noted that the objectives of interim measures in both civil and administrative proceedings do not differ in principle. However, the rules of civil procedure provide for additional procedural measures to protect the defendant's interests, for example, by requiring the defendant to pay damages for possible losses, which is not the case in administrative proceedings.

Interim measures are intended to temporarily settle or "freeze" a situation so that a future court decision (and thus justice) can be implemented. Interim measures of protection and measures to secure claims are, by their very nature, a temporary mechanism for the settlement of a contentious situation, applied on the legal grounds laid down by the law, in order to enable the future judgment to be enforced in reality. They do not constitute a remedy for the protection of a substantive legal relationship, since they merely provide procedural protection of a temporary nature, normally lasting until the judgment is enforced. They are 'provisional' in nature, as they can be modified or revoked and normally expire once the legal dispute has been finally settled. The principles of legal equality, economy of proceedings, fairness and other principles of judicial procedure are important in deciding whether to grant interim measures of protection or interim measures of security. However, they are not fully applicable to applications for interim measures in court proceedings. For example, the principle of the right to be heard is usually not fully realised at the initial stage of an application for interim measures, since the defendant is informed of the court's order without being heard, but has the procedural possibility to appeal against the order for interim measures at a later stage, or to ask the court to order the claimant to provide security for the defendant's potential damages.

Despite the differences in the regulation of civil and administrative proceedings, the substantive issues of interim measures are regulated in a similar way: the legislator has provided grounds for the application of these measures, provided a non-exhaustive list of the measures that may be applied in court proceedings, provided for an urgent mechanism to resolve these issues, and regulated the validity and enforcement of decisions on interim measures and measures to secure claims. The link between administrative and civil proceedings is also reflected in the redirecting legal provisions in the administrative procedure, which refer to the provisions of the CPC. However, one of the main differences is that administrative procedure does not provide for the possibility of applying for interim measures before the date of the acceptance of the complaint (application, petition). In administrative proceedings, the court is more active in examining applications for interim measures and may also apply such measures on its own initiative, and the application for interim measures is not subject to stamp duty. In addition, special laws may provide for a different mechanism for dealing with questions relating to interim measures.

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HOUSEHOLD FOOD DONATIONS IN MALAYSIA: AN INTEGRATED NORM ACTIVATION AND PLANNED BEHAVIOUR APPROACH

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Abstract
Food insecurity and food waste represent two sides of a global paradox—Hunger Amidst Abundance. Provocatively, the fact that food insecurity exists, given that the global food production exceeds the dietary needs of human population worldwide, necessitates critical examination. The extensive global loss and waste of food contribute not only to the depletion of finite resources but also to significant economic challenges for nations across the world. In Malaysia, households contribute significantly to food waste, with over 8.3 million tonnes discarded annually, including large quantities of edible food goes to waste. Even with its importance, research on food redistribution efforts in Malaysia, especially household-level contributions, remains scarce. Given this context, there is an urgent need to redirect edible food surpluses through systematic redistribution efforts. Reducing food waste, particularly via food bank donations, is among the most effective strategies to alleviate food insecurity. This study investigates the determinants influencing Malaysian households' intention to donate food surpluses to food banks, integrating the Norm Activation Model (NAM) and the Theory of Planned Behaviour (TPB) to develop a comprehensive framework to scrutinize this phenomenon. Using survey data from 312 households in Malaysia, the study examines the roles of perceived behavioural control, personal and subjective norms, awareness of consequences, and attitudes toward food waste reduction and food donation. Structural equation modelling via SmartPLS reveals that perceived behavioural control, personal norm, and awareness of consequences significantly influence donation intention. Notably, personal norm mediates the relationship between awareness of consequences and donation intention, suggesting that moral obligation activated by environmental awareness drives prosocial behaviour among households. Households' perceived behavioural control, personal norm, and awareness of food-waste consequences significantly influence their intention to donate food surpluses to food banks.While attitudes toward food waste reduction and food donation are positively correlated, they do not directly influence donation intention, indicating a disconnect between favourable attitudes and actual behavioural intent. This gap highlights the need to explore external barriers that may hinder households from acting on their intentions. The findings underscore the importance of fostering moral norms and environmental awareness to enhance food donation behaviour. They also call for policy interventions and cross-sector collaboration to address logistical and psychological barriers. Future research may incorporate external determinants and observed behaviours to enrich understanding and improve food redistribution practices. This study contributes to the literature on sustainable food management and offers practical insights for policymakers, NGOs, and food banks aiming to mobilize household-level food donations behaviour.
Keywords: Food Recovery, Food Redistribution, Donation Intention, Food Surplus, Households.
JEL classification: Q22, Q180, Q13.

Background and Introduction

The issues of hunger and food insecurity are at an unprecedented level of urgency now than at any previous point in the history. In year 2023, it was reported that 281.6 million, of people across fifty-nine countries suffered acute food-insecurity (FSIN & GNAFC, 2024). Over the span of one year, the number of individuals facing severe food insecurity has risen significantly, reaching 343 million across 74 countries (WFP, 2024). Notably, hunger and food insecurity are closely interrelated with the issue of food waste, highlighting a critical imbalance in global food distribution and resource management. Contemporarily, the global scale of food waste is staggering, amounting to approximately USD 1 trillion annually (Septianto et al., 2020). This significant economic and environmental concern underscores the urgent need for more sustainable food management and recovery practices.

The contrasting phenomena of food insecurity and food waste illustrate the Hunger Amidst Abundance paradox. Provocatively, the fact that food insecurity exists, given that the global food production exceeds the dietary needs of human population worldwide, necessitates critical examination. Modern agricultural systems, such as precision agriculture, digital and automation farming, have achieved remarkable advancements in improving yield productivity by seventy percent, while significantly reducing adverse effects on the environment (Anyibama et al., 2025). In the world of plenty, it is ironic to know that 19 percent or 1.05 billion tonnes of foods are wasted during the food retailing, food servicing and household consumption (UNEP, 2024). Before the point of food retailing, approximately 14% of food produced globally is lost during production, processing, packaging and distribution process (FAO, 2019).

Irrepressible amount of food loss and waste worldwide leads to not only depletion of finite resources, but also economic burdens for all nations (Jamaludin, Elmaky, & Sulaiman, 2022). One of the prominent economic loss caused by food waste is its dire environmental effects. When food waste is discarded in landfills, it decomposes and releases greenhouse gases (GHGs), such as Methane gas and Carbon Dioxide, into the atmosphere. Although Methane constitutes only seventeen percent of greenhouse gases, it has a profoundly destructive impact. It is highly potent in driving global temperature escalation, exerting a warming effect 80 times greater than that of Carbon Dioxide (Harinderan, 2023). Among other causes, landfills are, in fact, the world top largest contributor in emitting Methane gas.

Access-barriers and unequal distribution of food abundance are the two main causes of the Hunger Amidst Abundance paradox. Economic disparities, political instability, as well as poor infrastructure and collaboration, are among common reasons behind the causes, preventing impoverished populations from receiving the global food abundance. Moreover, contemporary global trends, including rapid population growth, escalating consumption levels, climate change, and anthropogenic environmental pollution, are becoming increasingly pronounced and underscore pressing concerns regarding the quality and adequacy of food supplies (Melnikova et al., 2023). Often times, natural disasters, conflicts, climate change and exploitative agricultural system, that prioritises exports over local food security, could further exacerbate the issue of food insecurity, especially in developing countries, such as those in Sub-Saharan region (Bjornlund, V., Bjornlund, H., & Van-Rooyen, 2020). In other words, this paradox highlights a failure of social systems and policies. It amplifies the essential role of practicality and ethical principles in achieving global food security while emphasising the importance of environmental sustainability.

The objective of this study is to investigate the role of household food donations in advancing food recovery efforts within Malaysia. Accordingly, the object of this study is key determinants influencing households' intention to donate food surpluses to food banks in Malaysia. The study tested 12 hypotheses, some of which are interconnected through mediating and mediated mediation relationships, reflecting the complex structural dynamics within the research model. To address these objectives, integrated two theoretical frameworks which are the Norm Activation Model (NAM) and the Theory of Planned Behaviour (TPB) - a combination supported by recent research on intentions to engage in pro-environmental behavior was used and the survey method was employed due to its structured approach and rigorous sampling requirements, which enhance data reliability compared to qualitative techniques.

Literature Review

Food insecurity remains a critical issue in Malaysia, further compounded by significant levels of food waste. The United Nations Environment Programme (2023) reports that Malaysians discard approximately 8.3 million tonnes of food annually—equivalent to 259.82 kg per person (Nizam, 2023). In 2021, Malaysia recorded the highest per capita food waste in Southeast Asia (Zalina, 2023). According to SWCorp, 17,007 tonnes of food were wasted daily, including 4,081 tonnes that were still edible - sufficient to provide three meals a day to nearly 3 million undernourished individuals. Households were identified as the largest contributors to this waste, accounting for 38%, outpacing wet markets (24%) and restaurants (23%) (Jereme et al., 2016; Ramli et al., 2022).

Given this context, there is an urgent need to redirect edible food surpluses through systematic redistribution efforts. Reducing food waste, particularly via food bank donations, is among the most effective strategies to alleviate food insecurity (Galli et al., 2019). Beyond alleviating food insecurity, such initiatives contribute to social welfare and reduce commercial disposal costs (Tarasuk & Eakin, 2005). However, household-level food surpluses remain an underutilised component in food recovery efforts, despite its substantial contribution to overall waste.

