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GDAŃSK UNIVERSITY OF TECHNOLOGY
FACULTY OF MANAGEMENT AND ECONOMICS

Intellectual Capital, and Knowledge Processes for Organizational Innovativeness across Industries: The Case of Poland

– the full version of a study published in JIC

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Intellectual Capital, and Knowledge Processes for Organizational Innovativeness across Industries: The Case of Poland

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Abstract

Purpose: This study aims to present the overview of intellectual capital creation micro-mechanisms concerning formal and informal knowledge processes. The organizational culture, transformational leadership, and innovativeness are also included in the investigation as ascendants and consequences of the focal relation of intellectual capital and knowledge processes.

Method: The empirical model was developed using the structural equation modeling (SEM) method based on a sample of 1,418 Polish knowledge workers employed in the construction, healthcare, higher education (HE), and information technology (IT) industries.

Findings: The study exposes that the essence of transformational leadership innovativeness oriented is developing all intellectual capital components. To do so, leaders must support both formal and informal knowledge processes through the organizational culture of knowledge and learning. Furthermore, for best results of the knowledge transformation into intellectual capital, the learning culture must be shaped by both components: learning climate and acceptance of mistakes.

Originality: This study presents the "big picture" of all intellectual capital creation micro-mechanisms linking transformational leadership with organizational innovativeness and explains the "knowledge paradox" identified by Mabey and Zhao (2017). This explanation assumes that intellectual capital components are created informally (i.e., human, and relational ones) and formally (i.e., structural ones). Therefore, for best effects, both formal and informal knowledge processes must be supported. Furthermore, this study exposes that the intensity of all explored micro-mechanisms is industry-specific.

Implications: Presented findings can be directly applied to organizations to enhance innovativeness. Namely, leaders who observe that the more knowledge is formally managed in their organizations, the less effective the knowledge exchange is - should put more effort into supporting informal knowledge processes to develop human and relational intellectual capital components smoothly. Shortly, leaders need to implement an authentic learning culture, including the mistakes acceptance component, to use the full organizational potential to achieve intellectual capital growth. Intellectual capital growth is essential for innovativeness.

Keywords: learning culture, knowledge culture, transformational leadership, innovations, intellectual capital, tacit knowledge, knowledge processes, healthcare industry, higher education, IT industry, construction industry, gender studies

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1. Introduction

Intellectual capital is a central focus of knowledge-driven companies today. It is believed that there is no knowledge without intellectual capital and vice versa (Rastogi, 2000). Therefore, all studies exploring this bidirectional relationship (Garcia-Perez *et al.*, 2020) are vital for organizational development: first because they strive to understand this relationship and second because they help organizations shape their policies in favor of creating both knowledge and intellectual capital.

This study focuses on intellectual capital creation arising from knowledge processes and contributes to the literature by demonstrating how tacit knowledge and explicit knowledge affect intellectual capital. This exploration is needed for understanding the contradiction identified by Mabey and Zhao (2017), who revealed that "the more knowledge is formally managed, the less likely effective knowledge exchange will occur" (p. 43), and they named this phenomenon the "knowledge paradox". Solving the mechanism of this paradox is vital for knowledge management theory and practice. However, following above mentioned Rastogi (2000) and Garcia-Perez *et al.* (2020), it seems possible only by the thorough, more in-depth investigation of intellectual capital-related and knowledge management-related organizational processes. This exploration is needed because tacit and explicit knowledge forms are created differently across the organization, which might affect intellectual capital. Specifically, this study aims to expose how informal processes of tacit knowledge, and formal processes of explicit knowledge influence each component of intellectual capital.

Tacit knowledge "often resembles intuition" (Smith, 2001, p. 314). As tacit knowledge is personal and sharing it cannot be formalized or forced (Kucharska, 2022; Polanyi, 1966), it was assumed that informal and formal knowledge processes supported by organizational culture promote tacit knowledge in a manner that is contrary to the support of the explicit knowledge processes of gathering, storing, distributing, and protecting knowledge, which can be formalized. Both tacit and explicit knowledge are important in intellectual capital development. Moreover, while each of the intellectual capital components (i.e., human, relational, structural, and renewal) are vital for organizational performance and development (Ahmed *et al.*, 2019), they all require different types of organizational support (Matricano *et al.*, 2020). This study serves as an in-depth exploration of how these four intellectual capital components contribute to organizational innovativeness performance. Specifically, it exposes how these components are created through formal and informal knowledge processes when

shaped by organizational culture and driven by transformational leadership, resulting in: first, IC, and next, innovativeness. It is argued that transformational leadership is a key factor in enhancing learning, knowledge, and innovation relations (Klaic *et al.*, 2020). Therefore, transformational leadership can't be omitted in this study. Besides, this study was also inspired by Alrowwad *et al.* (2020), who demonstrated that transformational leadership affects innovation through intellectual capital. Their study presented the general mechanisms of this effect. This study aims to go deeper.

During the last two decades, transformational leadership emerged as the most vital and frequently researched topic in leadership studies (Jung *et al.*, 2009; Hansbrough and Schyns, 2018). Transformational leadership "occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality" (Burns, 1978, p. 20). So, transformative leaders are true "change agents" (Bakari *et al.*, 2017). Since learning always changes the perception of things, these persons strongly support an organizational culture focused on knowledge, learning, and innovativeness (Lin and McDonough, 2011; Masadeh *et al.*, 2016; Lee *et al.*, 2018). Referring to the learning organization theory, the essence of the learning organizations concept is the management model where formally organizational system is designed to enhance learning across the entire organization (Garvin, 1993; Goh, 1998; Jerez-Gomez *et al.*, 2005; McGill, *et al.* 1992; Pedler *et al.*, 1991; Senge, 1990; Ulrich *et al.*, 1993). This systemic approach to learning processes in the organization is motivated by the fact that exploiting current knowledge and exploring new knowledge is vital for improvements in organizations (March 1991; Meyer, 1982). Therefore, the learning organizations focus on building a formal capacity for constant learning at the individual and organizational level (Watkins and Marsick, 1993) and facilitating the flow of constant transformation of tacit knowledge into explicit (Nonaka and Takeuchi, 1995). Besides, learning organization is a formal management system, whereas organizational learning is an activity that occurs thanks to formal systemic enhancements and even without them (Werner, 2017). Therefore, learning culture understood as employee positive attitude and behaviors towards learning processes seems to be vital for formal and informal organizational learning processes. Moreover, Watkins and Kim (2018) stressed that the assumption that organizational learning culture enhances knowledge creation and innovation – if it is empirically confirmed, it is a highly significant discovery. So, the ambition to deliver this proof justifies this study's profound complexity.

All above justifies that this study aims to fulfill the important gaps in the body of knowledge. Since understanding the influencing power of strategic leaders on organizational innovativeness is an important research focus (Cortes and Herrmann, 2020), and in the literature lacks a complex presentation of the micromechanisms of focal factors, attitudes, and behaviors that are vital for creating a management framework that can guide management policy formulation and practice (Kaplan, 2006). Thus, this study attempts to present a holistic overview of the micromechanisms to construct a framework for managing tacit and explicit knowledge processes to support all components of intellectual capital through the power of transformational leaders. These leaders are designated to create the company culture of knowledge and learning, which are vital for innovativeness. In the comprehensive literature review for 2014–2018, Bellucci *et al.* (2020) noted the urgent need for studies engaging in a more in-depth exploration of the interconnections between knowledge management, intellectual capital, and market performance with innovation. This study, strongly inspired by the literature presented above, directly responds to this call.

