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Company culture matters! Knowledge-driven companies' way to innovations and sustainability

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ABSTRACT

Companies today aim to adapt to rapidly changing business environments by acquiring knowledge, developing dynamic capabilities, fostering market innovations, and ensuring sustainability. Achieving these goals requires a supportive company culture aligned with its structure and strategy. This study proves the critical role of company culture in sustainability based on a sample of 496 Polish knowledge workers, using structural equation modeling and ordinary least squares (OLS) regression analysis methods.

The results showed that KLC culture synergy fosters knowledge sharing (both tacit and explicit), which is vital for dynamic capabilities development and, in turn, influences organizational intelligence, innovativeness, and, finally, sustainability.

The given evidence that collective organizational intelligence is rooted in company culture and strengthened by the KLC approach changes the perception of company culture, transforms its apprehension into a precious organizational resource, and prioritizes new study paths regarding its implementation.

1. Introduction

Knowledge is power, but learning is everything — static knowledge exploitation without its exploration hinders sustainability (Jakhar et al., 2020). For that reason, sustainable and timely knowledge-driven organizational ecosystems are attracting the attention of researchers and practitioners (Caputo et al., 2020). Organizations today must constantly learn to be sustainable (Haapasaari & Kerosuo, 2015). It is common knowledge today that we cannot rely on a static set of skills and a static knowledge base at an individual or an organizational level since they quickly become outdated due to hyperdynamic conditions. Even though individuals, leaders, and other shareholders and stakeholders may have different motivations to support organizational learning to capture timely knowledge, gain new insights, and implement effective changes, smooth, collective learning benefits all parties involved. How, then, can organizational learning be made efficient? The knowledge, learning, and collaboration (KLC) cultures approach proposed by Kucharska and Bedford (2023) was introduced as a prompt facilitator of a constant, perpetual organizational shift in hyperdynamic conditions. Knowledge-based dynamic capabilities are the key to achieving sustainable development goals (Li et al., 2023). Sustainable development has long been a great challenge for people (Bouncken et al., 2023). Some authors have claimed that the essence of innovations for sustainability achievement today lies in corporate responsibility strategy (González-Ramos et al., 2023). Others have seen it in company culture (Naveed et al., 2022). According to Tosti, the basis for the sustainable development of knowledge-based organizations is strategy–culture alignment (Tosti, 2007). Moreover, since the performance of an

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organization, despite the ongoing industrial revolution, is still human-related (Ammirato et al., 2023), this study ties the company culture oriented to people with knowledge processes and higher-level learning skills leading to desired sustainability performance achievement, aligning this way with the literature review study line of Silva--Jean and Kneippb (2024).

"It is all about culture!" – Sacristán-Navarro et al. (2022) say in the context of corporate governance practices. Following them, we see company culture as a critical issue for organizational growth. Undoubtedly, sustainability achievement is critical for societies, economies, and the environment (Lepore & Cunningham, 2023). Although we know that company culture is one of the critical internal sustainability drivers (Lozano & von Haartman, 2018), there is still a need to explore the processes that link company culture with sustainability achievement. The research problem that needs to be solved is that we do not have detailed knowledge about how company culture supports sustainability in knowledge-driven organizations. Recently, Kucharska and Bedford (2023) introduced the synergy of knowledge, learning, and collaboration cultures to support innovativeness and sustainability. Still, they did not deliver detailed empirical evidence exposing the entire mechanism of how exactly the KLC culture synergy achievement can support sustainability. This study aims to explore this mechanism in detail. The expected value of such detailed empirical evidence for society is to inspire managers to organize knowledge-based companies by paying particular attention to the structure of processes that link company culture with sustainability in knowledge-driven organizations. It is weighty because an approach to company culture as a tool for determining sustainability strategy implementation is rare (Pennington, 2022).

2. Conceptual framework

2.1. KLC cultures

The synergy of KLC cultures shifts knowledge-driven organizations (Kucharska & Bedford, 2023). According to these authors, knowledge culture is a shared organizational appreciation for knowledge as a critical company resource that makes knowledge culture a central point of the proposed KLC approach. However, suppose a learning culture does not support a knowledge culture impact on an organization. In that case, the organization is at risk of getting stuck at a particular level of knowledge exploitation, securing and controlling its status. Therefore, learning culture matters for a shared organizational motivation for constant knowledge expansion. Organizations that rely chiefly on proven knowledge often prefer to "keep things as they are" and "avoid any risk." They prefer maintaining a "safe, control-oriented environment based on well-known routines" (Kucharska & Bedford, 2023, p. 55). These organizational attitudes may hinder organizational development. The solution to this problem appears to be a continuous learning culture. To be efficient, the learning cultures of learning organizations must be multilevel. And to be multilevel, they must be collective by definition. From the organizational perspective presented by these authors, there is no culture of learning without the culture of knowledge, and there is no learning without collaboration. In summary, knowledge culture focuses on exploiting knowledge, whereas learning culture focuses on its exploration; collaborative culture makes both multilevel.

These three cultures are assumed to be exponentially valuable for tacit and explicit knowledge sharing, dynamic capabilities, innovations, and sustainability development.

2.1.1. Culture of knowledge

A culture of knowledge dominates in knowledge-oriented organizations that focus more on static knowledge exploitation rather than exploration (Van Wijkb et al., 2012). A culture of learning dominates in organizations that focus more on dynamic acting and seeking new solutions, constantly breaking the status quo. Knowledge culture is the foundation of learning culture. The easiest way to expose the differences between these cultures is to compare the effects of their organizational foci. It is easy to predict that if an organization gets stuck at the knowledge-orientation stage, its existence revolves around the static exploitation of knowledge and control, whereas it rejects new knowledge. In such organizations, cultivating old and proven acting methods and rejecting risk is appreciated more than seeking new solutions. Organizations based on proven knowledge often prefer to maintain the status quo as a stability illusion—and that seemingly safe, well-known routines, rules and procedures, and control-dominated organizational attitude might block organizational development.