Even with its importance, research on food redistribution efforts in Malaysia, especially household-level contributions, remains scarce. Existing literature has concentrated on sustainable food waste behaviour (Nik-Masdek et al., 2023), retailers' motivations to donate food (Hamik et al., 2021), and food-surpluses donation initiatives such as the Lost Food Project (Ganesan, Thinakaran & Ramiah, 2019). Notably, there is a gap in empirically tested frameworks that examine the determinants of households' food donation intention. In light of Malaysia's commitment to the United Nations Sustainable Development Goals, particularly SDG 12.3, which targets a 50% reduction in global per capita food waste, developing an inclusive framework that promotes household engagement with food banks is critical. Cross-sector collaboration throughout the food supply chain is essential for advancing sustainable food waste management (Nik-Masdek et al., 2023).

In light of the pressing need to reduce food waste and enhance food bank efficiency, this study investigates the determinants influencing Malaysian households' intention to donate their food surpluses. Despite the essential role food banks play in mitigating hunger and food insecurity, donation rates remain inconsistent. Socio-psychological factors, including personal values or norms, social influence and awareness of consequences, are likely to shape donation behavior. Recent evidence highlights the role of personal norms in shaping household engagement with sustainable food waste practices (Nik-Masdek et al., 2023), which may similarly influence relevant attitudes and intention to donate to food banks (Bennet et al., 2023). Besides, awareness of consequences has been shown to activate these personal norms, thereby promoting donation behavior (Fang et al., 2009) or another behavioural intention (Shin et al., 2018; T'ing et al., 2021). In other words, personal norm could mediate the effect of awareness of consequence on intention to donate to food banks.

Additionally, subjective norm, reflecting perceived social expectations, have been identified as influential in motivating donation intention (Amin et al., 2023; Buyong, 2024). Subjective norm was also shown to significantly shape attitudes toward entrepreneurship (Baba, Keling & Yap, 2025), highlighting their potential to influence related attitudinal constructs. Moreover, perceived behavioural control, defined as individuals' belief in their ability to perform a given behaviour, has been shown to positively influence pro-social and sustainable actions (Savari et al., 2023). When donors feel confident in their capacity to contribute to food banks, their intention to donate increases accordingly (Amin et al., 2023; Buyong, 2024). This construct has similarly predicted intentions in other contexts, such as organic food consumption (Shin et al., 2018).

As for attitudes, they were found to significantly influence intention to donate (Habib et al., 2023; Millán et al., 2024). Interestingly Habib et al. (2023) has discovered that individuals' attitudes regarding food waste reduction would positively affect their intention to donate their food surpluses. Furthermore, Park et al. (2017) also revealed how different attitudes could interact to each other, influencing behavioural intention. Thus, in this study, attitudes regarding food waste reduction is postulated to influence attitudes regarding food donation, leading to households' intention to donate to food banks. By examining constructs such as attitudes toward food donation and waste, personal and subjective norms, perceived behavioural control, and awareness of consequences, this research seeks to develop a framework that can effectively encourage household participation in food redistribution efforts.

Building on the insights from the preceding literature review, this study outlines its key objectives to guide the forthcoming empirical analysis.

To investigate on determinants of food-donation intention to food banks among households in Malaysia;

- To scrutinise how personal norm and subjective norm influence food-donation intention to food banks among households in Malaysia;
- To find out how Malaysian households' attitude regarding food waste reduction and attitude regarding food donation impact on their food-donation intention to food banks;
- To examine how Malaysian households', perceived behavioural control impacts on their food-donation intention to food banks;
- To examine how Malaysian households' awareness of consequences impacts on their food-donation intention to food banks.

Hypotheses and Research Framework. The study tested 12 hypotheses, some of which are interconnected through mediating and mediated mediation relationships, reflecting the complex structural dynamics within the research model. The full list of the twelve hypotheses and the research framework (Fig. 1) is provided as follow.

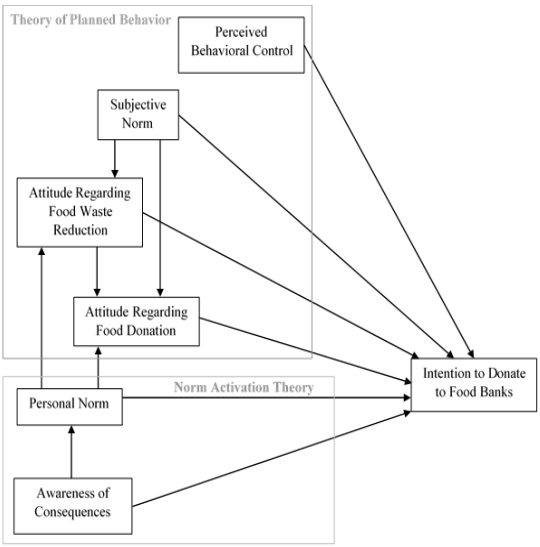

Fig 1. Research Framework

H1: Perceived Behavioural Control has positive impact on households' Intention to Donate to Food banks.

H2: Subjective Norm has positive impact on households' Intention to Donate to Food banks.

H3: Subjective Norm has positive impact on households' Attitude Regarding Food Waste Reduction.

H4: Subjective Norm has positive impact on households' Attitude Regarding Food Donation.

H5: Attitude Regarding Food Waste Reduction positively influence households' Intention to Donate to Food banks.

H6: Attitude Regarding Food Waste Reduction positively influence Attitudes Regarding Food Donation.

H7: Attitude Regarding Food Donation positively influence households' Intention to Donate to Food banks.

H8: Personal Norm positively influence households' Intention to Donate to Food banks.

H9: Personal Norm positively influence households' Attitude Regarding Food Waste Reduction.

H10: Personal Norm positively influence households' Attitude Regarding Food Donation.

H11: Awareness of Consequences has positive effect on households' Intention to Donate to Food banks.

H12: Awareness of Consequences has positive effect on Personal Norm.

Methodology

This study aims to identify the key factors influencing households' intention to donate food surpluses to food banks. It integrates two theoretical frameworks which are the Norm Activation Model (NAM) and the Theory of Planned Behaviour (TPB) - a combination supported by recent research on pro-environmental behavioural intentions (Dong et al., 2023; Savari et al., 2023; Setiawan et al., 2020). The integration of NAM and TPB offers a comprehensive model that captures both the pro-social drivers of NAM and the self-regulatory components of TPB. In this study, the proposed framework comprises of three independent variables (Perceived Behavioral Control, Subjective Norm, and Awareness of Consequences), three mediating variables (Personal Norm, Attitude Regarding Food Waste Reduction, and Attitude Regarding Food Donation) and one dependent variable (Intention to Donate to Food Banks). These constructs form the basis for twelve hypotheses underpinning the study. The survey method was employed due to its structured approach and rigorous sampling requirements, which enhance data reliability compared to qualitative techniques. A total of 312 valid responses were obtained from households in Selangor, Johor, and Kuala Lumpur which were selected for their high levels of municipal food waste and limited landfill capacity. The collected data were analysed using the SPSS and the SmartPLS 4.0 to perform internal validity and consistency, discriminant validity, descriptive analysis and hypothesis testing.

Result and Discussion

Assessing internal reliability, convergent validity, and discriminant validity is crucial to ensure constructs are stable, accurate, and distinct, enhancing the integrity of the analysis. The standard threshold for Cronbach's Alpha and Composite Reliability is 0.70 (Cronbach, 1951; Hair et al., 2022), indicating acceptable internal reliability and consistency. As shown in the Table 1, all constructs exceeded this threshold, confirming that the measurement model reliably assessed its intended constructs. Convergent validity evaluates how closely indicators correlate with the construct they are intended to measure, using AVE values as the benchmark. According to Hair et al. (2022) and Fornell & Larcker (1981), AVE values above 0.50 indicate sufficient convergent validity. In this study, all constructs met this criterion, with the lowest AVE at 0.69, demonstrating acceptable convergent validity across the model.

Table 1. Internal Reliability, Consistency and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude Regarding Food Waste Reduction	0.924	0.943	0.767
Attitude Regarding Food Donation	0.873	0.913	0.725
Awareness of Consequences	0.884	0.92	0.743
Intention to Donate to Food Banks	0.861	0.906	0.706
Perceived Behavioral Control	0.874	0.914	0.726
Personal Norm	0.887	0.917	0.69
Subjective Norm	0.892	0.92	0.699

Discriminant validity is assessed using both the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). As proposed by Fornell and Larcker (1981), the square root of the AVE for each construct should exceed its correlations with other constructs, indicating that each construct shares more variance with its indicators than with others. The Fornell-Larcker table (Table 2) confirms this criterion is met.

Table 2. Fornell Larcker

	1	2	3	4	5	6	7
1	**0.876**						
2	0.692	**0.851**					
3	0.61	0.669	**0.862**				
4	0.491	0.606	0.715	**0.841**			
5	0.426	0.537	0.533	0.664	**0.852**		
6	0.541	0.681	0.68	0.751	0.58	**0.831**	
7	0.543	0.522	0.546	0.603	0.641	0.655	**0.836**

Additionally, HTMT values are evaluated following recommendation by Hair et al., 2022 and Ringle et al., 2023, with the accepted threshold of 0.90. Bootstrapped confidence intervals were applied, with all HTMT values below 0.90 and no intervals containing the value of 1, satisfying the criteria for discriminant validity (Franke & Sarstedt, 2019; Henseler et al., 2015). Therefore, as shown in Table 3, discriminant validity is supported in this model.