2. Theoretical Framework

Innovations are claimed to be an underlying condition for organizational growth and sustainability (Bacon *et al.*, 2020; Hofmann and Jaeger-Erben, 2020). Kremer *et al.* (2019) claimed that nowadays, we have a state of an innovation-driven business revolution where innovations are the source of competitive advantage and that being successful in it requires constant transformation. Cascio and Aguinis (2019) argued that transformational leaders play an essential role in this business climate because, as change agents, such leaders are responsible for constant organizational change (Middleton *et al.*, 2015; Bakari *et al.*, 2017). Furthermore, if successful, this business climate created by leaders results in a shared employee's perception and experience of organizational mission, vision, norms, and values. Such shared group norms are referred to as "culture" (Schein, 1990). Simplifying, the organizational culture is a set of shared norms, attitudes, and beliefs reflected in the daily employees' behavior. Kremer *et al.* (2019) suggested that the development of appropriate group norms first way of introducing change. Given that organizational change and culture are tightly connected (Brandt *et al.*, 2019; Baek *et al.*, 2019) and that company culture influences knowledge processes (Nold, 2012), which are vital for intellectual capital development (Davenport and Prusak, 1998; Park *et al.*, 2004; Lee and Choi, 2003), intellectual capital is a source of company innovativeness (Bellucci *et al.*, 2020; Li *et al.*, 2020; McDowell *et al.*, 2018). In addition, the direct and positive impact of intellectual capital

on organizational innovativeness was demonstrated (e.g., Peng *et al.*, 2011; Roos, 2013; Hussinki *et al.*, 2017; Cabrilo *et al.*, 2018). Thus, exploring the ties between transformational leadership and organizational culture is important for demonstrating how leadership and innovativeness are related (Jaskyte, 2004; Khan *et al.*, 2020; Lasrado and Kassem, 2020).

Besides, while some existing studies demonstrate a link between organizational innovativeness and the factors of leadership, culture, intellectual capital, and knowledge processes (e.g., Xue *et al.*, 2011; Cantanelli *et al.*, 2017; Natalicchio *et al.*, 2017; Shao *et al.*, 2017; Elrehail *et al.*, 2018; Naqshbandi and Jasimuddin, 2018; Bachrach and Mullins, 2019; Cruz *et al.*, 2020; Pellegrini *et al.*, 2020), they explain only parts of the relationship rather than its entire structure. For example, Hadijah *et al.* (2015) investigated the effect of transformational leadership and knowledge management on intellectual capital. Khadir-Poggi and Keating (2015) also explored the relationship between intellectual capital and knowledge management but none of them did consider organizational culture, whereas other studies (e.g., Rao and Weintraub, 2013; Dodge *et al.*, 2017; Mallén Broch *et al.*, 2020; Hidalgo-Peñate *et al.*, 2020) showed clearly that organizational culture and leadership are significant determinants of innovativeness, but still left a deep analysis of knowledge processes contribution unexplored.

Based on all the literature that was presented so far, the profound complexity of the proposed study is the effect of the ambition to deliver a piece of empirical evidence exposing how exactly leaders support innovativeness by supporting organizational culture, knowledge processes, and intellectual capital. This expected empirical evidence surely is at the center of interest of organizations focused on development. The development is the focus of each knowledge-driven company (Garcia-Perez *et al.*, 2020). Besides, intellectual capital is a complex phenomenon, and as stressed in the Introduction section, each of its components requires different types of organizational support (Matricano *et al.*, 2020). Therefore, this study aims to investigate how formal and informal knowledge processes contribute to intellectual capital development. It is also assumed that the company culture formed by transformational leadership is powerful enough to shape and re-shape the entire organization and influence formal and informal processes. Bedford and Kucharska (2021) argued that the strategy of a company is not effective if proper and aligned aims and vision do not support it, because company culture serves as the determinants of behaviors. Therefore, this study strives to present the overview of intellectual capital creation micromechanisms of formal and

informal knowledge processes driven by organizational culture and transformational leadership to achieve innovativeness.

However, the following question may arise: why such important factors such as, e.g., the strategy, HR policy, IT system, organizational structure, maturity level, etc., are omitted in the planned approach? So, however complex, every model, including the proposed one, is still merely a simplification of the much more complex reality. So, this one also covers only selected factors. Company culture and transformational leadership were selected because they are key, powerful drivers determining the entire organization. Namely, it is assumed that the company culture formed by transformational leadership is powerful enough to shape or re-shape the entire organization and influence all formal and informal processes to achieve the company's aims. This assumption is justified by the fact that formal acts are caused by formal rules and policies (North, 1990), while informal acts are shaped by informal rules. Company culture accommodates both formal and informal rules. Namely, company culture can endorse or reject certain behaviors as congruent or incongruent with organizational norms and values (Scott, 2008; Sahasranamam *et al.*, 2021). Transformational leaders are potent enough to create organizational culture (Anselmann and Mulder, 2020). To sum up, this study aims to contribute to science by presenting the model of micromechanisms linking transformational leadership with organizational innovativeness, including company culture, knowledge processes, and intellectual capital. This model serves as a means of understanding how exactly all intellectual capital components—human, relational, structural, and renewal—are tied to each other and how formal and informal knowledge processes are supported and make an organization innovative. This knowledge is crucial in terms of the development of learning organizations.

Below the summary of this study's methodological logic is presented.

Research gap specification

Continuing, it is known that all of the factors mentioned above are somehow related. However, the "big picture" of all intellectual capital creation micromechanisms linking transformational leadership with organizational innovativeness is still missing. Moreover, the issue of how formal and informal knowledge processes shape intellectual capital and the overall relationship between leadership and innovativeness remains unexplored. A deep understanding of the essence of all the aforementioned relations is vital for transformational

leadership and innovativeness relation exploration that is exceptionally vital for learning organizations' growth. Moreover, revealing these micromechanisms is also critical for:

- the understanding of the way of how particular intellectual capital components in the organizations are developed thanks to knowledge processes (Garcia-Perez *et al.* 2020; Matricano *et al.*, 2020);
- the explanation of the "knowledge paradox" (Mabey and Zhao, 2017);
- the empirical proof supporting the theoretical thesis that learning culture influences organizational innovativeness (Watkins and Kim 2018).

This knowledge is desired by theory and practice to improve organizational innovativeness.

Research question

With this in mind, this study aims to answer the following research question: how formal and informal knowledge processes shape intellectual capital and link the overall relationship between transformational leadership and innovativeness thanks to company culture?

Research problem

The research problem addressed in this study concerns transformational leadership and the innovativeness of learning organizations. All factors mentioned in the Introduction section are related, but details are not known. This lack of knowledge makes it impossible to understand micromechanisms linking transformational leadership with organizational innovativeness—this understanding is desired by theory and practice to improve organizational innovativeness.

Aim

This study aims to present the overview of intellectual capital creation micromechanisms of formal and informal knowledge processes driven by organizational culture and transformational leadership to achieve innovativeness. Specific objectives that support the general aim are designated to:

- clarify the way of how the intellectual capital components are created in the organization;
- explain "knowledge paradox";
- deliver the empirical proof enabling the verification if learning culture influences organizational innovativeness.

Figure 1 presents the general framework and rationale of this study, as described above.

Figure 1. General Framework

Figure 1

The framework presented in Figure 1 is the basis for the development of hypotheses, which, in turn, enables the study framework to be expanded to include more details, as shown in Figure 2.

3. Development of Hypotheses

Transformational leadership shapes organizational culture

Transformational leaders are a prominent group because they are true agents of change. They materialize brave organizational ideas and visions, create strong bonds with employees, motivate employees, and are supportive and inspirational (Busari *et al.*, 2019; Jyoti and Dev, 2015; Middleton *et al.*, 2015). Such leaders are able to effect change through the development of organizational culture (Schein, 2010; Brandt *et al.*, 2019).