2.1.2. Culture of learning

A "learning culture" refers to the capability to create, acquire, and share knowledge, modify organizational behavior through decision-making, and integrate new insights into the overall organizational knowledge base (Garvin, 1993). Unlike knowledge culture, a learning culture generates an undisrupted knowledge acquisition that is a product of practical intelligence (Erickson & Rothberg, 2012). On its own, a knowledge culture doesn't produce this effect, although it lays the groundwork for encouraging curiosity and identifying knowledge gaps that promote learning. This view aligns with Webster and Pearce's (2008) research, which emphasized the significance of situational learning, a key component of active learning. Active learning happens in a contextual position that requires dynamic, situational adaptability. Such situational learning skill is tightly aligned with a particular context and is pertinent in today's fast-paced and constantly evolving business landscape. It is essential to enhance learning in an organization, specifically by creating a supportive learning culture (Meher et al., 2023; Rass et al., 2023). Thus, organizations that want to foster new knowledge development must encourage positive attitudes toward learning routines. To this end, it seems critical for companies to develop a culture that supports learning. As empirically proven by Kucharska and Bedford (2020), learning culture includes two components, i.e., learning climate and acceptance of mistakes as a source of learning. Based on empirical evidence, Kucharska and Rebelo (2022) later concluded that a knowledge culture supports both elements of a learning culture: learning climate and acceptance of mistakes (as a potential source of learning). Because of this, the following hypotheses were proposed:

H1a. Knowledge culture influences the learning-climate component of a learning culture positively.

H1b. Knowledge culture influences the mistake-acceptance (as a potential source of learning) component of a learning culture positively.

Consequently, following former studies (Kucharska, 2021) that exposed that the learning-climate component affects the mistake-acceptance component of a learning culture, the following hypothesis was added:

H1c. The learning-climate component of a learning culture influences the mistake-acceptance (as a potential source of learning) component positively.

2.1.3. Culture of collaboration

A "culture of collaboration" reflects an organizational ability to compose a smoothly cooperating network of minds (Kucharska and Bedford, 2023). Such a network matters for knowledge sharing—especially in the case of tacit knowledge because learning by interaction fosters tacit knowledge awareness and sharing (Kucharska & Erickson, 2023). Prior works show that people learn faster in groups through interaction (Melander, 2012). Teamwork, dialogue, and shared responsibility also support the decision-making process in an organization (Julien-Chinn & Liets, 2019) and shape the behavior of individuals (Garvin et al., 2008). Thus, one of the core competencies of the learning organization is the ability to collaborate (Nugroho, 2018). A collaborative culture may be the success factor of any organization, which by

definition and logic is a group of people coordinated to achieve the goal none of them could without the others (Kucharska & Bedford, 2023, p. 48). Collaborative culture supports a learning culture that consists of two components: a learning climate and acceptance of mistakes as a source of learning as a potential source of learning component, as previously stated. For this reason, the following hypotheses were proposed:

H1d. A collaborative culture influences the learning-climate component of a learning culture positively.

H1e. A collaborative culture influences the mistake-acceptance (as a potential source of learning) component of a learning culture positively.

Since knowledge culture should be a base for knowledge-based organizations and, as stated above, the essence of each organization's existence is cooperation, it is assumed that both functional cultures of knowledge and collaboration occur and are correlated in knowledge-based organizations. For this reason, based on the given logical reasoning, the following hypothesis was proposed:

H1f. Knowledge culture and collaborative culture are correlated.

All these formulated hypotheses (H1a-f) reflect relations between components of the KLC cultures approach. The next stage of the proposed theoretical framework (Fig. 1) clarifies the relationship between the KLC cultures synergy (KLC approach) and knowledge sharing.

2.2. Knowledge sharing

Today's companies recognize that knowledge is the most critical resource that provides them with a sustainable competitive advantage (Adams & Lamont, 2003). A culture of learning supports knowledge dissemination (tacit and explicit) across the company (Islam et al., 2015). Kucharska (2021) stressed that tacit and explicit knowledge must circulate in the organization for the best effects. She also exposed empirically that tacit knowledge (contextual and personal) is the critical source of innovation. However, to be applied, it must take on an explicit form. Contrary to tacit knowledge, explicit knowledge is easily formalizable, manageable, and transferable (Faccin et al., 2019; Nonaka & Takeuchi, 1995), but both create organizational knowledge, especially when interchanged. In some recent works, this approach was extended with the aspects of effectuation (Jisr & Maamari, 2017) and socialization (Insch et al., 2008), showing that collaboration is crucial for knowledge transfer and good-quality social interactions between team members (Ryan & O'Connor, 2013). It suggests that tacit knowledge can be acquired through mentoring (Olaisen & Revang, 2018) and stakeholder engagement (Easterby-Smith & Prieto, 2008) under supportive circumstances. The study by Kucharska and Erickson (2023), in detail, empirically exposes how tacit knowledge is acquired and shared and proves that the best effects in transforming tacit knowledge into explicit form happen in a "learning by doing" and "social interaction" context. Thus, the following hypothesis was formulated:

H2a. A collaborative culture influences explicit knowledge sharing positively.