Table 3. HTMT and Confidence Interval

Correlation	HTMT	5.%	95%
2 <-> 1	0.768	0.683	0.842
3 <-> 1	0.673	0.577	0.76
3 <-> 2	0.76	0.67	0.842
4 <-> 1	0.549	0.437	0.651
4 <-> 2	0.699	0.611	0.777
4 <-> 3	0.82	0.731	0.898
5 <-> 1	0.467	0.372	0.56
5 <-> 2	0.609	0.523	0.688
5 <-> 3	0.602	0.505	0.693
5 <-> 4	0.762	0.688	0.83
6 <-> 1	0.589	0.487	0.687
6 <-> 2	0.766	0.687	0.835
6 <-> 3	0.763	0.661	0.851
6 <-> 4	0.857	0.771	0.93
6 <-> 5	0.652	0.554	0.741
7 <-> 1	0.592	0.494	0.687
7 <-> 2	0.584	0.492	0.671
7 <-> 3	0.611	0.495	0.727
7 <-> 4	0.69	0.58	0.792
7 <-> 5	0.724	0.62	0.812
7 <-> 6	0.733	0.649	0.813

1: Attitude Regarding Food Waste Reduction
2: Attitude Regarding Food Donation
3: Awareness of Consequences
4: Intention to Donate to Food Banks
5: Perceived Behavioral Control
6: Personal Norm
7: Subjective Norm

Before examining the results of hypothesis testing, it is necessary to profile the 312 individuals who contributed to the dataset. The demographic profile of the respondents, shown in Table 4, reveals a predominantly youthful and socially conscious cohort, with a notable skew towards female participants (54.2%). The age distribution is concentrated among individuals aged 18 to 24 (75.3%) and the majority of respondents are single (68.3%), suggesting a population in early adulthood. Educational attainment is relatively high, with over 90%

of them possessing at least a college-level or higher qualification, reflecting well educated and informed group. Prior donation behavior is prominent, with 73.7% having contributed before, indicating a predisposition towards altruistic and community-oriented activities. Household composition is typically moderate, with 76.3% residing in households of three to six members, while 89.7% report having no children, reinforcing the demographic's youthful and unattached status.

Table 4. Demographic Profile

Demographic Variable	n	%
GENDER		
Female	169	54.2
Male	137	43.9
Prefer not to say	6	1.9
MARITAL STATUS		
In a relationship	67	21.5
Married	32	10.3
Single	213	68.3
EDUCATIONAL BACKGROUND		
College / Professional Background	186	59.6
Higher Education or Above	96	30.8
Other or Non-Formal Education	2	0.6
Primary / Secondary School	28	9
AGE		
18-24 years old	235	75.3
25-34 years old	50	16
35-44 years old	8	2.6
35-54 years old	14	4.5
55-64 years old	4	1.3
65 years old and above	1	0.3
NUMBER OF CHILDREN		
1-2	14	4.5
3-4	15	4.8
5 and more	3	1
none	280	89.7
NUMBER OF PEOPLE LIVING IN THE HOUSE		
1-2 people	44	14.1
3-4 people	125	40.1
5-6 people	113	36.2
More than 6 people	30	9.6
DONATED BEFORE?		
No	82	26.3
Yes	230	73.7

As presented in Table 5, eight out of twelve hypothesized relationships are empirically supported. Specifically, households', perceived behavioral control, personal norm, and awareness of food-waste consequences were found to have significant and direct effects on their intention to donate to food banks. In overall, all the path coefficients are also depicted in Fig.2

Interestingly, although subjective norm does not directly influence the intention to donate, it demonstrates a significant direct effect on households' attitude regarding food waste reduction. Moreover, subjective norm exerts a significant indirect effect on households' attitude regarding food donation through the full mediation of food waste reduction attitudes (refer to Table 6). In turn, households' positive attitude regarding food waste reduction significantly predicts a favorable attitude regarding food donation.

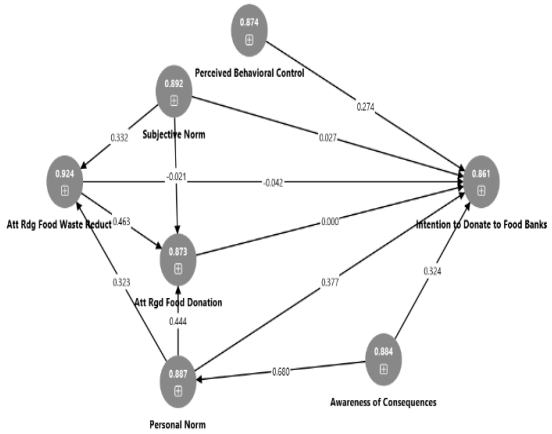

Fig 2. SmartPLS Structural Model

Table 5. Hypotheses Testing Results

Hypothesis	Relationship	Path Coeff	P Value	Decision
H1	**Perceived Behavioral Control → Intention to Donate to Food banks**	**0.274**	**0*** **	**S**
H2	Subjective Norm → Intention to Donate to Food banks	0.027	0.372	NS
H3	**Subjective Norm → Attitude Regarding Food Waste Reduction**	**0.332**	**0*** **	**S**
H4	Subjective Norm → Attitude Regarding Food Donation	-0.021	0.366	NS
H5	Attitude Regarding Food Waste Reduction → Intention to Donate to Food banks	-0.042	0.25	NS
H6	**Attitude Regarding Food Waste Reduction → Attitudes Regarding Food Donation**	**0.463**	**0*** **	**S**
H7	Attitude Regarding Food Donation →Intention to Donate to Food banks	0	0.497	NS
H8	**Personal Norm → Intention to Donate to Food banks**	**0.377**	**0*** **	**S**
H9	**Personal Norm → Attitude Regarding Food Waste Reduction**	**0.323**	**0*** **	**S**
H10	**Personal Norm → Attitude Regarding Food Donation**	**0.444**	**0*** **	**S**
H11	**Awareness of Consequences → Intention to Donate to Food banks**	**0.324**	**0*** **	**S**
H12	**Awareness of Consequences → Personal Norm.**	**0.68**	**0*** **	**S**

Note: *** Significant at 1%; S: Supported; NS: Not Supported

However, it is noteworthy that neither of the attitudes - regarding food waste reduction nor food donation - are found to have a significant impact on the intention to donate to food banks. Further analysis reveals that personal norm has a direct and significant effect on both attitudes: regarding food waste reduction and food donation. Additionally, personal norm shows a significant indirect influence on households' attitude regarding food donation, indicating a partial mediation effect, as illustrated in Table 6.

Importantly, households' awareness of consequences is identified as a key antecedent, exerting direct and significant effects on both personal norm and the intention to donate to food banks. Beyond these direct effects, awareness of consequences also contributes an indirect effect via personal norm, highlighting another partial mediation pathway in shaping donation intentions to food banks. In addition to the indirect effect of households' awareness of consequences on their attitude toward food donation, a mediated mediation effect is also observed. Specifically, personal norm was found to mediate the mediating effect of awareness of consequences on attitude, indicating a more complex relationship. This layered mediation suggests that while awareness of consequences influences attitude, this effect is further transmitted through the internalization of personal norms. For detailed statistical support, refer to Table 6.

Table 6. Specific Indirect Effects

Mediating / Mediated Mediation Relationship	Path Coeff.	P values	Remark
Personal Norm → Att Rdg Food Waste Reduction → Att Rgd Food Donation	0.15	0***	M
Subjective Norm → Att Rdg Food Waste Reduction → Att Rgd Food Donation	0.154	0***	M
Awareness of Consequences → Personal Norm → Att Rdg Food Waste Reduction → Att Rgd Food Donation	0.102	0***	MM
Awareness of Consequences → Personal Norm → Att Rdg Food Waste Reduction	0.22	0***	M
Awareness of Consequences → Personal Norm → Att Rgd Food Donation	0.302	0***	M
Awareness of Consequences → Personal Norm → Intention to Donate to Food Banks	0.256	0***	M

Note: *** Significant at 1%; M: Mediating Relationship; MM: Mediated Mediation Relationship

To validate the specific indirect effects, the results of the total indirect effects are presented in Table 7. Consistent with aforementioned findings, the total indirect effects of awareness of consequences on households' attitudes regarding food waste and food donation were found to be significant. Likewise, awareness of consequences has a significant total indirect effect on households' intention to donate to food banks. Additionally, both personal and subjective norms demonstrate significant indirect effects on households' attitudes regarding food donation.

However, households' attitudes do not necessarily translate into households' intention to donate food surpluses to food banks. This disconnection may stem from various intervening factors, such as logistical, social, or psychological barriers that impede food donation intention. The disjunction between attitude and donation intention warrants further exploration in future research to identify the underlying mechanisms and possible moderating variables.

Table 7. Total Indirect Effects

Mediating / Mediated Mediation Relationship	Path Coeff	P values	Remark
Awareness of Consequences → Att Rdg Food Waste Reduction	0.22	0***	M
Awareness of Consequences → Att Rgd Food Donation	0.404	0***	MM
Awareness of Consequences → Intention to Donate to Food Banks	0.247	0***	M
Personal Norm → Att Rgd Food Donation	0.15	0***	M
Subjective Norm → Att Rgd Food Donation	0.154	0***	M

Note: *** Significant at 1%; M: Mediating Relationship; MM: Mediated Mediation Relationship

The Q^2 Predict value assesses the model's predictive relevance, with values above 0 indicating some level of relevance. The construct 'Intention to Donate to Food Banks' demonstrates strong predictive capacity with a Q^2 of 0.600. Additionally, the coefficient of determination (R^2 = 0.692) reveals that 69.2% of the variance in donation intentions is explained by the structural model, highlighting substantial explanatory power. The unexplained variance (30.8%) suggests the potential influence of other unexamined factors.