Organizational culture is the essence of the organizational mindset. It is defined as the combination of the values, beliefs, and attitudes that are emphasized by a particular organization (Cho *et al.*, 2013). It is sometimes the case that leaders focus too much on changing organizational policies rather than changing the organizational mindset, often failing to improve performance as a result (Schwartz, 2018). For this reason, this study focuses on transformational leadership that actively shapes organizational culture to ensure good innovation performance. Given that this study focuses on intellectual capital and knowledge processes in relation to the innovativeness of learning organizations, learning organizations facilitate the learning process of all employees, continuously transforming themselves (Pedler *et al.*, 2006). Garvin (1993, p. 80) defined a learning organization as "an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights". With this in mind, a desire to possess knowledge is a motivation for learning. For this reason, knowledge culture also matters for the purpose of this study. Islam *et al.* (2015) described knowledge culture as conditions that support the effective and efficient flow of knowledge throughout the organization. The knowledge culture of an organization facilitates knowledge sharing and is important in terms of innovativeness and organizational improvement (Mueller, 2014). Moreover, knowledge culture is fundamentally crucial for the "status quo" of learning organizations, but a learning culture is essential for their growth. To make this statement less abstract, knowledge culture can lead to static

"knowledge consumption," whereas learning culture always leads to progress, making knowledge dynamic. In addition, knowledge culture does not accept mistakes because the central value of knowledge culture is knowledge itself, not progress. Therefore, the domination of knowledge culture may lead to the adoption of an extreme attitude such as "If knowledge is a value, then I know; if I don't - I'll find out, but officially I never admit my deficits, gaps, or mistakes. I am knowledgeable = I am valuable; therefore, I am always right - to justify my value=workplace." Meanwhile, the attitude of learning culture is along the lines of "If I accept that my progress is a value, I am looking for it, so mentally I am ready to admit that I am wrong, and I learn faster as a result because I am mentally open to changes." Both attitudes promote "knowledge-seeking" in a way, but the learning one accepts deficits and mistakes, which is embodied in at the root of learning. Therefore, the learning attitude is more effective for fast progress. However, knowledge culture is vital for the development of learning culture. Learning guarantees development, but knowledge culture is required to enhance the positive attitude and motivation to learn (Kucharska and Bedford, 2020). With this in mind, both these cultures (knowledge and learning) are included in this study.

Naqshbandi and Jasimuddin (2018) demonstrated that knowledge-oriented leadership affects knowledge management capability, which is defined broadly as creating infrastructure and processes to increase innovativeness. These researchers followed the studies by Donate and de Pablo (2015) and Donate and Guadamillas (2010), who found that a knowledge-oriented company culture influences knowledge-management practices, and that knowledge processes are supported by leadership. Transformational leadership supports knowledge sharing (Li *et al.*, 2014; Dong *et al.*, 2017; Coun *et al.*, 2019). Transformational leadership also creates an organizational culture that promotes knowledge, learning, and innovativeness (Lin and McDonough, 2011; Masadeh *et al.*, 2016; Lee *et al.*, 2018; Nguyen and Mohamed, 2011). Therefore, the following hypotheses are proposed:

H1: *Transformational leadership has a positive effect on the culture of learning.*

H2: *Transformational leadership has a positive effect on the organizational culture of knowledge.*

The spontaneous flow and exchange of tacit knowledge (both) require strong leadership to create favorable conditions for doing so (Fleming and Waguespack, 2007; Mabey, 2013; Mabey and Nicholds, 2015). According to Mabey and Zhao (2017, p. 48), intentional leadership "based on a collaborative ethic is necessary for the creation of a 'shared' space to

promote informal knowledge exchange". Leaders must facilitate such learning interactions to transform tacit knowledge into explicit knowledge. To support knowledge sharing, organizations also need to develop a culture in which employees can learn, unlearn, and relearn in a safe climate (Nold, 2012). Farnese *et al.* (2019, 2020) also clearly demonstrated the importance of culture for overall organizational learning. Edmondson (1999) and Boh and Wong (2013) noted that organizational climate is important for learning. The "be ready to be wrong" attitude is crucial for all who wish to learn (Senge, 2006). Moreover, leadership has a positive impact on the psychological safety climate of organizations, with this climate mediating the relationship between leadership and tacit knowledge sharing (Shao *et al.*, 2017). Considering that not only the component of the climate promotes learning but also the component of acceptance of mistakes forms learning culture (Kucharska and Bedford, 2020), the following hypotheses are proposed:

H1a: Transformational leadership has a positive effect on the climate component of learning culture.

H1b: Transformational leadership has a positive effect on the mistake acceptance component of learning culture.

Employees with learning mindsets are open to changes, they "are ready to be wrong" (Senge, 2006), meaning that they accept the occurrence of mistakes and they learn from them. Zappa and Robins (2016) stressed that the essence of organizational learning is to identify and modify mistakes. Thus, as demonstrated by Kucharska and Bedford (2020) and Kucharska (2021a-b, 2022), the climate component of learning culture supports the acceptance of mistakes in the learning process. Therefore, the following hypothesis is formulated:

H1c: The climate component of learning culture supports the mistake acceptance component.

Knowledge culture affects learning culture

Organizational culture facilitates the creation and distribution of knowledge (Aramburu *et al.*, 2015). Islam *et al.* (2015) defined knowledge culture as the one that has the conditions to support the flow of knowledge across the organization. Pérez-López *et al.* (2004) and Kucharska and Bedford (2020) argued that knowledge culture has a positive impact on learning culture. They noted that knowledge culture is important, but it is insufficient to ensure constant development. There is no learning culture without knowledge culture. The significant effect of knowledge culture on knowledge sharing and learning was also pointed

out by Eid and Nuhu (2011) and Mueller (2014, 2018). Therefore, the following hypotheses are proposed:

H3a: *Knowledge culture has a positive effect on the climate component of learning culture.*

H3b: *Knowledge culture has a positive effect on the mistake acceptance component of learning culture.*

Organizational culture shapes knowledge processes

Knowledge management is defined as a dynamic and a systematic process (Massingham, 2014; García-Fernández, 2015) consisting of a set of subprocesses (Cheng and Leong, 2017) designed for identifying, gaining, organizing, creating, storing, and distributing (sharing) knowledge across the organization (García-Fernández, 2015; Raudeliuniene *et al.*, 2018). Knowledge is the "life blood of most organizations today" (Mabey and Zhao, 2017, p. 39). Thus, the principal focus of current organizations is to create and maintain conditions and processes for utilizing knowledge and creating competitive advantage (Xue *et al.*, 2011; Radaelli *et al.*, 2011; Leone and Schiavone, 2019). Inkpen and Tsang (2005) emphasized that access to knowledge is important but is not sufficient for effective knowledge capturing and sharing. Moreover, Heising (2009) noted that apart from the knowledge processes (identifying, gaining, organizing, creating, storing, and distributing knowledge), technology and entire organization design, as well as human-oriented factors such as culture and leadership, are critical to ensure the successful implementation of knowledge management visible in performance. As a result, the knowledge culture of an organization can shape a positive attitude of employees towards (tacit and explicit) knowledge that supports the smooth flow of all knowledge processes. The tacit component of knowledge reflects novelty. The distinction between the explicit and tacit components of knowledge is perfectly explained by Nonaka's (1994) "ba" concept, which determines the moment of transforming the uncoded, often unconscious tacit knowledge into the conscious and easily codified explicit form. The sharing of both explicit and tacit knowledge is important and expected. The understanding and appreciation of knowledge as a resource visible in knowledge culture lead to knowledge management and the development of formal knowledge processes. As a result, knowledge culture supports these processes (Mueller, 2014; Intezari *et al.*, 2017). With this in mind, the following hypothesis is proposed:

H4a: *Knowledge culture has a positive effect on formal explicit knowledge processes.*

Polanyi (1966) said that the entire knowledge is rooted in tacit knowledge. Crane and Bontis (2014, p. 1136) defined tacit knowledge as knowledge that is "acquired unconsciously and automatically, but capable of influencing action". The culture that enables the channel of knowledge flow to be created greatly supports tacit knowledge sharing (Mabey *et al.*, 2012; Mabey and Zhao, 2017). In contrast to the explicit form of knowledge, which is expressed in words and data and codified into many easy-to-share forms (e.g., books, reports, documents, and databases), tacit knowledge is personal, context-specific, stored in the human mind, and, undoubtedly, impossible to be formalized (Kucharska, 2022; Polanyi, 1966). Therefore, tacit knowledge generation and sharing are not formalized or structured but depend on the free will of the knowledge owner, while the factor supporting such sharing includes personal motives (e.g., altruistic motives or desire for self-presentation associated with creating an impression of being an expert). Besides, the majority of tacit knowledge processes happen inside the human mind, and the majority of them are unconscious, except when they are revealed and exactly when they are shared e.g. when knowledge workers actively collaborate (Kucharska, 2017; Olaisen and Revang, 2018; Asher and Popper, 2019). Therefore, following Islam *et al.*'s (2015) statement that knowledge culture supports the flow of knowledge throughout the organization, it is assumed that knowledge culture might motivate knowledge workers to share their newly discovered thoughts and ideas. With this in mind, the hypothesis is formulated as follows:

H4b: *Knowledge culture has a positive effect on tacit knowledge sharing.*

Informal sharing is greatly dependent on social skills, cohesion, and the willingness to commit time and effort to share knowledge with others (Reagans and McEvily, 2003). It can also depend on the promise of perks and other motivational benefits (Shao *et al.*, 2017) or the overall company culture focused on a positive attitude towards knowledge and learning. Studies by Bock *et al.* (2005) and Shao *et al.* (2012) revealed that tacit knowledge sharing behaviors are not only motivated by psychological reasons but also facilitated by contextual factors such as organizational climate. Garvin (1993, p. 80) defined an organization with a learning culture as an "organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights". Yoon *et al.* (2009) noted that learning culture supports knowledge creation. Therefore, the following hypotheses are proposed:

H4c: *The climate component of learning culture has a positive effect on tacit knowledge sharing.*

H4d: *The mistake acceptance component of constant learning culture has a positive effect on tacit knowledge sharing.*

Following Polanyi's (1966) discussion on the distinction between tacit and explicit knowledge, Nonaka (1994) and Nonaka *et al.* (2000) transferred this understanding of knowledge to the business context. Nonaka and Takeuchi (2019) developed their socialization, externalization, combination, and internalization model (SECI) (Nonaka and Takeuchi, 1995), which emphasizes that organizational continuous innovation is achievable through constantly and repeatedly creating new knowledge (tacit), disseminating this knowledge, and converting it into explicit knowledge. Thus, the following hypothesis is proposed:

H5: *Tacit knowledge sharing has a positive effect on formal explicit knowledge processes.*

Knowledge processes support intellectual capital creation

Intellectual capital is conceptualized as knowledge-based assets that organizations use to achieve and maintain a competitive advantage (Yang *et al.*, 2015). Knowledge management processes and intellectual capital affect one another (Seleim and Khalil, 2011). Intellectual capital results from the intangible assets of knowledge and social relationships (Bontis *et al.*, 2000; Jardon, 2015). The intangible assets of today are vital sources of innovativeness, which is the key driver to ensure long-term organizational competitiveness (Tsui *et al.*, 2014). Intellectual assets are also defined as the "stock of knowledge" possessed by an organization (Bontis, 1998). According to Bontis (1998), intellectual capital is composed of human, structural, and relational capital. Human capital is related to employees' knowledge, capabilities, education level, soft and professional skills, and other personal characteristics (Bontis, 1998). Structural capital reflects the entire knowledge infrastructure of an organization (Hussinki *et al.*, 2017; Kianto *et al.*, 2010; Roos 2013). The explicit knowledge acquisition and management of an organization are fundamental parts of structural capital (Abualoush *et al.*, 2018; Agostini and Nosella, 2017; Agostini *et al.*, 2017). However, explicit knowledge is also supported by the tacit dimension. Structural capital is perceived as an effect of explicit knowledge integrated into information systems and as the result of knowledge conversion (Asiaei *et al.*, 2018). Relational capital accumulates internal and external relationships as a source of potential value (Kianto and Waajakoski, 2010; Nahapiet and Ghoshal, 1998). Another type of capital also identified in the research is renewal capital

(Kianto, 2008; Kianto *et al.*, 2010), which reflects the general organizational ability to learn and acquire new skills and capabilities.

This study assumes that the knowledge processes affected by company culture influence the creation of intellectual capital. The exchange of knowledge is important for innovation and creativity (Wageman *et al.*, 2012), while innovation and creativity are direct results of intellectual capital (Tsui *et al.*, 2014). Therefore, it is clear that knowledge processes directly support intellectual capital creation. What is more, knowledge capturing is a prerequisite for enhancing the innovation and performance level of organizations (Rutten *et al.*, 2016). Several studies highlighted that knowledge sharing fosters idea generation among employees, bringing innovation (Henri, 2016). Mehralian *et al.* (2018) stressed that knowledge creation and sharing (Allameh, 2018) foster intellectual capital creation that is vital for organizational innovativeness and performance. This approach is in line with the study by Guthrie (2001), who emphasized that intellectual capital reflects the stock of knowledge of organizations, which is derived from the organizational flow of knowledge processes over time. Formal knowledge management processes support structural capital creation (Abualoush *et al.*, 2018). Saint-Onge (1996) noted that tacit knowledge has different forms for each organizational intellectual capital component: for human capital, tacit knowledge is reflected in mindsets, assumptions, beliefs, and biases; for relational capital, tacit knowledge is reflected in the collective mindsets of meaning perception; and for structural capital, tacit knowledge is reflected in the collective culture, norms, and patterns of behavior (Saint-Onge, 1996, p. 12). Vagnoni and Oppi (2015) argued that newly created knowledge strongly supports structural capital. Thus, intellectual capital is a result of formal and informal knowledge processes and is the focal point of organizational performance. As a result, hypotheses that both formal (related to explicit knowledge) and informal (related to tacit knowledge) knowledge processes support intellectual capital are proposed. Besides, Wang *et al.* (2014) demonstrated that the impact of tacit and explicit knowledge on specific intellectual capital components differs. Thus, the hypotheses are divided into tacit and explicit knowledge as follows:

H6a: *Tacit knowledge sharing has a positive effect on human capital.*

H6b: *Tacit knowledge sharing has a positive effect on relational capital.*

H6c: *Tacit knowledge sharing has a positive effect on structural capital.*

H7a: *Explicit knowledge processes have a positive effect on human capital.*

H7b: *Explicit knowledge processes have a positive effect on relational capital.*

H7c: Explicit knowledge processes have a positive effect on structural capital.

Agostini and Nosella (2017), Buenechea-Elberdin *et al.* (2018), Kianto *et al.* (2017), Oliveira *et al.* (2020) consider human capital an antecedent of relational (internal and external) capital. In addition, Kianto (2008) and Kianto *et al.* (2010) argued that renewal capital (reflecting the general organizational ability to learn and acquire new skills and capabilities) is supported by human capital. Thus, the following hypotheses are put forward:

H8a: Human capital has a positive effect on relational capital.

H8b: Human capital has a positive effect on renewal capital.

Santos-Rodrigues *et al.* (2013) pointed out that the human and relational components of intellectual capital are important for innovation development and that the relational and structural components of intellectual capital are vital for innovation adoption, demonstrating that relational capital is critical. Moreover, Buenechea-Elberdin *et al.* (2018) revealed that internal and external relational capital has a positive impact on renewal capital. Therefore, the following hypothesis is formulated:

H9a: Relational capital has a positive effect on renewal capital.

The relational capital component of intellectual capital includes all company relationships (Bontis, 2001; Bozbura, 2004; Meles *et al.*, 2016). It can be perceived as a mandatory source of structural capital understood as infrastructure for human capital to create value by sharing, using, and transferring existing knowledge (Sullivan, 2000). Moreover, Lervik (2006) argued that both structural and relational capital are interrelated. With this in mind, the following hypothesis is developed:

H9b: Relational capital has a positive effect on structural capital.