The dissemination of knowledge among employees is critical. A learning culture supports explicit (equally as tacit) knowledge sharing within the organization (Lucas, 2006). Moreover, a constant learning culture entails the general learning climate and acceptance of mistakes as a source of learning (Kucharska & Bedford, 2020). A negative attitude toward mistakes hinders learning from them. The negative framing of mistakes, as noted by Kucharska and Bedford (2023) and furthered by Kucharska and Kopytko (2024), complicates the process of learning (Hull, 1930). Transformative learning theory (Mezirow, 1991) says that adult learning happens thanks to "intuitively becoming aware that something is wrong with the result of one's thought, or challenging its validity through discourse with others of differing viewpoints and arriving at the best-informed judgment" (p.46). So, mistake reflectivity is a critical factor for learning. If mistakes are denied or ignored, they cannot be a source of reflection and learning for the mistake maker or anyone else. Therefore, the following hypothesis was proposed:

H2b. The mistake-acceptance component of a learning culture influences explicit knowledge sharing positively.

Hidden mistakes harm organizations and are a waste of value rather than a source of learning a lesson (Kucharska & Rebelo, 2022). This statement aligns with the "negative resource spirals" concept (Hobfoll et al., 2018), which says that losing one resource (e.g., knowledge from mistakes) can generate other resource losses. Failing to learn from experience means wasting the potential knowledge gained from this learning, and this waste is against sustainability.

Mistakes are valuable experiences shared by humans. If we ignore or drive them out, we can neither understand their meaning nor learn from them. To make this learning efficient, we need a learning climate, and this climate component also supports explicit knowledge sharing (Rebelo & Gomes, 2017). Based on this, the following hypothesis was proposed:

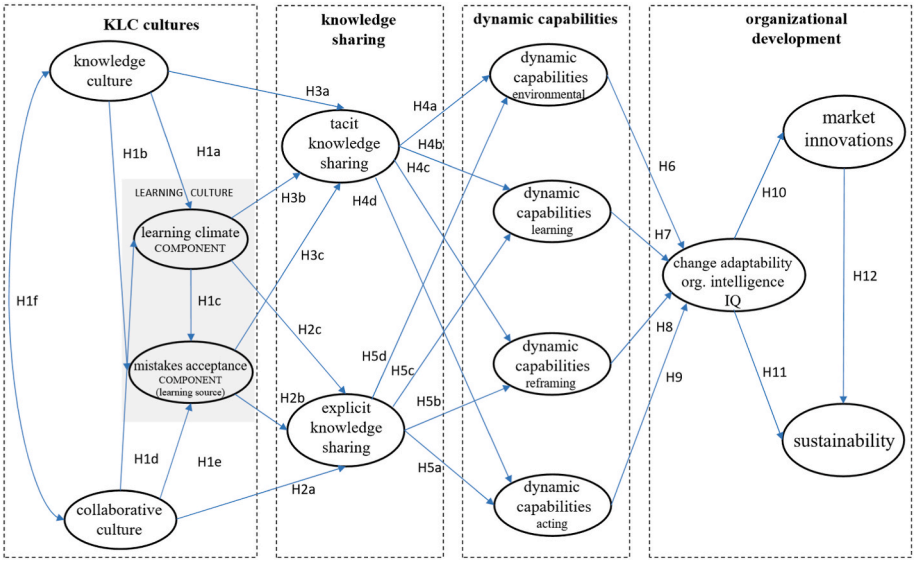

Fig. 1. Conceptual framework.

H2c. The learning-climate component of a learning culture influences explicit knowledge sharing positively.

"Tacit" knowledge is a higher level of organizational knowledge contributing to innovativeness, comprising individual experiences, personal beliefs, assumptions, values, and attitudes (Saint-Onge, 1996). Especially during the early stages of its formation, as depicted in Asher and Popper's (2019) "onion" model, the concept is more sensed than described, with layers representing degrees of tacitness. Besides explicit knowledge and hidden practical knowledge, both conscious and explainable, people create reflective tacit knowledge (almost conscious) and unconscious tacit knowledge, which can only manifest as their abilities. The level of tacitness determines awareness and sharing.

Tacit knowledge is a fantastic source of innovation (Jisr & Maamari, 2017; Perez-Luno et al., 2016). However, forcing and formalizing tacit knowledge sharing will never work since tacit knowledge is more context-specific and is more personal (often unconscious and therefore mistaken for intuition) than explicit knowledge. Tacit knowledge sharing occurs either unconsciously or consciously, but only if the knowledge owner becomes aware of it and acts of their free will (Polanyi, 1966). This knowledge is stored in minds and, especially in its initial stages of formation, is difficult to articulate or even identify (Kucharska & Erickson, 2023). Therefore, creating a company culture that fosters favorable conditions for knowledge sharing is crucial for raising awareness and spreading tacit knowledge. Based on this, the hypothesis is created:

H3a. A knowledge culture influences tacit knowledge sharing positively.

Business failures are often attributed to poor management and can be sources of individual trauma (Cope, 2011; Walsh & Cunningham, 2016). The fear of making a mistake in the workplace and the shame associated with it prevent individuals from taking risks and breaking conventions in seeking new solutions. Many people find it challenging to see mistakes as a valuable source of knowledge. There is a vast contradiction in how mistakes are perceived. Therefore, the idea of mistakes as a source of learning remains controversial, and it is subject to double cognitive bias for this reason (Hosseini et al., 2023; Kucharska & Kopytko, 2024). Researchers have proven that mistakes help individuals to grow and learn (Frese & Keith, 2015; Guchait et al., 2018; Simonsson & Heide, 2018; Weinzimmer & Esken, 2017). Tacit knowledge acquisition usually happens through informal learning (Alonderiene et al., 2006), as it does learning from mistakes; a company can support this process by creating a culture of learning. Based on these assumptions, the hypothesis was formulated as below:

H3b. The mistake-acceptance (as a potential source of learning) component of a learning culture influences tacit knowledge sharing positively.

Exchanging tacit knowledge is a real challenge today, as Koriat and Gelbard (2014) noted. Social interactions are crucial for developing tacit knowledge (Insch et al., 2008). Similarly, to facilitate its sharing, the organization must enhance trust, collaboration, and psychological safety alongside the overall learning climate (Andersson et al., 2020; Politis & Gabrielsson, 2009). Therefore, the following hypothesis was developed:

H3c. The learning-climate component of a learning culture influences tacit knowledge sharing positively.