Table 8. Coefficient of Determination and Predictive Relevance

Construct	R^2	Q^2 Predict
Attitude Reducing Food Waste Reduction	0.355	0.378
Attitude Regarding Food Donation	0.613	0.434
Intention to Donate to Food Banks	**0.692**	**0.600**
Personal Norm	0.456	0.456

Conclusion

Households' perceived behavioural control, personal norm, and awareness of food-waste consequences significantly influence their intention to donate food surpluses to food banks. Notably, personal norm plays a mediating role in the relationship between awareness of

food-waste consequences and donation intention. This suggests that households' recognition of food waste issue can activate moral obligations toward helping those in need, ultimately reinforcing their intention to donate their food surpluses.

Importantly, in this study, while personal norm is primarily associated with prosocial behaviour, such as aiding the underprivileged, awareness of consequences pertains to the broader societal issue of food waste. This mediation effect underscores the intricate relationship between food waste and food insecurity. Households with strong moral convictions about helping the poor tend to develop favourable attitudes regarding both food waste reduction and food donation.

Interestingly, attitude toward reducing food waste positively correlates with attitude regarding food donation, further reinforcing the interconnectedness of these issues. This association also reflects households' understanding of how food donation can serve as a practical means of addressing food waste. However, despite these favourable attitudes, households' intention to donate food surpluses does not improve correspondingly. This disengagement between attitude and intention reveals underexplored determinants that inhibit households from translating their positive attitudes into behavioural intention.

Limitation of Study

The findings of this study are derived from data collected exclusively from households residing in three Malaysian states: Kuala Lumpur, Selangor, and Johor. As such, caution must be exercised when generalising these findings to the broader Malaysian population, as regional differences in socio-economic profiles, cultural attitudes, and infrastructural support may yield varying outcomes in other states. Moreover, the study's structural model is limited to internal determinants, such as personal attitudes, perceived behavioural control, and subjective norms, that operate at the level of individual cognition and intention. In reality, however, households' decisions regarding the donation of food surpluses are likely influenced by a complex interplay of external factors that support or hinder food redistribution practices. Without accounting for these external variables, the predictive capacity of the model remains inherently constrained. Additionally, it is crucial to highlight that the present research focuses on behavioural intention rather than observed behaviour. Although intention is often considered a strong antecedent to action, it does not guarantee behavioural execution. Factors, such as situational barriers, changes in personal circumstances, or the absence of enabling environments, can disrupt the translation of intention into actual behaviour.

Further research

Future research should consider examining additional variables that may influence households' intention to donate food surpluses to food banks. In particular, it is essential to investigate external determinants, such as government initiatives, institutional support, and macroeconomic conditions that could lead to donation intention. Given that the current study reveals no significant relationship between attitudes and donation intention, further inquiry is warranted into perceived risks and barriers that may hinder households from engaging in food surpluses donation. It is strongly recommended that subsequent studies delve deeper into the underlying psychological and contextual mechanisms governing food donation practices among households and identify potential moderating factors that may impact this donation intention. In addition, employing a mixed-method approach that integrates both quantitative and qualitative techniques would enhance understanding of the complexities surrounding food donation intention and its underlying determinants. Besides, mixed-method approaches could capture both intention and real-world behaviours, thereby offering a more comprehensive understanding of food donation dynamics among households.

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AI-BASED INNOVATION MANAGEMENT: A BIBLIOMETRIC ANALYSIS

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Abstract
Innovation management is widely recognized as a critical driver of organizational performance, competitiveness, and long-term growth. The advent of advanced digital technologies, particularly artificial intelligence (AI), has transformed how organizations approach innovation, positioning AI not merely as a supportive tool but as a strategic enabler of knowledge creation, product development, and business model innovation. Despite the increasing relevance of AI in innovation management, current research remains fragmented, focusing largely on specific applications such as machine learning for product design, predictive analytics for strategic planning, or natural language processing in knowledge management. Consequently, there is a lack of comprehensive understanding that integrates technological, managerial, and societal dimensions, limiting both theoretical advancement and practical guidance for organizations aiming to leverage AI for innovation.
This study addresses this gap through a systematic bibliometric analysis of the AI-based innovation management literature. Using Scopus as the primary data source, publications up to August 31, 2025, were analyzed to map the field's evolution, thematic clusters, key contributors, and emerging trends. The analysis employed performance indicators including publication counts, citation patterns, h-index metrics, and science mapping methods such as keyword co-occurrence and co-authorship networks. Visualization was performed using VOSviewer to identify thematic clusters and interrelationships.
Results indicate that the field has undergone two distinct phases. The formative phase (1993–2015) was characterized by sporadic publications and limited academic visibility, while the growth phase (post-2018) exhibits exponential increases in both publications and citations, reaching a peak of 86 publications and 2,175 citations in 2025. The bibliometric mapping identified eight major thematic clusters: (1) Generative AI, NLP, and innovation practices; (2) Industrial innovation, risk, and strategic management; (3) Artificial intelligence, technology management, and foresight; (4) Research methods, organizational change, and knowledge work; (5) Decision-making, design, and innovation processes; (6) Sustainability, risk, and societal impacts of technology; (7) Open innovation, SMEs, and technology-driven entrepreneurship; and (8) Digital transformation, global competitiveness, and management practices. These clusters illustrate the field's interdisciplinary nature, bridging technical, managerial, and societal perspectives. Key topics such as generative AI, digital transformation, and sustainability reflect emerging priorities for both research and practice.
The study underscores ongoing gaps and opportunities in the literature, including the need for integrative frameworks that combine technological capabilities, managerial practices, and societal considerations. Furthermore, context-specific research in emerging economies and empirical studies assessing AI adoption across sectors are limited but necessary for advancing both theory and practice. Overall, AI-based innovation management has evolved into a rapidly expanding, influential research field that functions as a transformative force, shaping organizational knowledge creation, strategic foresight, and sustainable competitiveness in the digital economy.
Keywords: Artificial Intelligence, Innovation Management, Digital Transformation, Generative AI, Sustainability, Open Innovation.
JEL classification: O31, O32, L86

Introduction

Innovation management has long been acknowledged as a key driver of organizational performance, competitiveness, and long-term growth (Tidd & Bessant, 2020). The emergence of advanced digital technologies, particularly artificial intelligence (AI), is profoundly transforming how organizations manage innovation. AI can enhance decision-making, accelerate research and development processes, facilitate knowledge recombination, and enable the creation of novel products, services, and business models, positioning it not only as a tool but as a strategic enabler of innovation (Cockburn, Henderson, & Stern, 2018).

Despite the growing scholarly and managerial interest in AI-driven innovation, existing literature remains fragmented. Most studies focus on specific applications, such as machine learning in product design, natural language processing in knowledge management, or predictive analytics in strategic planning, with limited attention to integrative perspectives that capture the intellectual structure, thematic interconnections, and global dynamics of the field (Donthu et al., 2021). This fragmentation highlights the problem addressed in this study: the absence of a comprehensive understanding of AI-based innovation management that links technical, managerial, and societal dimensions. The resulting knowledge gap limits both theoretical advancement and practical guidance for organizations seeking to leverage AI for innovation.

The aim of this study is to systematically map the scientific landscape of AI-based innovation management using bibliometric analysis, thereby providing a comprehensive overview of the field's evolution, thematic clusters, influential contributors, and emerging trends. To achieve this objective, the study addresses the following research questions: (1) How has AI-based innovation management evolved over time in terms of publication output, citation patterns, and intellectual influence? (2) What are the dominant thematic clusters, and how do they reflect the interdisciplinary nature of the field? (3) Which countries, institutions, and international collaborations have played the most significant roles in shaping this research domain? (4) How do emerging topics such as generative AI, digital transformation, and sustainability influence the trajectory of AI-based innovation research? (5) What gaps and opportunities exist in the current literature that can inform future research and managerial practice?

By addressing these questions, the study contributes to both scholarly knowledge and practical application, offering insights into how AI reshapes innovation management and highlighting areas for future research that integrate technological, managerial, and ethical considerations.

Literature Review

Innovation is often described as a process through which an initial invention or creative idea progresses from research and development to market introduction (Jensen et al., 2012). This process typically involves stages such as idea generation, evaluation, and implementation (Schultz, 2019) and is characterized by its capacity to induce changes in operational processes, making it a form of dynamic capability. Innovation processes encompass creative activities that result in new and purposeful business processes, as well as diverse tasks requiring multiple skills and approaches (Voigt, 2013). A major challenge in these processes is ensuring reproducible manufacturing, particularly when there is limited experience with new procedures, materials, and tooling. Developing methods to acquire sufficient process knowledge is therefore essential for the success of innovative endeavors (Großmann & Wiemer, 2010).

Effective management of innovation processes requires a structured approach, incorporating functional, process, and administrative subsystems (Grynko & Gviniashvili, 2017). Evaluating the efficiency of innovation management must consider multiple impacts, including scientific and technological, resource-related, economic, financial, and social effects (Rybin et al., 2020; Junior et al., 2012). Innovation management integrates disciplines such as technology management, research and development, and process management to optimize the creation and implementation of innovative products and services (Zabala-Iturriagagoitia, 2014).