Intellectual capital fosters organizational innovativeness

Innovative ideas are at the center of organizational efforts aimed at delivering superior market performance and securing sustainable competitive advantages (Cillo *et al.*, 2019). Intellectual capital is a source of innovation (Campanella *et al.*, 2014; Inkinen, 2015; Chen *et al.*, 2015). Renewal capital (Kianto, 2008) is in line with Senge's (2006) idea that learning organizations have a shared vision of organizational aims, and that open-mindedness accommodates diverse viewpoints, experimenting, questioning existing assumptions, and shared beliefs to promote continuous innovation (Li *et al.*, 2010). Buenechea-Elberdin *et al.* (2018) demonstrated that

structural capital has a positive effect on renewal capital and that renewal capital supports organizational innovation performance.

H10: *Structural capital has a positive effect on renewal capital.*

H11: *Renewal capital has a positive effect on organizational innovativeness.*

Control variables

A control variable is an additional factor (additional variable) possibly affecting the relationship between an independent and a dependent variable. As a result, a control variable may act as a confounder, moderator, or suppressor (MacKinnon *et al.*, 2000; Spector and Brannick, 2011). The methodology of the imputation of a control variable enables such an extraneous variable to be included in the model and remain theoretically important, even when the variable is not the focal point of the study (Becker *et al.*, 2016; Kish, 1959; Nielsen and Raswant, 2018). Moreover, such imputation of a variable to the model should be justified as with any other hypothesis (Becker *et al.*, 2016). For this study, such theoretically important variables are industry and tacit knowledge awareness.

According to El-Den and Sriratanaviriyakul (2019), tacit knowledge awareness is simply the stage at which an individual realizes something new (e.g., opinion/idea). Thus, at its early stage, it can be demonstrated and elaborated through metaphors, contextual stories, or close examples (Olaisen and Revang, 2018; Asher and Popper, 2019). Social interactions foster awareness and the development of new concepts (Nonaka and Takeuchi, 1995). Tacit knowledge is vital for innovation (Pérez-Luño *et al.*, 2016, 2019; Ganguly *et al.*, 2019). Therefore, the tacit knowledge awareness moment is promoted by general socialization, i.e., task-related interactions and overall formal, informal, and unformal organizational social interactions (Insch *et al.*, 2008), referred to by Morrison (2011) as the employee "voice". Moreover, Kremer *et al.* (2019, p. 67) highlighted that "if new ideas are not articulated, they can hardly be implemented". Tacit knowledge can be shared unconsciously (e.g., by being observed when acting), but when tacit knowledge becomes conscious, then it can be articulated, facilitating its sharing. As a result, being aware (the "ba" moment) of tacit knowledge is the significant condition that may enhance the expected effect of learning culture influence on tacit knowledge sharing. The lack of tacit knowledge awareness may disrupt its sharing. Therefore, it is considered a moderator in this study (Hayes, 2018). With this in mind, the following hypothesis is proposed:

Hcv1: *Tacit knowledge awareness moderates the impact of learning culture on tacit knowledge sharing.*

This study also aims to control the industry factor. Kucharska and Erickson (2019) empirically demonstrated that the industry factor matters for knowledge-sharing studies. Knowledge-intensive organizations and industries rely on professional knowledge relating to a specific technical or functional sphere (Egbu and Robinson, 2005). Specifically, all of the sectors included in this study (IT, healthcare, higher education, and construction industry) are defined as knowledge-based industries (KBI), but healthcare, IT, and higher education (HE) – contrary to the construction industry – are defined as knowledge-intensive industries (Lee and Jung, 2020). However, Hari *et al.* (2005) and Wang *et al.* (2020) presented several arguments that the construction industry moves from labor-intensive to knowledge and technology-intensive direction. With this in mind, this transition makes the construction industry a fascinating object of study. Besides, the construction industry is perceived as being highly tacit knowledge-intensive in nature (Løwendahl, 2000; Chaminda *et al.*, 2007; Leung and Fong, 2011). Therefore, as a result of the above consideration, this industry was included in the study as a probably remarkably interesting benchmark. Moreover, IT, HE, and healthcare are knowledge-intensive but, at the same time, are somehow specific. Since the healthcare industry requires constant knowledge adaptability to new contexts under time pressure (human life), it appears to be the most tacit knowledge-intensive industry. On the one hand, the IT industry seems to be very logical, schematic, but on the other hand, it is probably the fastest developing industry worldwide; it is so developing that it must include a strong creativity factor that is closely connected with tacit knowledge (Kucharska, 2021). The mission of higher education (and science – both are connected in the Polish context) is to learn about deep thinking at a higher level of awareness in order to be able to "produce" tacit knowledge; therefore, logically, it is expected to operate with tacit knowledge constantly. With this in mind, all the above industries are driven by tacit knowledge but in a different (industrial) context. Therefore, the comparison between them seems to be fascinating. Moreover, all knowledge is rooted in tacit knowledge (Polanyi, 1966), so the concept of how exactly the industry factor moderates formal and informal knowledge processes in potentially learning organizations in Poland seems appealing. The word "potentially" is used here, because it is not always the case that a knowledge-based organization is a learning organization, as "in this regard, simply developing capability to acquire and share knowledge is not sufficient to become a knowledge-based, learning organization" (Albert and Pisq, 2004,

p. 169). Therefore, the following hypotheses concerning the potential effect of industry factors on informal tacit knowledge sharing and formal knowledge processes are proposed:

Hcv2a: *Industry factor determines informal tacit knowledge sharing.*

Hcv2b: *Industry factor determines formal knowledge processes.*

Figure 2 below summarizes all the proposed hypotheses.

Figure 2. Detailed Theoretical Model

Figure 2

4. Methodology

Sample

The sampling process focused on recruiting knowledge workers staff from the information technology (IT), construction, higher education, and healthcare industries in Poland. Given that the healthcare industry is broadly represented by pharmacy and bio pharmacy and by medical technology devices (Mason and Manzotti, 2009), the sampling process for this industry focused on medical staff working in hospitals and clinics (private and public), excluding administrative staff. It was important to learn how the tacit knowledge sharing of medical staff, who interact with patients every day, affects the internal innovations of working methods. It was so because it shows how tacit knowledge is generated through interactions with patients. It is the kind of knowledge that is produced "live". Therefore, this particular group was selected. For higher education, the employees included in the sample hold the following positions: rectors, vice-rectors, and deans; employees with Ph.D. (adjuncts or assistant professors), employees without Ph.D. (research assistants). The IT and construction industry samples involved respondents from C-suite, top management, and groups of professionals.

The data were collected in January and February 2020. The survey began with questions asking about the workers' qualifications to ensure the selection of respondents who: first, had been employed for a minimum of one year by the same company perceived by them as a "learning organization"; second, have a "knowledge worker" status, which concerns positions where knowledge is a tool and the result from their work (input and the output of their working processes). The respondents were given a brief explanation of the purpose of the

study and a definition of a learning organization, knowledge worker, and tacit knowledge. Specifically, tacit knowledge was introduced as personal, informal knowledge, often mistaken for intuition, especially at its early stages. To explain it better, it was compared to the situation when we realize something new, e.g., a better way of doing things or to the "I have a new idea" moment. Learning organization was simplified to an organization that is learning and change-oriented. They were then asked to respond to focal statements measuring all involved constructs using a seven-point Likert scale in order to assess respondents' attitudes to these statements. The further analysis only included fully completed questionnaires with SD > 0.4.

The sample size and structure are given in Table 1. The sampling quota was designed according to the statistics concerning the labor market in Poland (Statistics Poland, 2017). Based on the construction industry study, Kucharska and Kowalczyk (2019) proved that the perception of certain organizational aspects strongly depends on the respondent's position. With this in mind, the sampling quota was designed equally for each industry to avoid the impact of respondents' positions on particular industry findings. Moreover, all samples are characterized by gender balance for the same reasons.