All these formulated hypotheses (H2a-c and H3a-c) reflect relations between the components of the KLC cultures approach and knowledge sharing. The next stage links knowledge sharing with dynamic capabilities seen as organizational higher-level learning skills. We concentrate on dynamic capabilities because social and organizational learning has proven critical for companies' sustainability and innovation (Bartels, 2023; Silva-Jean et al., 2024; Smith, 2012), which is the interest of the next stage of the mechanism explored.

2.3. Dynamic capabilities

Can anything thrive in a changing world without changing itself? Climate change, Brexit, and COVID-19 are recent examples of turbulences that force the business world to adapt by developing dynamic capabilities in organizations (Bornay-Barrachina et al., 2023). "Dynamic capabilities" are defined as higher-level change routines (Winter, 2003). Over time, they become new core capabilities through environmental monitoring, knowledge integration (collective shared-knowledge creation), organizational learning, and resource coordination (Moreno et al., 2020). Teece et al. (1997) defined dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments, an organization's ability to achieve new and innovative forms of a competitive advantage given path dependencies and market positions" (p.516). Dynamic capabilities lead to competitive advantage (Jurksiene & Pundziene, 2016). They explain how firms can survive and thrive in a changing environment by modifying and renewing their assets and competencies (Ambrosini & Bowman, 2009). These capabilities allow organizations to adapt, integrate, and reconfigure resources, which is essential in strategic management. Essentially, dynamic capabilities enable firms to sense opportunities and threats, seize them, and maintain competitiveness by reconfiguring both tangible and intangible assets (Jantunen et al., 2018; Teece, 2007, 2018, 2019). Each of these abilities is further elaborated below.

2.3.1. Sensing

"Sensing" capability represents the firm's activities and processes for scanning the external environment, interpreting information, and searching and identifying market opportunities (Teece, 2007). According to existing studies, the factors that influence the sensing capability of an organization are its entrepreneurial resources, sustainability-driven strategy for innovation, and the anticipation processes (Ince & Hahn, 2020); the scanning of market and technology development, creation of new ideas and knowledge, and empirical learning (Khan et al., 2020); internal assets and research and development, anticipation and pre-venture examination, and sustainability of recipients (Bhardwaj et al., 2021); and experimental exploration, consideration of the functional core, and paradoxical framing (Vallaster et al., 2021). Bhardwaj et al. (2023) also observed that dynamic capabilities are perceived as a set of the firm's activities related to KM—that is, altering, renewing, and using knowledge-based resources—leading to both the "inflow" and "outflow" of knowledge (Paarup Nielsen, 2006). Organizational knowledge affects the creation of dynamic capabilities the most (Grant, 1996; Zollo & Winter 2002). The success factors of the outlined sensing, seizing, and reconfiguring capabilities refer to both tacit and explicit knowledge sharing. Furthermore, Bratianu and Bejinaru (2020) proved that effective management of knowledge and knowledge dynamics contributes to competitive advantage and organizational learning. Bhardwaj et al. (2023) also argued that tacit and explicit knowledge facilitates the development of dynamic capabilities. Considering all the above, the following set of hypotheses was proposed:

H4a. Tacit knowledge sharing affects the 'sensing' capability positively.

H5c. Explicit knowledge sharing affects the 'sensing' capability positively.

2.3.2. Reconfiguring

"Reconfiguring" capability represents a firm's ability to orchestrate its asset base, transform resources and processes into new valuable combinations, and build new capabilities through learning (Teece, 2007). Research showed that resource reconfiguration capability is affected by implementing open innovation strategies, cooperating within the business ecosystem, marketing in combination with technology development, and incorporating market expectations (Ince &

Hahn, 2020); organizational rearrangement, technological advancement, knowledge assimilation, and the utilization of best practices (Khan et al., 2020); gathering marketing knowledge and the rearranging and decentralization of power (Bhardwaj et al., 2021); and cross-vergence organization, flexible connecting structures, and cost-cutting (Vallaster et al., 2021). Based on this, the following hypotheses are formulated:

H4b. Tacit knowledge sharing affects the 'reconfiguring' capability positively.

H5b. Explicit knowledge sharing affects the 'reconfiguring' capability positively.

2.3.3. 'Seizing' explanation

"Seizing" capability relates to attempts made by a firm to capture value from market opportunities and make decisions on strategic investments and business models and how to manage value chains and ecosystems (Teece, 2007). Seizing capability is affected by increasing internal abilities, value-chain investigation, including customers in the creation of innovation, actions in the area of market implementation, resource allocation and investment, co-specialization of assets and capabilities, defining the business model are seen as seizing (Ince & Hahn, 2020). It also depends on strategic planning, business model and governance, and partnership (Khan et al., 2020); communication with stakeholders, knowledge incorporation, the market implementation of products, and signaling with suppliers for critical resources create seizing competency. Moreover, what creates organizational seizing capability is the ability to develop inimitable business and technological models (Bhardwaj et al., 2021), systems thinking, bending established norms, integrative learning, and strengthening of resilience (Murakami, 2021; Vallaster et al., 2021). Based on all of the above, the following hypotheses were formulated:

H4c. Tacit knowledge sharing affects the 'seizing' capability positively.

H5a. Explicit knowledge sharing affects the 'seizing' capability positively.

All the formulated hypotheses (H4a-c and H5a-c) reflect relations between knowledge sharing (tacit and explicit) and dynamic capabilities (sensing, seizing, reconfiguring). The next stage of the conceptual framework links dynamic capabilities with organizational development, seen through the prism of adaptability to change, innovation, and sustainability.