A variety of tools and techniques, including design thinking, business model canvas, and technology watch, are used to systematically observe, analyze, and leverage technological information, enabling firms to align their technological base and internal competencies with external signals (Hurni & Grösser, 2017). Organizations must also develop flexible and sustainable structures and cultures to adapt effectively to environmental changes and emerging challenges as they grow (Yu, 2017).

Recent literature emphasizes that AI does not merely optimize existing processes but can fundamentally transform the nature of innovation processes and research and development organizations. AI supports human competencies across different stages of the innovation process, including opportunity identification, solution development, and testing (Haefner, 2021). The development of advanced deep learning methods positions AI as a "discovery tool", capable of accelerating innovation through improved prediction, data exploration, and automation of routine experiments. At the same time, concentration of data and algorithms in the hands of a few firms may constrain overall innovation unless appropriate data-sharing mechanisms are in place (Cockburn, Henderson & Stern, 2018).

From a managerial perspective, the concept of *prediction machines* illustrates how decreasing prediction costs shift strategic decision-making value toward judgment, creativity, and implementation as key areas for innovation. Consequently, firms must reconfigure resources, processes, and business models to capitalize on lower prediction costs (Agrawal, Gans & Goldfarb, 2018).

AI also enhances *innovation capabilities*. Literature proposes a taxonomy of AI applications in innovation, such as "replace" (substituting human functions), "reinforce" (strengthening human competencies), and "reveal" (identifying new opportunities), and identifies critical organizational capabilities for effective AI deployment, including data management, resource integration, and adaptive culture. At the same time, a gap persists between managerial expectations and actual AI adoption: managers often view AI as a strategic technology, but transformation requires changes in competencies, decision-making processes, and data governance. Competitive advantage stems not from possessing AI technology alone, but from the ability to integrate it with organizational capabilities (Brynjolfsson & McAfee, 2017).

Overall, literature highlights that (1) AI has the potential to radically transform knowledge production and innovation processes, but outcomes depend on data access and management practices, and (2) transformation requires new organizational capabilities, including data governance, interdisciplinary integration, and adaptive innovation routines. There is also a pressing need for empirical studies comparing AI effects across sectors, as well as research on public policies promoting data sharing and transparency to prevent innovation concentration in the hands of a few actors (Gama & Magistretti, 2023; Haefner et al., 2021).

Methodology

This study employs a bibliometric approach to systematically examine the development and intellectual structure of the research domain on AI-based innovation management. Bibliometric analysis has gained wide acceptance as a rigorous method for mapping scientific fields and evaluating their conceptual foundations (Donthu et al., 2021). Following the framework proposed by Zupic and Čater (2015), the methodological process was structured into five stages: design, compilation, analysis, visualization, and interpretation.

In the first stage, the study design and research questions were defined to capture the scope, structure, and emerging themes in AI-based innovation management. The second stage involved data compilation. Bibliometric data were retrieved from the Scopus database, which is widely recognized for its comprehensive coverage of peer-reviewed publications. The search was conducted between 5 and 10 September 2025, considering publications available up to 31 August 2025. To ensure relevance and focus, the following search query was applied: *(TITLE-ABS-KEY ("AI") OR TITLE-ABS-KEY ("artificial intelligence") AND TITLE-ABS-KEY ("innovation management")) AND (LIMIT-TO (LANGUAGE, "English"))*

The third stage encompassed performance analysis and science mapping. Performance analysis was conducted using publication-related indicators (e.g., number of publications per year, most productive authors, journals, and institutions) and citation-related indicators (e.g., total and average citations per article). Science mapping was applied to explore the conceptual and intellectual structure of the field. In particular, keyword co-occurrence analysis was performed to identify clusters of research themes, uncover dominant topics, and trace their evolution over time.

The fourth stage, visualization, was carried out using VOSviewer (Nees Jan van Eck and Ludo Waltman, Leiden University, version 1.6.17), a widely used tool for bibliometric mapping. Co-occurrence analysis was based on the full counting method, with a threshold of at least five keyword occurrences for inclusion in the mapping process. This enabled the identification of distinct research clusters and their interrelationships.

Finally, in the interpretation stage, the findings were synthesized to address the research questions and provide insights into the evolution, current state, and future directions of AI-based innovation management. This systematic process ensured transparency, reproducibility, and alignment with best practices in bibliometric research.

Results

The article that can be considered the first Scopus-indexed publication in the domain of AI-based innovation management is: *Toward a knowledge-based framework to foster innovation in networked organizations*. In *Proceedings of the Seventh International Conference on CSCW in Design (CSCWD 2002)* (Spinosa et al. 2002). This pioneering work introduces theoretical and technological foundations for innovation management in networked organizations, such as virtual, extended, and distributed enterprises. The authors emphasize that, in a competitive environment, managers should deliberately adopt information technology solutions to support knowledge and intellectual capital management. The paper particularly addresses the fundamental research question: how can information technology be leveraged to capture individual knowledge and intellectual capital and transform it into innovative products and services exploitable by the organization? In response, the authors propose an IT-based framework designed to support the full knowledge life cycle in networked organizations. As such, this publication marks the starting point for research linking knowledge management, information technology, and innovation, laying the groundwork for what is today referred to as *AI-based innovation management*.

Since this initial contribution, research on *AI-based innovation management* has evolved gradually, showing a clear trajectory from isolated publications to a rapidly expanding research stream. The first Scopus-indexed publication appeared in 1993, followed by a long period of minimal activity, with the next paper published only in 2002. Between 2003 and 2010, contributions were sporadic, rarely exceeding one study per year, which illustrates the limited academic attention given to this field at that time. A modest increase occurred between 2011 and 2014, when three to four papers appeared in certain years, though the area remained relatively niche. From 2015 onwards, publications began to emerge more regularly, and by 2018, a new phase of development was evident. The year 2019 marked a turning point, with 16 publications indicating a surge of scholarly interest. This momentum continued into 2020 with 20 contributions, highlighting that the field was gaining recognition as a relevant area of study.

The trend accelerated significantly from 2021 onwards, with 27 publications in 2021 and 29 in 2022, demonstrating consistent growth. In 2023, the number of studies nearly doubled to 36, reflecting the increasing importance of AI-driven innovation in both academic and practical contexts. By 2024, the field had expanded even more rapidly, with 64 publications, more than doubling the output of just two years earlier. The peak so far has been recorded in 2025, with 86 publications, marking the highest level of activity in the history of the discipline. This rapid rise underscores how *AI-based innovation management* has moved from being a marginal research interest to a central theme in management and technology studies. The growing body of literature reflects a shared recognition among scholars and practitioners that artificial intelligence is becoming a critical enabler of innovation, as enterprises increasingly adopt AI-based solutions to secure and sustain competitive advantage in the near future.

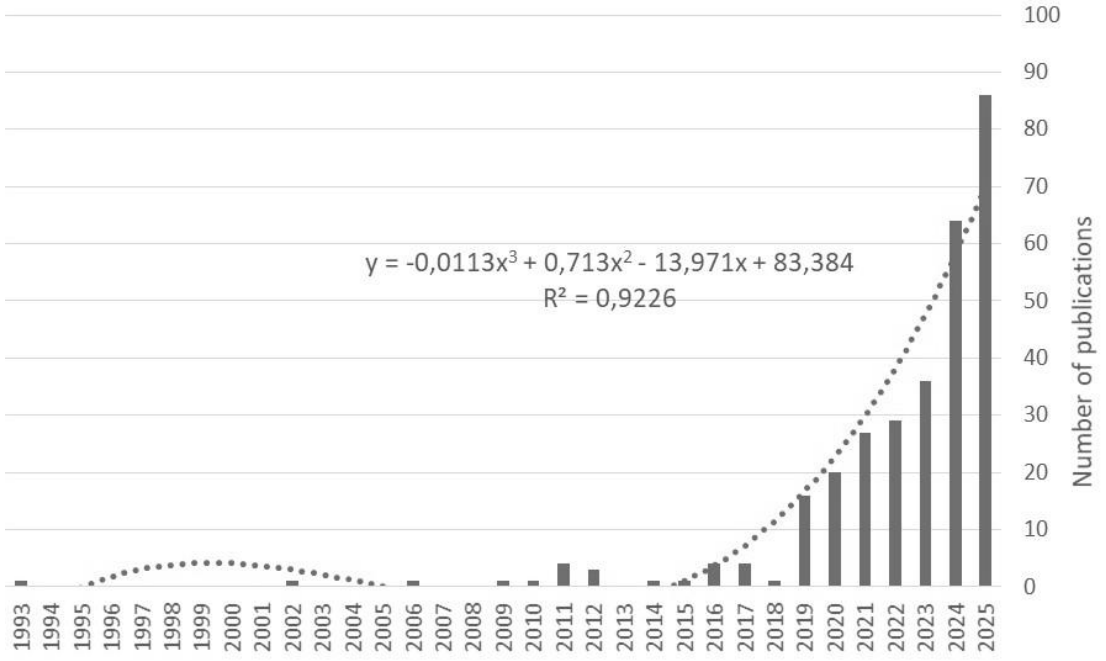

Fig. 1. Number of publications related to AI-based innovation management
Source: Scopus data, 31.08.2025

The scientific landscape of *AI-based innovation management* demonstrates both a significant growth in research output and an accelerating accumulation of scholarly influence. In total, the field has generated 6,490 citations with an h-index of 31, which reflects both productivity and impact at a relatively mature level of development (Figure 2). The temporal distribution of publications and citations reveals a two-phase evolution: an early formative stage with sporadic contributions and limited visibility, followed by a phase of exponential growth beginning after 2018.