Table 1. Sample Structure

Table 1
<p>The total variance of the samples was extracted at 73% (total Poland), 76% (construction industry), 74% (healthcare), 80% (IT), and 77% (HE), while the Kaiser–Meyer–Olkin (KMO) test of the samples' adequacy was obtained at level 0.929 (total Poland), 0.885 (construction industry), 0.922 (healthcare), 0.896 (IT), 0.936 (HE), which was confirmed the good quality of the samples – all exceeded 0.6 (Cerny and Kaiser, 1977; Hair <i>et al.</i>, 2010). Further, the Harman single-factor test (Fuller <i>et al.</i>, 2016; Harman, 1976; Podsakoff <i>et al.</i>, 2012) was applied, and none of the results — 30% (entire Poland), 29% (construction), 34% (healthcare), 29% (IT), 38% (HE)—exceeded 50%, confirming the quality of the datasets. Common method variance was detected at the 21% level (total Poland), 27% (construction), 17% (healthcare), 36% (IT), 19% (HE), confirming the accepted level of bias and justifying further analysis and presentation of the measures.</p>

Measures

All the included constructs represented by latent variables were measured using attitude scales. The respondents answered in their native language: in Polish. Therefore, the statements from the existing scales presented in the literature in English were translated, and statements were optimized based on the pilot study results before the final data set gathering. Appendix 1 presents the details of the measurement scales of the constructs along with their scales' sources and obtained reliabilities. The scale for knowledge processes was introduced in this study and validated according to the procedure of deVellis (2017) based on the four industry samples included in the study. The sampling plan included independent samples composed of higher education (n=368) and construction, healthcare, and IT professionals from Poland (n=350 each). The measured constructs reached (standardized) indicator loadings above the reference level of > 0.6 (Fornell and Larcker, 1981; Hair *et al.*, 2010). The internal consistency of the constructs was assessed using Cronbach's alpha and a critical level of > 0.7 (Francis, 2001). The average variance extracted (AVE) was assessed with a test statistic of > 0.5 and composite reliability of > 0.7 (Byrne, 2016; Hair *et al.*, 2010), with all establishing scale validity. Discriminant validity was assessed by comparing the AVE square root against correlations with other constructs (deVellis, 2017; Fornell and Larcker, 1981; Hu and Bentler, 1999). All AVE coefficients were appropriately larger than the reference value. Table 2 presents the results obtained using the IBM Statistical Package for Social Sciences (SPSS) AMOS software.

Table 2. Descriptive Statistics, AVE, Cronbach alpha, CR, and Correlations between the Constructs

Table 2 a-d

Procedure

The analysis procedure began with the construction and assessment of the structural model for total Poland. The control variable "industry" (nominal) was input to the total Poland model, and after the positive result achievement ($\beta = -.10^{***}$), separate models were created to identify differences. Given that tacit knowledge awareness was included as a control variable (composite variable) and was also significant for the total Poland sample ($\beta = .17^{***}$), it was also imputed for separate industry models. Structural equation models were developed using SPSS AMOS (Byrne, 2016). All the obtained effects are detailed in the Results section.

5. Results

Several hypotheses put forward in this study were not supported. Details of the verification of the hypotheses are presented in Table 3 and the most interesting findings are elaborated. Namely, the most interesting findings concern the effect of knowledge processes on intellectual capital. Formal knowledge processes and informal knowledge processes were found to affect different intellectual capital components. Specifically, formal knowledge processes are not significant for relational capital, which was observed for all four industries under analysis (H7b). Similarly, formal knowledge processes are not significant for human capital (H7a), except for in the higher education and IT industries, but this support is not very strong ($\beta=.11^*/.13^*$). This implies that formal knowledge processes do not support human-related components of intellectual capital. In contrast, informal tacit knowledge sharing has a positive effect on all intellectual capital components (H6a), with the strongest effect being observed for higher education and healthcare ($\beta=.61^{***}/.65^{***}$). However, its effect on the structural component (H6c) is comparably weaker and not significant in construction and higher education industries. This implies that informal knowledge sharing does support human-related components of intellectual capital. Furthermore, formal knowledge processes do support the structural component, which was observed for all four industries under analysis (H7c). This implies that formal knowledge processes, in contrast to informal, strongly support the structural capital component. It is worth noting that renewal capital is strongly supported by human and structural capital (H8b and H10), whereas the positive impact of the relational component on renewal capital is noted only in the healthcare industry (H9a). This study revealed a very strong effect of renewal capital on innovativeness for all four industries under consideration (H11). This exposes how vital is renewal capital for innovativeness.

Another important finding was the influence of knowledge culture and learning culture on formal and informal knowledge processes. The study exposed that knowledge culture strongly influences the climate component of learning culture (H3b), and that this relationship applies to all the four analyzed industries. In contrast, the mistake acceptance component of learning culture is strongly supported by knowledge culture in the construction and higher education industries (H3a). For the healthcare industry, this relationship is weaker but still significant, and it is completely insignificant for the IT industry. With this in mind, the acceptance of mistakes component of learning culture is not equally observed in all the four industries, which means that the potential of mistakes as a source of learning is not likely to be equally used in industries as a potential source of tacit knowledge awareness either.

Moreover, the results demonstrate that knowledge culture strongly supports formal knowledge processes (H4a), and significantly and strongly supports informal tacit knowledge processes for the healthcare industry (H4b). For the IT industry, this relationship is weaker, and it is not significant for the construction and higher education industries. In addition, it was discovered that learning culture was more important than knowledge culture for informal tacit knowledge sharing (H4c-d). The climate component of learning culture was found to have a significant and direct impact on tacit knowledge sharing in the construction, higher education, and IT industries (H4c). Still, this effect was found not significant in the healthcare industry. In contrast, the climate component of learning culture supports the mistake acceptance component of learning culture in the healthcare and IT industries but not in the higher education and construction industries (H1c). This means that in the higher education and construction industries, the acceptance of mistakes does not result from the learning climate component. It is worth stressing that as opposed to the construction industry and higher education, learning climate significantly supports mistake acceptance in the healthcare industry, and the relationship between learning climate and tacit knowledge sharing is fully mediated by mistake acceptance (indirect effect = .20(***)-two-tailed BC significance). What is more, the acceptance of mistakes directly supports tacit knowledge sharing in the higher education, healthcare, and construction industries, but not in the IT industry (H4d); however, learning climate supports mistake acceptance in the IT industry (H4c). So, this issue is interesting and requires a more in-depth investigation. Moreover, when it comes to the effect of knowledge culture on knowledge processes, it is worth emphasizing that the impact of tacit knowledge awareness on tacit knowledge sharing is the strongest in the healthcare industry (Hcv1), where the learning culture is the strongest and fully supported by the mistake acceptance component.

Regarding leadership issues, it was found that transformational leadership significantly affects knowledge and learning cultures in all four analyzed industries (H1a-b, H2). However, while knowledge culture and learning climate are supported equally strongly by transformational leadership (H1b, H2), the mistake acceptance component was supported by transformational leadership to a lesser extent. This suggests that the mistake acceptance component of learning culture may be controversial for companies with strong knowledge culture. Specifically, companies of this type where knowledge is highly valued may find it difficult to accept the fact that mistakes do occur. This all may create the learning paradox described by Kucharska and Bedford (2020).

The R-squared levels obtained for all the four analyzed industries are interesting as well. Rather high R-squared levels of the variables were obtained for the healthcare and IT industries – 47% and 46% respectively, but they were only 24% for the construction industry. The higher education industry model obtained R-sq=55%. R-sq reflects the level to which the presented model explains the phenomena under study. This means that the theoretical model presented in Figure 2 best fits the higher education and healthcare industries to the greatest extent, as seen in Figure 3, which presents all the obtained results.

Table 3. Verification of the Hypotheses

Table 3
Figure 3. Structural Model
Figure 3

Note: ML: standardized results; *** $p < .001$, ** $p < .01$, * $p < .05$.

TOTAL POLAND $n = 1418$; $\chi^2 = 3237.72(746)$; CMIN/df = 4.34; RMSEA = .056; CFI = .910; TLI = .901

CONSTRUCTION $n = 350$; $\chi^2 = 1931.221(711)$; CMIN/df = 2.71; RMSEA = .070; CFI = .881; TLI = .870

HEALTHCARE $n = 350$; $\chi^2 = 1421.01(638)$; CMIN/df = 2.23; RMSEA = .059; CFI = .910; TLI = .901

IT $n = 350$; $\chi^2 = 1577.79(602)$; CMIN/df = 2.62; RMSEA = .068; CFI = .887; TLI = .874

HE $n=368$; $\chi^2=1388(535)$; CMIN/df=2.59; RMSEA = .066; CFI=.900; TLI=.889

The results presented above reveal that internal micromechanisms of IC knowledge processes connecting leadership with innovativeness are industry-specific.