2.4. Organizational development

"Knowledge management" refers to all tools applied at a system level that help to identify and analyze knowledge and react to related challenges, making organizations adaptable (Durst et al., 2016). Teece's (2007) idea of dynamic capabilities fundamentally states that what creates the corporate ability to adapt smoothly is an organization's capacity to sense, seize, and reconfigure intangible and tangible assets over time. Organizations deal with increasing uncertainty of all kinds, which makes organizational adaptability to change a more relevant need for development than ever before. They experiment with new products, services, strategies, operations, and business models. Adaptive organizations read and react to signs of change faster than their competitors (Reeves & Deimler, 2011). So, with such intensive experimenting when seeking new solutions, organizations are ready to take the risk of being mistaken and to learn from new experiences dynamically. Dynamic times encourage companies to constantly develop, capture new knowledge, and learn to maintain or gain an advantage over competitors thanks to change adaptability and innovativeness (Kucharska & Rebelo, 2022). These learning processes, in turn, build dynamic capabilities that affect change adaptability, innovativeness, and sustainability (Klein, 2022). Dynamic capabilities are critical for these developmental aims. The presented dependencies are discussed in-depth further below.

2.4.1. Adaptability to change (organizational collective intelligence)

Feuerstein et al. (1979) defined "intelligence" as the ability to adapt to change. These researchers see the capacity of an organization to adapt to change as its intelligence. Since an organization is a network of people, organizational intelligence is a collective issue. Change is a characteristic of the current economy (Reupert, 2020). In the knowledge economy, organizations and individuals create and adapt to change to exist and create value (Teece, 2007; Rass et al., 2023). Because the collective intelligence developed in an organization reflects its ability to adapt, in this study, the terms "organizational adaptability to change" and "organizational (collective) intelligence" are used interchangeably. There are a few ways for companies to achieve adaptability, e.g., by slimming down planning processes, making them more frequent, delegating decision-making, encouraging experimentation with processes, technology, and company structure, or re-framing business models (Reeves & Deimler, 2011). That is why "reconfiguring" skills are in organizations so vital today.

"Reconfiguring" skills refer to a firm's ability to manage its assets, transform resources, and build new capabilities through learning (Teece, 2007; Jantunen et al., 2018). In a rapidly changing environment, change needs to become part of daily routines. A strong KM strategy is essential for enhancing collective intelligence, which in turn boosts innovation and business performance. Developing collective intelligence is vital for improving an organization's sensing skills, which involve scanning the external environment and identifying market opportunities, and seizing skills, which focus on capturing value from those opportunities through strategic decisions (Teece, 2007). Based on this, the following hypotheses were formulated:

H6. The sensing dimension of dynamic capabilities affects organizational intelligence (change adaptability) positively.

H7. The reconfiguring dimension of dynamic capabilities affects organizational intelligence (change adaptability) positively.

H8. The seizing dimension of dynamic capabilities affects organizational intelligence (change adaptability) positively.

2.4.2. Market innovations

Affected by the dynamic capabilities, as stated earlier, adaptability to change may foster innovation development (Wilson & Doz, 2011). Some researchers link dynamic capabilities with innovation performance (Giniuniene & Jurksiene, 2015; Kaur, 2023). Verona and Ravasi (2003) empirically proved that the development of knowledge-related dynamic capabilities is crucial to sustaining the innovativeness of companies. Those capabilities help companies adapt to external changes by continuously renewing their organizational knowledge (Ali et al., 2012). That is why collective learning is crucial for collective intelligence. Collective intelligence affects collective acting, especially innovative acting.

Innovation is a widely discussed topic in both research and practice. Johne (1999) asserts that market innovation, alongside product and process innovation, drives business development through improved target market strategies, creating new opportunities. However, Donbesuur et al. (2020) emphasize the importance of distinguishing between internal-oriented and external-oriented innovations. The first, internally oriented innovations, are focused on new methods and processes that improve the organization's operations and are often technological, leading to the creation of external innovations. The second, i.e., external innovations, are at the same time product and service innovations, referred to as "market-dedicated innovations." Kucharska and Erickson (2023) proved that no external innovations are without internal improvements. As a result of this conclusion, market innovation was applied in this study as a proxy for the entire ability of the organization

to be innovative. So, the following hypothesis was proposed:

H9. Organizational collective intelligence (change adaptability) fosters market innovation.

2.4.3. Sustainability

The essence of sustainability is to responsibly manage resources in the long term and expose the widely understood solidarity in development (not at the expense of others). Its essence is to meet the needs of the present generation without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development - WCED, 1987). This idea of intergenerational solidarity is probably why the business world deals with increasing stakeholder pressure to become sustainable (Silva et al., 2019). Responsiveness, competency, flexibility, and aptness help organizations to achieve a sustainability level at which they not only reduce their negative impact but also actively aim to create positive impacts on society and the planet (Dyllick & Muff, 2016; Voegtlin & Scherer, 2017). Kucharska and Bedford (2023, p. 253) stated that organizational sustainability is a long-run perspective management enabling the organization to continuously generate shared value, to survive and thrive in a dynamic knowledge economy. From the knowledge-centered perspective, a knowledge-driven organization can be seen as a network of knowledgeable and knowledge-creating minds. In effect, the root of organizational sustainability lies in creating a sustainable collaboration network of brilliant minds that constantly adapt. This statement agrees with Soderstrom and Heinze's (2021) study, which stated that collective efforts amplify organizational sustainability. Considering all this, the following hypothesis was proposed:

H10. Organizational collective intelligence (change adaptability) fosters sustainability.