During the initial stage (2002–2015), annual publication counts were low, typically between zero and one paper per year, and citation volumes remained modest, rarely exceeding 25 per year. This pattern indicates a marginal research area with limited academic attention. A gradual increase is observable from 2016 onward, when small but consistent publication activity (three to four papers annually) began attracting a growing number of citations, reaching 22 in 2016 and 25 in 2017. The first notable breakthrough occurred in 2019, when 16 publications generated 39 citations, followed by 20 publications and 121 citations in 2020, which signaled the field's entry into a phase of broader academic recognition.

The second phase is characterized by accelerated expansion and heightened citation impact. In 2021, publications accumulated 305 citations, while in 2022, publications nearly doubled the citation count to 560. The growth intensified in 2023, when 36 publications were cited 1,050 times, reflecting a marked increase in knowledge diffusion and scholarly engagement. The trend continued sharply upward in 2024, with 64 publications generating 2,053 citations, and culminated in 2025, when 86 publications attracted 2,175 citations.

The concentration of citations in recent years demonstrates not only the rising output but also the increasing intellectual relevance of *AI-based innovation management*. The data suggests that the field has transitioned from a peripheral niche to a mainstream research domain at the intersection of artificial intelligence, knowledge management, and innovation studies. The steep upward trajectory of both publication volume and citation counts underscores its growing role as a driver of theoretical advancement and practical applications in the context of enterprise competitiveness and digital transformation.

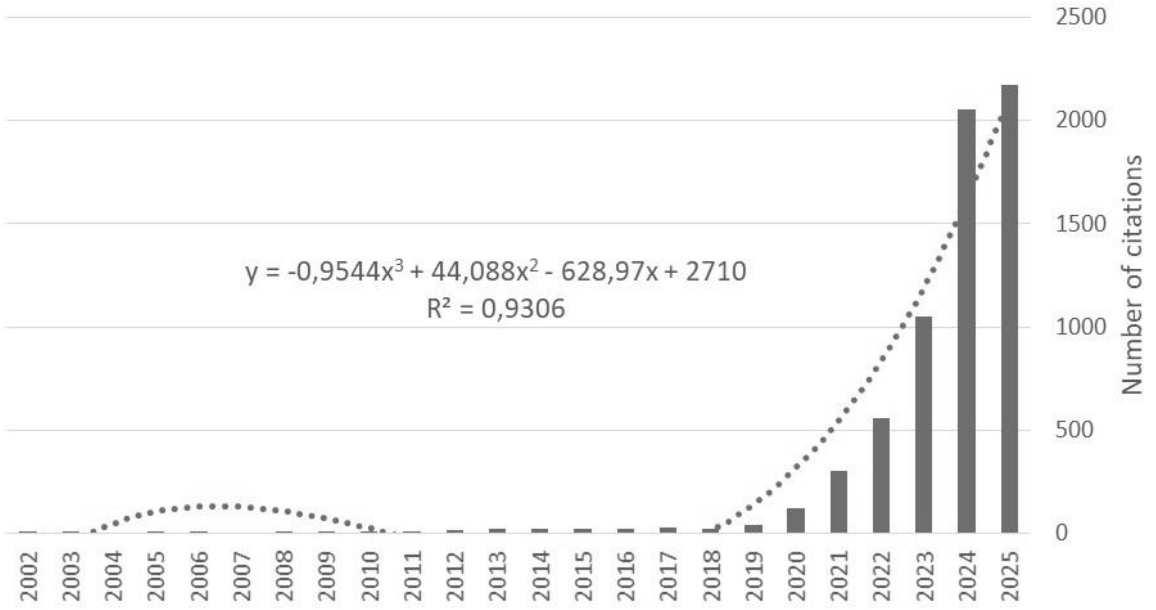

Fig. 2. Number of citations of publications related to AI-based innovation management
Source: Scopus data, 31.08.2025

In the bibliometric analysis, 2,127 keywords were identified. The keyword of *Innovation Management* (161 occurrences) is at the center of current discussions on how organizations can create, manage, and scale new ideas. Closely related to it is *Artificial Intelligence* (147 occurrences), which increasingly serves as both a tool and a driver for innovation. The broader theme of *Innovation* (55 occurrences) shows that the topic is studied not only as a managerial process but also as a fundamental force shaping modern organizations.

Digital Transformation (22 occurrences) and *Generative Artificial Intelligence* (21 occurrences) reflect how organizations are reshaping their operations through advanced technologies. AI-related subfields such as *Decision Making* (19 occurrences), *Machine Learning* (15 occurrences), and *Generative AI* (8 occurrences) indicate the growing importance of algorithmic tools in guiding innovation strategies. The competitive aspect of innovation is highlighted by *Competition* (18 occurrences), showing that technological innovation is strongly linked to gaining and sustaining competitive advantage.

Strategic approaches remain important: Open Innovation (14 occurrences) emphasizes collaboration beyond organizational boundaries, while *Knowledge Management* (12 occurrences) and *Information Management* (11 occurrences) highlight the role of capturing and structuring organizational knowledge. Similarly, *Decision Support Systems* (10 occurrences) and *Big Data* (10 occurrences) demonstrate the reliance on data-driven tools for supporting innovation decisions.

Sustainability also plays an important role: *Sustainable Development* (13 occurrences), *Sustainability* (9 occurrences), and *Life Cycle* (9 occurrences) show that innovation is increasingly evaluated not just by profitability but also by its environmental and social impact. In parallel, *Technology Adoption* (11 occurrences), *Technology Management* (8 occurrences), and *Technological Innovation* (11 occurrences) reflect the managerial need to integrate and govern emerging tools effectively.

From an operational perspective, innovation involves *Innovation Process* (11 occurrences), *Innovations Process* (10 occurrences), *Product Development* (8 occurrences), *Product Design* (8 occurrences), and *Project Management* (8 occurrences). These terms highlight the structured and systematic side of bringing new ideas to life. Supporting this, *Industrial Management* (8 occurrences) and *Strategic Management* (8 occurrences) indicate that innovation must be embedded in broader management systems.

Finally, the forward-looking nature of the field is captured by *Emerging Technologies* (8 occurrences) and *Technological Development* (8 occurrences), supported by *Investments* (11 occurrences) that enable organizations to experiment and scale. The presence of *Human* (8 occurrences) emphasizes that, despite technological advances, people remain central to the innovation process as users, creators, and decision-makers.

The analysis of keyword co-occurrence made it possible to identify eight clusters (Figure 3). The full counting method was applied, with the minimum number of keyword co-occurrences set at three.

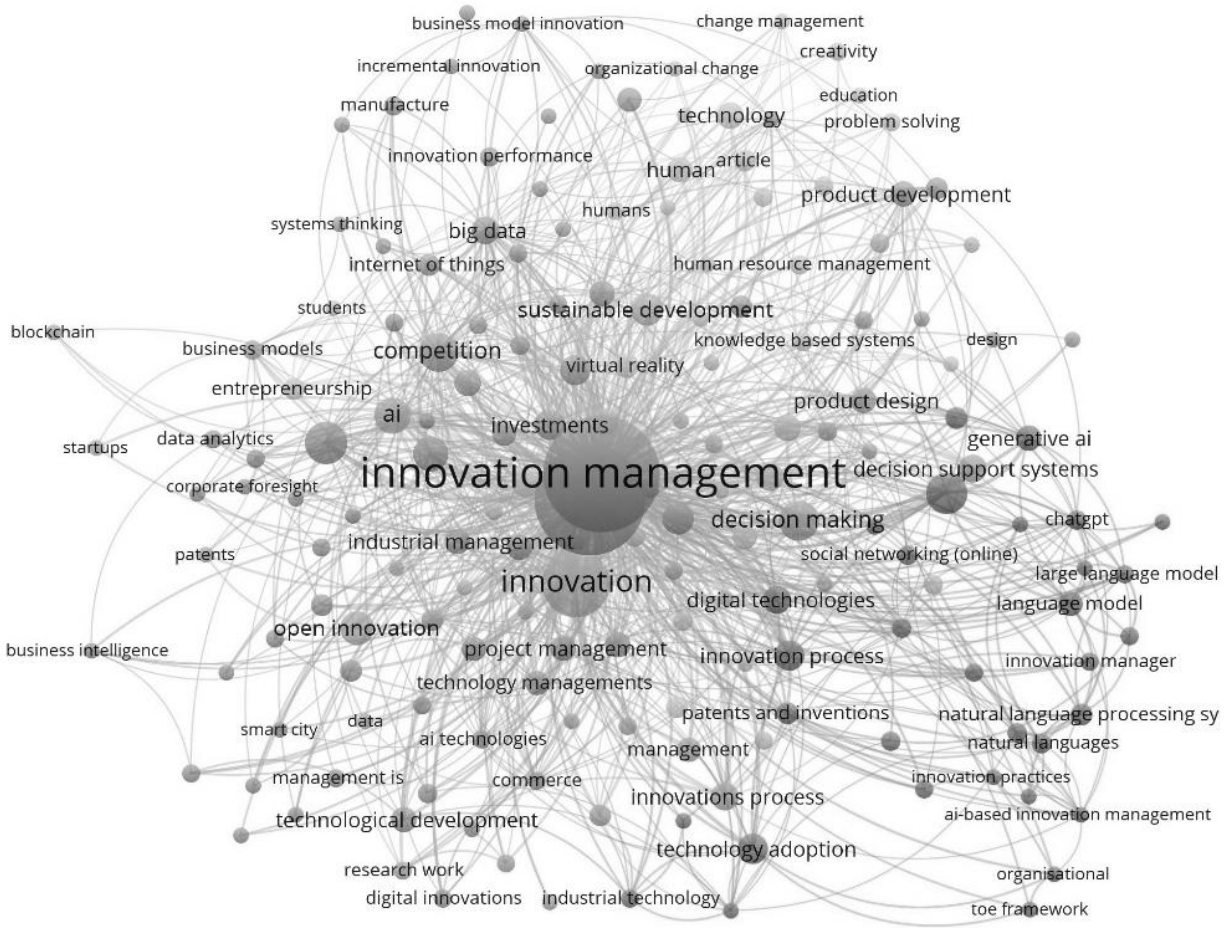

Fig. 3. Co-occurrence of keywords related to AI-based innovation management
Source: VOSviewer, based on Scopus data, 31.08.2025