6. Discussion

Based on all that was presented so far, the profound complexity of the proposed study is the piece of empirical evidence exposing how exactly leaders support innovativeness by supporting knowledge processes and intellectual capital through organizational culture. Such a broad approach makes it possible to acquire a deep understanding of intellectual capital creation and tacit and explicit knowledge development mechanisms supported by company culture because of innovativeness. Summing up, results illustrate the "big picture" of all the identified micromechanisms linking transformational leadership with organizational innovativeness. It is worth emphasizing that revealed micromechanisms enabled:

- to expose that way of how intellectual capital is in the organizations developed is industry-specific;
- to explain the "knowledge paradox";
- to deliver empirical proof that learning culture influence organizational innovativeness.

This contribution allows expanding theory and practice regarding organizational innovativeness. All these findings are elaborated on below.

Intellectual capital development is industry-specific

The results presented above reveal that the overall relationship between leadership and innovativeness is industry-specific as a result of the observed differences in how knowledge and learning culture affect the development of intellectual capital based on formal and informal knowledge processes. Namely, the learning-from-mistakes component in the construction industry is not supported by the climate component of a learning culture, and knowledge culture only supports explicit knowledge applied to develop structural capital. Structural capital is formally created and it is the main source of innovativeness in the construction industry in Poland. In contrast, the main source of innovativeness in the healthcare industry is human capital strongly supported by learning culture reflected in informal learning (constant “knowledge in action”), including mistakes as a source. The healthcare industry is the one in Poland where relational capital supports renewal capital and overall innovativeness directly and indirectly. The IT industry in Poland is very close to the construction industry when it comes to the priority position of structural capital for renewal capital and innovativeness. HE exposes a higher level of knowledge and learning culture and creating intellectual capital, uses both formal and informal processes, and achieves the best results in human capital creation. It is the industry where human capital is the highest, but at the same time, human capital in HE does not support other IC components, whereas in other industries it does. With this in mind, there is a huge untapped potential in the human capital of HE in Poland. In contrast, the healthcare industry exposes the full usage of intellectual potential. If it were strongly supported by structural capital (healthcare is public in Poland, so structural capital strongly depends on public funds), the obtained performance of the healthcare industry would probably be much higher. All presented considerations lead to very interesting and practical implications for Poland elaborated more prominently in the implication section. Besides, all the above prove that intellectual capital components

development differs across industries because different knowledge processes shape particular components that intensity is characteristic for industries.

Knowledge paradox is explained by the difference in intellectual capital components creation

When discussing the presented results in more general terms, the most interesting finding of the study is that formal knowledge processes affect structural capital but are not significant in the development of human and relational capital. In contrast, the informal processes of tacit knowledge sharing have a far greater impact on human and relational capital than on structural capital. This finding is in line with Mabey and Zhao (2017), who found that more formal knowledge processes lead to less effective knowledge exchange. Mabey and Zhao (2017, p. 43) revealed that "the more knowledge is formally managed, the less likely effective knowledge exchange will occur", and they named this phenomenon the "knowledge paradox". They noted that for organizations of all types (i.e., business and science-oriented ones), benefits from explicit knowledge management are supported by an appropriate set of processes. Still, such processes are not effective for tacit knowledge utilization. The present study sheds light on this by explaining why this paradox occurs. Based on the results, formal knowledge processes support human capital development only in the IT industry ($\beta = .13^*$) and these processes are completely ineffective for relational capital creation – even in the IT industry. However, voluntary tacit knowledge sharing (TKS) significantly supports human and relational capital in all industries. Still, the influence of TKS on structural capital is weak for healthcare and IT ($\beta = .16^*/\text{both}$); and it is not significant in the higher education and construction industries. In contrast, formal processes are not effective for the human and relational components of intellectual capital. The quantitative study by Wang *et al.* (2014) in the context of technology companies in China also identified the lack of significant impact of explicit knowledge sharing on relational capital, but also noted its significant effect on human capital. In the current study, the weak but positive effect of formal, explicit knowledge processes on human capital was confirmed for the higher education and IT industries, and not for the healthcare and construction industries. With this in mind, this study, Wang *et al.* (2014, 2017), and Mabey and Zhao (2017) demonstrate that the IT industry is specific in relation to intellectual capital creation through formal and informal knowledge processes. This specificity is also clear when the mistake acceptance component of learning culture is considered. This component is not supported by knowledge culture in the IT industry and does not support informal tacit knowledge sharing, whereas the learning climate component does support informal tacit knowledge sharing in IT. Thus, considering the results of the

present study and those of Mabey and Zhao (2017), it seems that the IT industry should be studied in greater depth because it has unique results. This might be because this industry is strongly associated with mathematical rules that match the predictable nature of algorithms that are easy to follow logically. Therefore, unlike the human body in the healthcare industry, algorithms are easily controlled using logic and can be predicted in a way that is not possible for the human body; however, the IT industry is undoubtedly one of the most innovative industries. For this reason, it seems that tacit knowledge occurs and is shared differently in the IT industry than in the healthcare industry, and the methods of this sharing in the IT industry warrant further examination.

There are also interesting conclusions that apply to the construction industry, particularly given that the R-squared level obtained for this industry was half ($R\text{-sq}=24\%$) of that obtained for healthcare, IT, and higher education industries (47%, 46%, and 55% respectively). In the construction industry, transformational leadership supports learning culture more than it supports knowledge culture. Besides, learning climate significantly affects tacit knowledge sharing, which influences human and relational capital and does not influence structural capital, whereas in IT and healthcare it does. The other difference between the construction industry and other industries is that although human capital is strongly created by tacit knowledge sharing and strongly influences relational capital, its impact on structural capital is only significant to a lesser extent and it does not support renewal capital. In the construction industry, structural capital is supported by formal knowledge processes and is the main source of renewal capital. Thus, external innovativeness in the construction industry is created by a source similar to that in the IT industry, i.e., mainly from new technologies created outside the company. While innovativeness is supported from the outside in the healthcare industry, it is principally fostered by human and relational capital from inside of the organization, i.e., from dynamic intelligence and cooperation. This might be the result of the working environment. The IT and construction industries are more static and predictable than the healthcare industry, which requires knowledge to be in use on a continuous basis.

Striking findings are observed for the higher education industry. Formal and informal knowledge processes support human capital. Still, their effect on renewal capital is much lower than that observed for healthcare and IT. Besides, the observed influence of the human component on higher education is the weakest among all the analyzed industries. Relational capital in HE barely supports structural capital and, ultimately, does not support the renewal component. This means that even though human capital in the HE industry is more efficiently

created and prominently supported by leadership, company culture, and knowledge processes than in other industries, it is not exploited effectively. The highest obtained innovativeness for HE could be even higher if the human capital component supported relational capital to a greater extent. The weakest part of IC creation in higher education is thus internal relational capital. Still, it is generally a grave problem, which is observed for all industries involved in this study except for healthcare.

Summing up, all the above exposes that intellectual capital components are created informally (i.e., human, and relational ones) and formally (i.e., structural ones). If leaders observe that the more knowledge is formally managed in their organizations, the less effective the knowledge exchange is. It means that they must put more effort into supporting informal knowledge processes to smoothly develop human and relational intellectual capital components. Shortly, leaders need to develop authentic learning culture to use the full potential of organizational growth.