Another process with the power to influence sustainability in an organization is the innovative process. Innovativeness comes from scanning and interpreting external conditions and growing social and environmental challenges to identify problems and improve organizations' offers to serve sustainable development in a better way (Zięba et al., 2022). So, from this perspective, innovations may significantly drive sustainability. Some researchers noted the positive effect of innovativeness on sustainable process management (Ahmed, 2017; Dangelico et al., 2017) and improved environmental performance (Kuscer et al., 2017). Matinaro and Liu (2017) confirmed that all entities that aim to implement sustainability in all dimensions need innovativeness. They also stressed the negative impact of a lack of innovativeness on social change toward sustainability.

Furthermore, since external-oriented innovations are the key to competitive advantage building and monetizing the proposed shared value (Cillo et al., 2023), organizations are seeking innovations that reconcile the economic, environmental, and social goals of all stakeholders. Sustainable innovations secure sustainable development (Lubberink et al., 2019; Voegtlin & Scherer, 2017). Based on this, the following hypothesis was proposed:

H11. Market innovations foster sustainability.

Fig. 1 visualizes the entire conceptual framework presented.

3. Methodology

3.1. Sample quality and characteristics

This study focused on Polish knowledge workers, qualifying respondents who indicated that knowledge was critical to their work and had at least one year of experience with their current employer. A questionnaire was developed to measure the latent variables from the conceptual framework, with measurement statements sourced in Appendix A. Respondents used a 7-point Likert scale to rate these statements. Scale reliabilities are presented in Table 1. Additionally, Appendix B presents the cross-loadings matrix, indicating that the applied scales do not overlap. Data collection occurred in March 2023 through computer-assisted web interviewing. As a result, 496 fully completed and valid questionnaires were collected (SD $>$ .4) represented by: 247 specialists and 249 managers, 251 women and 249 men mainly working in private (77%) companies in different sectors and almost equally represented by micro (14%), small (28%), medium (31%), and large companies (26%). The sector-mixed and company-size-mixed sample was dedicated to this study to illustrate the general view of the KLC cultures synergy approach—that is, tacit and explicit knowledge sharing, dynamic capabilities, innovations, and sustainability development in Poland. Dominating sectors in the study sample were knowledge-intensive services (31%) and production (18%), with the remaining sectors public administration (10%), technology (hardware) (10%), science (10%), construction (10%), pharmacy (10%), health care (8%), and others (24%). Sample quality assessment started with several tests: the Kaiser–Meyer–Olkin test (result: .960), total variance extracted (result: 84%), the Harman one-factor test (result: 38%), and the CMB test (result: 36%). The obtained results justify the good quality of the sample, which enabled further analysis.

3.2. Initial analysis procedure

After the positive assessment of the reliability of the sample and scale, the structural confirmatory factor analysis model was developed to ensure that the scales were appropriate. The model quality evaluation was initially conducted based on implemented construct measurement consistency tests such as the average of variance extracted (AVE), composite reliability (CR), and Cronbach's alpha. AVE exceeded 0.57 for all constructs, which was acceptable (Hair et al., 2017). Cronbach's alpha test was used to confirm the consistency of the construct measurement model. The alpha coefficient was greater than 0.89 for all constructs, which was adequate (Hair et al., 2017, p. 112). The CR was greater than 0.80 for all loadings, which was more than the required minimum of 0.7 (Hair et al., 2017). The square root of each construct's AVE exceeded the correlations between any pair of distinct constructs except "reconfiguring" (R)— adaptability to change (IQ) and adaptability to change (IQ)—"market innovations" (I) (italic in Table 1). This result means that there is a strong interdependency between the dynamic capability "reconfiguring" and adaptability to change (IQ), and similarly between adaptability to change reflecting collective organizational intelligence (IQ) and market innovations in Poland. On the one hand, this interdependence may cause slight measurement bias; on the other hand, it exposes the importance of organizational intelligence for dynamic organizational growth via innovations in Poland. Moreover, the total variance extracted (result: 84%) and the Harman one-factor test (result: 38%) proved that the explored structural model is unaffected by a measurement bias. So, it means that the conceptual layer of reconfiguring capabilities, adaptability to change, and innovations constructs differ, and they are not synonymous but strongly depend on one another. Therefore, the fact that reconfiguring capabilities, adaptability to change, and innovations are strongly correlated (Table 1) suggests that they can be proxies for one another. The next section of this study will expose the meaning of the structure of these relations in more depth.

After the positive results of the initial analysis, the structural model was created, assessed, and analyzed.

4. Results

4.1. General structural model output

The entire structural model output confirms that KLC cultures synergy fosters knowledge sharing (tacit and explicit) that is vital for dynamic capabilities development, which, in turn, influences organizational intelligence (change adaptability), innovativeness, and

Table 1
Basic statistics correlations matrix and the square root of average of variance extracted (AVE).

	Mean	SD	AVE	CR	Cronbach alpha	CC	KC	LCc	LcM	EKS	TKS	SN	SZ	R	IQ	INN	S
CC	4.96	1.79	.71	.92	.95	**.843**											
KC	5.4	2.10	.71	.88	.89	.448	**.844**										
LCc	5.10	1.92	.71	.88	.91	.746	.511	**.845**									
Lcm	4.7	1.81	.65	.85	.88	.841	.318	.627	**.805**								
EKS	4.87	1.76	.57	.80	.89	.79	.415	.697	.747	**.753**							
TKS	4.95	1.86	.79	.88	.92	.757	.499	.82	.728	.688	**.890**						
SN	5.06	1.83	.80	.92	.93	.765	.462	.762	.709	.743	.889	**.960**					
SZ	5.17	1.85	.77	.91	.93	.692	.416	.687	.641	.674	.8	.742	**.953**				
R	5.03	1.81	.73	.80	.89	.795	.485	.801	.74	.766	.89	.866	.78	**.856**			
IQ	5.03	1.84	.70	.88	.91	.742	.452	.746	.691	.716	.874	.828	.752	*.915*	**.839**		
INN	4.93	1.81	.74	.90	.91	.671	.408	.674	.624	.647	.79	.748	.68	.827	*.904*	**.860**	
S	4.99	1.82	.76	.88	.92	.607	.369	.61	.565	.586	.715	.677	.615	.748	.818	.773	**.872**

Note sample size n = 496.

sustainability. Thus, the KLC synergy approach can be considered an efficient tool supporting sustainability achievement in light of the given empirical evidence. The given model explains the entire structure of explored relations presented in Fig. 2 in 68% ($R^2 = .68$), which is a solid result. However, the other missing 32% of the explored relation can be explained by variables not included in this study, which creates a space for further research. The entire model effects are presented in Fig. 2. Details are presented in Table 2, and the following are elaborated on.