Cluster 1 is called *„Generative AI, NLP, and Innovation Practices"*. This cluster is strongly focused on the rise of generative artificial intelligence and its applications in organizations. It includes concepts such as ChatGPT, large language models, and natural language processing systems, which represent the cutting edge of AI-driven innovation. Alongside the technical aspects, the cluster contains themes like design thinking, TRIZ, and innovation frameworks, which connect AI technologies to structured methods of creativity and problem-solving. This combination highlights how generative AI is not only a tool for automation but also a driver of new ways of thinking about innovation. The inclusion of terms such as "social networking" and "organizational" shows that these technologies are embedded in wider social and business contexts. They influence knowledge sharing, communication, and collaboration across organizations. Moreover, *innovation management* and *innovativeness* suggest that firms must adopt new managerial approaches to fully exploit these technologies. In practice, this cluster is about linking advanced AI capabilities with the managerial and human dimensions of innovation. It demonstrates that generative AI is shaping both the technical side of language processing and the cultural/organizational side of creativity. Overall, this cluster emphasizes the integration of cutting-edge AI with practical innovation practices.

Cluster 2 is named „*Industrial Innovation, Risk, and Strategic Management*". This cluster highlights the application of innovation management in industrial and manufacturing settings. Concepts such as automation, Industry 4.0, and big data indicate a strong focus on how digital technologies transform industrial operations. The presence of terms like *competitiveness*, *competitive advantage,* and *radical innovation* shows that this cluster addresses how companies use innovation to remain competitive in global markets. At the same time, it includes *risk assessment, risk management, and health care*, reflecting that technological change comes with uncertainty and sector-specific challenges. Manufacturing enterprises and supply chain management are central topics, pointing to the operational and logistical dimensions of innovation adoption. New product development, incremental innovation, and business model innovation illustrate the need to balance radical and incremental changes in industrial environments. Strategic management and strategic decision-making highlight the managerial tools needed to guide these innovations effectively. This cluster therefore represents the intersection between technological innovation, risk, and strategy in industrial contexts. It shows that successful

industrial innovation requires not only new technologies but also robust strategic frameworks. In essence, this cluster captures the challenge of integrating innovation into industrial operations while safeguarding efficiency and competitiveness.

Cluster 3 is labeled *„Artificial Intelligence, Technology Management, and Foresight".* This cluster emphasizes the role of artificial intelligence and emerging technologies in organizational management. It includes central terms such as artificial intelligence, data analytics, and business intelligence, which represent the core of data-driven decision-making. At the same time, it contains themes like corporate foresight, strategic foresight, and technological forecasting, which suggest a strong orientation toward long-term planning and anticipating technological change. The inclusion of *science and technology, technological development,* and *machine learning* highlights the research and technical dimensions of AI integration. Information systems, information management, and digitalization connect this cluster to the digital transformation of organizations. Management research and industrial management indicate that this cluster has both an academic and practical dimension. It explores how companies adopt and manage AI-driven technologies to stay competitive and innovative. The educational aspect, such as *engineering education*, shows that developing the necessary human capital is also a concern. This cluster demonstrates how AI is embedded in management processes, from data analysis to foresight and planning. Overall, it underlines that AI is not just a tool but a strategic enabler for organizations in an era of rapid technological change.

Cluster 4 is called *„Research Methods, Organizational Change, and Knowledge Work"*. This cluster combines methodological approaches, organizational dynamics, and human factors. On the research side, it contains *bibliometric analysis, content analysis, systematic literature review,* and *entrepreneurship,* indicating a focus on academic approaches to understanding innovation and management. On the organizational side, keywords such as *organizational change, human resource management, students, and creativity* suggest a strong link with human capital, leadership, and innovation culture. It emphasizes how research and data analysis can inform practical approaches to organizational transformation. The inclusion of *trust, technological innovation, and knowledge-based systems* suggests that this cluster also considers the social and cultural dimensions of adopting new technologies. Human factors like creativity, problem-solving, and education are seen as essential for successful innovation processes. This cluster also addresses how organizations adapt to change, combining structured methods of analysis with soft skills and leadership. It demonstrates the importance of research-driven insights for guiding change in organizations. Moreover, it connects academic research practices with real-world management challenges. In short, this cluster underlines that innovation is not only technological but also deeply human and organizational.

Cluster 5 is designated as „*Decision-Making, Design, and Innovation Processes".* This cluster revolves around decision-making and innovation design within organizations. It includes concepts such as decision support systems, decision-making processes, and strategic approaches, which highlight the role of structured tools in improving organizational performance. The inclusion of *design and innovations, product design,* and *product development* connects decision-making directly to tangible outcomes in products and services. Research and development management is another key theme, pointing to the systematic nature of innovation activities. The presence of *problem solving, strategic planning,* and *managing innovation* suggests that this cluster is about balancing creativity with structured management approaches. Sales and innovation performance show that commercial outcomes are a key measure of success in these processes. This cluster also emphasizes incremental innovation and practical approaches to product innovation. It shows that organizations must carefully manage the innovation pipeline from ideation to market implementation. Decision support systems and management practices play a central role in ensuring effectiveness. Overall, this cluster represents the operational and managerial side of decision-making for innovation, bridging strategic planning with product and process design.

Cluster 6 is named *„Sustainability, Risk, and Societal Impacts of Technology"*. This cluster focuses on the ethical, environmental, and societal dimensions of technology and innovation. It brings together sustainability-related terms such as *sustainable development, environmental management, and supply chain management,* which indicate the importance of integrating ecological and social concerns into innovation processes. The inclusion of *economic and social effects, life cycle, and learning systems* highlights a systemic perspective on innovation impacts. Risk management, ethical technology, and machine learning show that emerging technologies must be assessed not only for efficiency but also for ethical and social consequences. Agroindustry and industrial sustainability are also mentioned, which suggests that this cluster has a strong relevance for applied industrial sectors and their environmental responsibilities. The presence of *current and literature review* shows that this cluster is anchored in contemporary debates. It emphasizes the need to consider long-term risks, resource efficiency, and ethical responsibility. Companies and policymakers must adopt sustainability-oriented approaches to innovation management. This cluster is therefore about responsible innovation that takes into account risks, ethics, and global challenges. It demonstrates the growing importance of balancing technological progress with sustainability.

Cluster 7 is referred to as „*Open Innovation, SMEs, and Technology-Driven Entrepreneurship".* This cluster captures the ecosystem of entrepreneurship, small and medium-sized enterprises (SMEs), and technology-driven innovation. Keywords like *open innovation, startups, SMEs,* and *patents* reflect the role of intellectual property and collaboration in shaping new business models. The presence of blockchain and intelligent systems highlights how digital technologies enable novel entrepreneurial opportunities. This cluster also emphasizes efficiency, competitiveness, and innovation performance, pointing to

the economic drivers of technology adoption in smaller firms. The role of data, information processing, and innovation is central to enabling flexible, agile, and collaborative forms of business innovation. It shows how startups and SMEs adopt cutting-edge technologies to overcome resource limitations and gain a competitive edge. Patents and inventions highlight the importance of protecting intellectual property in these contexts. Open innovation practices demonstrate the collaborative and networked nature of modern innovation ecosystems. This cluster is highly future-oriented, reflecting how entrepreneurship adapts to emerging technologies and new market opportunities. Overall, it underscores the interplay between technological innovation, small business dynamics, and entrepreneurial strategy.

Cluster 8 is called *„Digital Transformation, Global Competitiveness, and Management Practices".* This cluster emphasizes digital transformation as a strategic and managerial challenge for organizations and economies. It contains central terms such as *digital innovations, digital transformation, technological change, and innovation management.* The presence of "developing countries" highlights the global dimension of digitalization, showing that both advanced and emerging economies face challenges in adopting these technologies. Competitiveness and commerce indicate that digital transformation is linked to economic performance and market adaptation. Project management, management practice, and management process reflect the organizational side of implementing digital strategies. This cluster also connects AI technologies and digitalization with broader management frameworks. It emphasizes how firms integrate technological change into strategic and operational processes. The focus on competitiveness suggests that digital transformation is essential for maintaining or achieving a strong position in global markets. It also underlines the role of managers and innovation leaders in shaping these transformations. Overall, this cluster shows that digital transformation is not only about adopting technologies but also about restructuring business models and organizational practices. It highlights the global, managerial, and competitive aspects of innovation in the digital era.

The geographical distribution of authors contributing to the field of AI-based innovation management demonstrates a strong international scope, with significant concentrations in Europe, Asia, and North America. The leading contributor is Germany with 48 publications, followed by China with 41 and the United States with 32. In Europe, Italy with 30 publications and the United Kingdom with 17 also occupy prominent positions, while in Asia, India with 23 has emerged as a major contributor alongside China. Several other European countries show notable activity, including Sweden with 15 publications, Spain and Australia with 13 each, Austria with 12, Switzerland and France with 10 each, and the Netherlands and Denmark with 9 each. This reflects a strong European research presence in this domain, often associated with innovation policy initiatives and collaborative projects. The Russian Federation with 12 and Ukraine with 7 also demonstrate active involvement, indicating that Eastern Europe contributes meaningfully to the field.

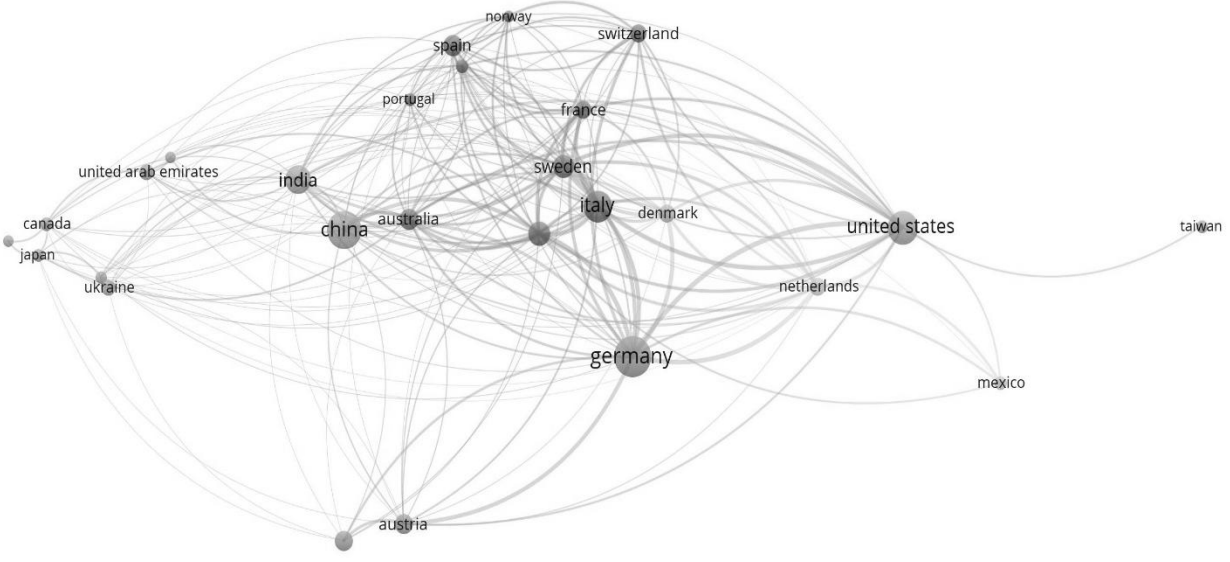

Fig. 4. Bibliometric mapping of countries of publications related to AI-based innovation management
Source: VOSviewer, based on Scopus data, 31.08.2025

Outside Europe, Australia with 13 and Canada with 7 suggest that English-speaking countries with advanced digital economies play a supporting but relevant role. Emerging economies are also represented, with Mexico contributing 6 publications, Brazil and Chile 3 each, and Malaysia 4, pointing to a gradual diffusion of research activity into Latin America and Southeast Asia. In Asia, contributions are further diversified across Taiwan, Japan, and Poland with 5 publications each, South Korea and Norway with 4 each, and the United Arab Emirates with 7, suggesting that innovation management in the context of AI is increasingly addressed by both developed

and rapidly developing economies. Smaller but still relevant contributions also come from countries such as Portugal, Jordan, Greece, and Hungary, each with three to five publications, reflecting the breadth of participation across different research systems. At the global periphery, isolated contributions are recorded from countries such as Zimbabwe, Vietnam, Uzbekistan, Tanzania, Costa Rica, and Bahrain, each with a single publication. Although numerically minor, these cases highlight the global diffusion of interest in AI-based approaches to innovation.

The network of international collaboration within this research field can be further understood through the analysis of clusters of co-authorship. The data reveal distinct groupings of countries that tend to cooperate more closely. For instance, cluster 1 includes Australia, Finland, France, Italy, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom, representing a predominantly European-Western alliance with strong academic traditions in innovation and management studies. Cluster 2 brings together China, Canada, India, Japan, Malaysia, Poland, South Korea, the United Arab Emirates, and Ukraine, reflecting a strong Asia–Pacific orientation with links to North America and Eastern Europe, indicating the global diffusion of knowledge production. Cluster 3, which consists of Austria, Germany, and the Russian Federation, highlights the central role of Central and Eastern Europe in this domain. Cluster 4 links Mexico and the Netherlands, showing emerging cooperation between Latin America and Western Europe. Finally, cluster 5 includes the United States and Taiwan, underlining strong transpacific collaboration.

Overall, the analysis shows that while research on AI-based innovation management is geographically diverse, it is structured around several collaboration hubs that reflect both regional strengths and transnational partnerships. These clusters not only reinforce the role of leading economies in shaping the field but also demonstrate the increasing integration of emerging economies into global research networks.

Discussion

The discussion of the results addresses the research questions by linking bibliometric evidence with the evolution, thematic structure, and global patterns of AI-based innovation management. The first research question concerns the evolution of the field over time. The bibliometric data reveal a clear two-phase development: from 1993 to 2015, publication activity was sporadic, reflecting limited scholarly attention, whereas after 2018, publications and citations grew exponentially, peaking in 2025 with 86 publications and 2,175 citations (Brynjolfsson & McAfee, 2017; Davenport & Ronanki, 2018). This trajectory indicates that AI-based innovation management has moved from a peripheral niche to a mainstream research area, confirming its growing relevance for theory and practice.

The second research question examines dominant thematic clusters. Keyword co-occurrence analysis identified eight major clusters, illustrating the interdisciplinary nature of the field. For example, the cluster combining generative AI with structured innovation practices highlights how AI technologies enable creative problem-solving in organizational contexts (Amabile, 1998; Vial, 2019). Another cluster emphasizing sustainability demonstrates the integration of environmental and societal concerns into innovation management, reflecting the increasing importance of ethical and sustainable innovation frameworks (Geissdoerfer et al., 2017; Schiederig et al., 2012). These findings suggest that AI-based innovation management is simultaneously technical, managerial, and socially embedded.

Regarding the third research question on countries, institutions, and international collaborations, the results show that Germany, China, and the United States are the leading contributors, with strong European, Asian, and emerging economy participation. Co-authorship patterns reveal regional and transnational networks that facilitate knowledge exchange (Hu, et al., 2020; OECD, 2021). This suggests that research productivity is concentrated in regions with strong technological infrastructures and innovation policies, while emerging economies are gradually becoming integrated into global research networks.

The fourth research question concerns emerging topics, including generative AI, digital transformation, and sustainability. The results show that generative AI is not only a tool for automation but also a driver of novel innovation practices, enhancing creativity and accelerating product and service development (Davenport & Ronanki, 2018; Vial, 2019). Digital transformation is closely linked to organizational restructuring and competitive advantage, suggesting that AI adoption reshapes business models and managerial processes. Sustainability, which appears prominently in one cluster, indicates that organizations increasingly evaluate innovation impacts in ethical, environmental, and social terms (Geissdoerfer et al., 2017). These insights show a dual focus on short-term managerial efficiency and long-term strategic orientation in AI-based innovation management.

Finally, the fifth research question focuses on gaps and future opportunities. Despite rapid growth, the field remains fragmented, with limited integration across technological, managerial, and societal dimensions. While human factors such as creativity, leadership, and skill development are acknowledged, their interaction with AI-driven processes requires further exploration (Amabile, 1998; Brynjolfsson & McAfee, 2017). Moreover, the underrepresentation of emerging economies highlights a need for context-specific research. Sustainability-oriented innovation also remains an area that requires deeper theoretical and empirical investigation (Schiederig et al., 2012; Geissdoerfer et al., 2017). Overall, these gaps suggest avenues for developing integrative frameworks that combine technological advancement, managerial practice, and societal impact.

In summary, the discussion demonstrates that AI-based innovation management is a dynamically evolving, interdisciplinary field. The bibliometric evidence confirms its growth, identifies thematic and geographical patterns, and highlights critical areas for future research.

By systematically linking the empirical findings to the research questions, it becomes evident that AI functions both as a practical tool and a strategic enabler, shaping organizational innovation, guiding policy, and supporting global competitiveness.

Conclusions

AI-based innovation management has developed into a rapidly expanding and influential research field, moving from marginal attention in the early 2000s to a mainstream domain after 2018. The field integrates technological, managerial, and societal perspectives, with themes ranging from generative AI and decision support to sustainability, open innovation, and organizational change. Research confirms that AI functions both as a practical tool for improving processes and as a transformative force redefining knowledge creation and foresight.

The analysis highlights strong international engagement, led by Germany, China, and the United States, alongside contributions from Europe, Asia, and emerging economies, with clear patterns of regional clusters and transnational collaborations. Human factors such as creativity, trust, and leadership remain central, while education and skills development are recognized as key enablers of innovation.

The results also point to challenges of knowledge fragmentation, underscoring the need for integrative frameworks that connect technical, strategic, and ethical dimensions. Overall, AI-based innovation management has matured into a cornerstone of digital transformation, offering both theoretical advances and practical tools for organizations seeking sustainable competitiveness in the knowledge economy.

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