4.2. Details of hypotheses verification

Generally, in light of the empirical evidence given by the entire modeled structure, the KLC synergy approach can be considered an efficient tool supporting sustainability achievement. However, not all hypotheses were verified positively.

H1a (β = .25***) confirms that knowledge culture positively supports the learning-climate component of a learning culture, but the mistake-acceptance component is not supported by knowledge culture, so H1b is not confirmed. The expected positive influence of the learning-climate component on the mistake-acceptance component of learning culture is also not confirmed (H1c). Hypothesis H1d (β = .64***) confirms a strong, positive influence of collaborative culture on the learning-climate component of a learning culture, and H1e exposes an even stronger effect of collaborative culture on the mistake-acceptance component of a learning culture (β = .85***). The correlation between collaborative and knowledge cultures is also confirmed (H1f: β = .41***). Summing up, collaborative culture is the strongest influencer among the KLC cultures and thus is the center of the KLC approach.

The KLC cultures' support of the power of knowledge sharing is confirmed for tacit knowledge sharing (H3a: β = .16***; H3b: β = .51***; H3c: β = .33***) and only partially for explicit knowledge sharing. Collaborative culture's positive influence on explicit knowledge sharing is confirmed (H2a β = .83***), but that of learning culture (H2b, H2c) is not. Similarly, when analyzing the influence of tacit and explicit knowledge on dynamic capabilities, all hypotheses (H4a: β = .62***; H4b: β = .36***; H4c: β = .62***; H5b: β = .27***; H5c: β = .43***) except H5a are sustained. So, tacit knowledge sharing supported by the KLC approach influences dynamic capabilities more robustly than explicit knowledge sharing. Consequently, the seizing capability's (H8) positive influence on the organizational ability to adapt to change (organizational intelligence) is not confirmed, but those of the sensing (H6: β = .14*) and reconfiguring (H7: β = .74***) capabilities are. Finally, the hypotheses about the positive influence of organizational intelligence (adaptability to change) on market innovations and sustainability are sustained (H9: β = .89***; H10: β = .65***), as is H11, which states that market innovations support sustainability achievement (β = .18*). Table 2 presents the hypothesis verification details.

The results inspired two post hoc hypotheses, presented in the extended version of this article (Kucharska & Karwowska, 2024).

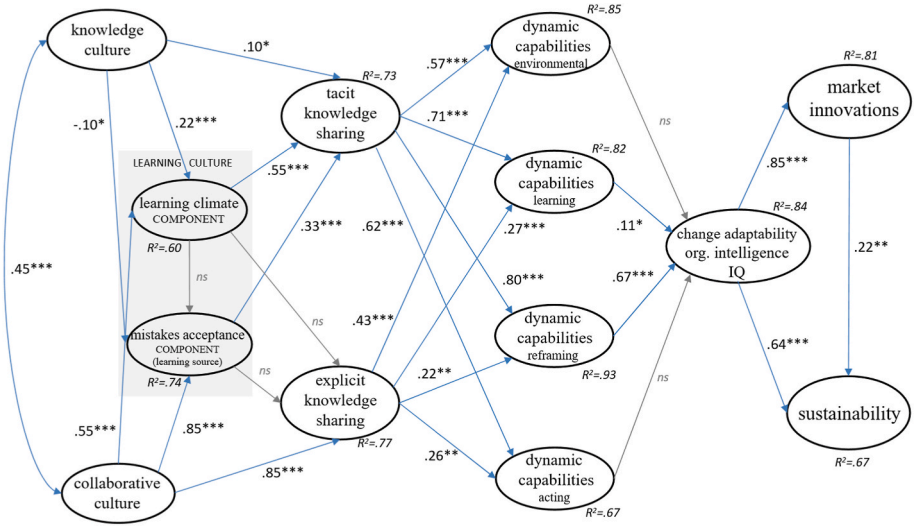

Fig. 2. Results
Note: n = 496; ML–maximum likelihood; $\chi^2 = 1694.161$ (533); CFI = .915; TLI = .918; RMSEA = .066; Cmin/*df* = 3.18; *$p < .05$; **$p < .01$; ***$p < .001$; ns—not significant result.

Table 2
Hypotheses verification.

hypothesis	β	verification
H1a	.25(***)	*sustained*
H1b	−.04(.371)	*rejected*
H1c	.01 (.856)	*rejected*
H1d	.64(***)	*sustained*
H1e	.85(***)	*sustained*
H1f	.41(***)	*sustained*
H2a	.83(***)	*sustained*
H2b	−.03(.766)	*rejected*
H2c	.07(.363)	*rejected*
H3a	.16(***)	*sustained*
H3b	.51(***)	*sustained*
H3c	.33(***)	*sustained*
H4a	.62(***)	*sustained*
H4b	.36(***)	*sustained*
H4c	.74(***)	*sustained*
H5a	.13(.189)	*rejected*
H5b	.27(***)	*sustained*
H5c	.43(***)	*sustained*
H6	.14(*)	sustained
H7	.74(***)	*sustained*
H8	.07(.189)	*rejected*
H9	.89(***)	sustained
H10	.65(***)	*sustained*
H11	.18(*)	*sustained*

Note: n = 496; ML; $\chi 2 = 1694.161(533)$; CFI = .915; TLI = .918; RMSEA = .066 Cmin/df = 3.18; *p < .05 **p < .01 ***p < .001; ns-not significant result.

5. Discussion and practical implications

The findings highlight the importance of the KLC culture approach in promoting sustainability through effective tacit knowledge sharing. This mechanism is vital for developing dynamic capabilities like reconfiguring and sensing, which enhance an organization's adaptability to change—essential for sustainability. While the KLC approach supports explicit knowledge sharing, its strength lies in fostering tacit knowledge exchange, aligning with Kucharska's (2021) research on innovation. Since tacit knowledge sharing is driven by personal motivation rather than formal protocols, cultivating an empowering culture is essential. Ultimately, company culture, particularly through the KLC approach, is crucial for organizations, and managers should view it as a valuable asset for sustainability.

Another issue worth discussing is the R-sq of the model. Since company culture view as a sustainability supporting tool is still rare (Pennington, 2022), the fact that the synergic power of KLC culture influences sustainability development in 68% ($R^2 = .68$) in the given model is impressive evidence that company culture matters for successful sustainability implementation.

Moreover, the current model explains sensing capability in 82% ($R^2 = .82$), reconfiguring in 91% ($R^2 = .91$), but seizing capability only in 69%. This might result from the more substantial influence of KLC cultures on tacit rather than explicit knowledge (H5a). The study shows that tacit knowledge sharing supported by the KLC approach influences dynamic capabilities more robustly than explicit knowledge sharing. It confirms that structural capital can foster explicit knowledge sharing (and vice versa), whereas tacit knowledge sharing can be supported only through culture (Kucharska, 2021).

Another critical finding reveals the dominating position of collaborative culture in the KLC culture approach. Kucharska and Bedford (2023, p. 124) stated that from the perspective of knowledge-driven organizations, collaborative culture enhances seamless cooperation of the knowledge workers' mind network; therefore, collaborative culture is critical for tacit knowledge awareness and spreading and, thus, collective intelligence building. The study results appear to confirm this.

5.1. Key recommendations

- Simultaneous implementation of the KLC. Knowledge-driven organizations often see knowledge-learning-collaboration cultures separately. For knowledge-driven organizations that want to adapt to the hyperdynamic economy and introduce market innovations, it is critical to implement the KLC functional cultures simultaneously because none of them is as powerful alone as they are together.
- Culture-structure-strategy alignment. As the famous adage of Peter Drucker states, *company culture eats strategy for breakfast every day. This* indicates that even the most brilliant strategy is doomed to failure if it is not aligned with the company culture.
- Sustainability is rooted in culture, and the KLC approach—emphasizing knowledge sharing, collective learning, adaptability, and innovation—is essential. To make it work, all employees, managers, and leaders must embody the KLC principles. Those who neglect knowledge, learning, or collaboration should not lead or manage others. This is a key recommendation of the study.

5.2. Limitations & further research ideas

- The studied model explained sustainability in 68% ($R^2 = .68$), which is a solid result. However, 32% of the explored relation can be explained by variables not included in this study, creating a space for further research.
- It has not been confirmed whether seizing capability (H8) positively influences the organizational ability to adapt to change (organizational intelligence). It might be that this impact is indirect. Further studies are needed.
- Another research window concerns the effect of the DBM on the relationship between learning-culture components across different sectors. It was concluded that those sectors that rely more on knowledge culture than learning culture may be more affected by the DBM (knowledge culture does not support the acceptance of mistakes component of learning culture – as our findings showed). This issue also requires further study.
- From the DBM results, other related questions arise: How should organizations deal with the existence of DBMs to be more adaptive and innovative to secure organizational learning and growth? Also, it would be interesting to know how artificial intelligence (AI) deals with the existence of DBM. Algorithms are as intelligent as the people creating them. Is collective organizational intelligence intelligent enough to detect a DBM and its influence on decision-making? Is AI intelligent enough to detect a DBM and its influence on decision-making?—All these questions remain open.
- This study is limited to one country and various sectors. Since national and sectoral cultures influence a company's culture, replicating this research in other countries and specific sectors could provide further insights.
- Collective, multilevel company culture: How do various aspects of an organization, such as its culture type, strength, and consistency (congruence) across different company levels, impact the benefits of the KLC approach identified in this study that help build company intelligence? How do they shape any other potential benefits, e.g., dynamic capabilities?
- Collective, multilevel intelligence: goes beyond the individual intelligence of employees; it involves the capacity to think and act intelligently as a group. Factors like trust, critical thinking, risk, and safety are essential. Achieving this collective intelligence can be challenging, warranting more multidisciplinary studies in psychology, sociology, and management.
- Collective, multilevel innovativeness: it would be worth conducting studies exploring how organizational culture can simultaneously support market orientation and sustainable collectivism.
- Leadership: It is vital to discover what kind of leadership and specific business practices help implement the KLC approach and how the

synergy of KLC cultures influences other organizational outputs, such as efficacy, efficiency, and general performance.

6. Conclusion

The KLC synergy approach was proved to be an efficient tool supporting sustainability achievement. The results showed that KLC culture synergy fosters knowledge sharing (both tacit and explicit), which is vital for dynamic capabilities development and, in turn, influences organizational intelligence, innovativeness, and sustainability achievement. The critical factors of the entire mechanism are collaborative and learning cultures and tacit knowledge sharing. Tacit knowledge sharing is a vital source of dynamic capabilities. Collaborative culture is proven to be the strongest influencer among the KLC cultures and is the central driver of the KLC approach.

CRediT authorship contribution statement

Wioleta Kucharska: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Elżbieta Karwowska:** Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssaho.2024.101268.

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