Learning culture meaning for innovativeness is empirically proved

Following Watkins and Kim (2018), it was noted in the Introduction section that, the assumption that organizational learning culture enhances knowledge creation and innovation – if it is empirically confirmed, it is a highly significant discovery. The theoretical consequences of the findings concerned the "knowledge paradox" identified by Mabey and Zhao (2017) exactly delivers such evidence. Namely, this paradox is explained due to the identified structure of micromechanisms linking transformational leadership with organizational innovativeness. The essence of the presented explanation is an important element of delivering empirical evidence for learning culture's influence on innovativeness. Namely, the presented knowledge paradox's essence is that the particular components of intellectual capital are created thanks to different knowledge processes. Specifically, human and relational capital are created informally and structural capital is created formally. Therefore, organizations focusing on formal knowledge processes may lose the tacit knowledge created by informal processes that are strongly supported by learning culture. This study revealed that learning culture and tacit knowledge sharing are vital for the human and relational components of intellectual capital creation. Exposed how intellectual capital components are related, and exposed that the renewal component supported by other components is vital for innovativeness. Hence, this study demonstrates how vital for all intellectual capital components development is learning culture and exposed how IC

components are connected and how vital they are in terms of organizational innovativeness. So, this study exposed how vital for organizational innovativeness the learning culture is.

Transformational leadership and innovativeness

This study focused on the more in-depth exploration of transformational leadership and innovativeness by inspecting micromechanisms of intellectual capital components and knowledge processes. Still, it is also worth elaborating on the value of these micromechanisms analyses in order to obtain a better picture of the focal relation between leadership and innovativeness. Namely, based on the presented R-sq for the models of involved industries, it can be seen that the examined relation structure best fits the HE industry – the whole model explains external innovativeness in the higher education industry in 55%; for healthcare and IT, the value is 47% and 46% respectively. The value is only 24% for the construction industry. This begs the question: Why is that so?

First, transformational leadership in the construction industry does not support knowledge culture. The threshold between these variables is $\beta=.25^{***}$, but the R-sq of knowledge culture is only R-sq=6%, and R-sq=8% for explicit knowledge. Meanwhile, learning culture thresholds are $\beta=.40^{***}$ (climate) and $\beta=.28^{***}$ (mistakes), with the R-sq values being 45% and 34%, respectively. For this reason, leaders in the construction industry expect employees to apply a learning approach rather than a knowing approach; however, due to informal knowledge sharing (R-sq=34%), human capital ($\beta=.40^{***}$ /R-sq=15%) and relational capital ($\beta=.23^{***}$ /R-sq=60%) are not utilized in the end. Namely, both: human and relational capital is not effectively transformed to structural capital ($\beta=.14^*$) and renewal capital ($\beta=ns/.18^*$) - not as effective as it is visible for other industries. So, the lack of knowledge culture created by construction industry leaders appears to be a considerable problem in terms of structural capital creation. Namely, the gained learning is lost.

Furthermore, the mean value of knowledge culture loadings in the construction industry is high=6.20 (see descriptive statistics in Appendix 2). Still, at the same time, the obtained R-sq=0.06 of the construct is exceptionally low. So, it means that construction industry leaders do not create a knowledge culture. The observed high mean value might be affected by other factors not included in this model (e.g., by the overall high knowledge culture from engineering education; engineering studies are very prestigious in Poland). Besides, the presented case of the construction industry in the light of the results for other industries exposes the difference between knowledge-driven and learning-driven organizations. Based

on the present study, the main difference between seemingly similar empirical models demonstrated for the IT industry and the construction industry lies in knowledge culture (KC). Namely, the obtained mean values of KC are equal but the obtained R-sq is high for the IT industry (26%) and low for the construction industry (6%). As a result, the weak effect of this is visible in the value for explicit knowledge processes (R-sq=8%) and a low value of structural capital (R-sq=16%) for the construction industry, which is high (R-sq=28%) for the IT industry. Therefore, company culture determines the way if and how intellectual capital is created, and it is industry-specific. Knowledge culture affects structural capital, whereas learning culture affects human and relational capital. Knowledge culture-dominated industries are driven by structural capital, whereas learning culture-oriented industries are driven by human and relational capital. Learning-oriented industries without knowledge culture only create internal, relational capital effectively; the opportunity to improve other IC components is lost without knowledge culture. With this in mind, the considerations presented above lead to the question about the cultural differences between knowledge-based, knowledge-intensive, and learning organizations. Watkins and Marsick (1996, p. 4) noted that "a learning organization must capture, share, and use knowledge so its members can work together to change the way the organization responds to challenges. People must question the old, socially constructed, and maintained ways of thinking. Learning must take place and be supported in teams and larger groups, where individuals can mutually create new knowledge. And the process must be continuous because becoming a learning organization is a never-ending journey". Therefore, in light of this definition, learning culture seems to be crucial for learning organizations but is not effective without the implemented culture of knowledge.

Going back to the analyses presented for the construction industry, it is a knowledge-based industry but without leaders' support for the culture of knowledge. The case of this industry reveals that it is impossible to effectively apply newly learned knowledge to the organization without developed knowledge culture. For this reason, being an authentic learning organization means the implementation of both knowledge culture and learning culture. Kucharska and Bedford (2020) revealed the differences between the two and proved that they do not overlap with one another. However, this study – and based on the example of the construction industry – points to the fact that learning culture without knowledge culture is ineffective because the learned knowledge is somehow gained by the employee but lost by the organization. This is in line with Hari *et al.* (2005), who noted that the construction industry is characterized by the lack of awareness of complex issues associated with an effective

knowledge capture process and that the effective implementation of knowledge capture is dependent on leaders. Moreover, Teräväinen and Junnonen (2019) argued that the culture change within the construction industry is what construction organizations need to reach a higher level of organizational development. To take full advantage of tacit knowledge creation happening in employees' minds every day, both patterns of organizational behavior – learning-oriented and knowledge-oriented – are required for intellectual capital development. With this in mind, transformative leaders should care about the implementation of both knowledge culture and learning culture to develop all IC components because each and every one of them is vital for innovativeness. However, the intensity of these relations is industry-specific.

7. Implications, Future Research, and Limitations

The general practical context of the study findings suggests that for the effective development of all intellectual capital components, organizations must think and act more holistically. For this reason, organizations must create formal solutions and strongly support informal knowledge sharing through a company culture that is focused not only on the management of knowledge assets (knowledge culture), but also on knowledge creation, i.e., on learning culture that fosters appropriate climate and mistake acceptance components. The healthcare industry is characterized by a constant need for "knowledge in action", and it seems to provide an example of a holistic approach to formal and informal knowledge absorption, usage, re-usage, and development. The present study serves to further confirm the theory that there is no knowledge without learning. Truly innovative, creative, and productive knowledge exchange, particularly the exchange of new (tacit) knowledge, must be considered a counter-intuitive process (Mabey and Zahn, 2017), demanding new solutions dedicated to knowledge-intensive organizations interested in maximum added value creation. This study not only presents the current state of innovativeness in organizations, but also takes a step forward by demonstrating how innovativeness can be improved by defining how the counter-intuitive process of knowledge exchange should be understood and how exactly this process may be supported and developed in different industries.

What is the meaning of the results of this study for Poland?

Specific and practical implications for Poland mainly concern human potential that is still untapped. The dominance of knowledge culture over learning culture is an issue for IT and construction industries in Poland. It results in the attitude of having knowledge without learning, specifically visible in the attitude of low or lack of acceptance of mistakes as a source of potential learning. Therefore, organizations from these industries should put more effort into transforming themselves from knowledge-intensive organizations to learning-intensive organizations. In contrast, HE should evolve to utilize human capital more intensively in Poland. Employees in this group are brilliant and learn fast and passionately but keep all that they learned for themselves, which is a huge national waste. The potential reasons for this may boil down to their personalities or feelings that "no one else is interested" or the fact that they are often representatives of narrow fields, so their human capital supports external relational capital instead of internal. It is a severe limitation of the presented model, which measures internal capital only. With this in mind, the phenomenon should be explored more in-depth.

When it comes to healthcare, this industry suffers from underinvestment. Generally, all presented industries expose the mean value of structural capital above five, which is good (see descriptive statistics in Appendix 2). But even high structural capital is visible to be the most critical component of IC influencing innovativeness in Poland. Besides, healthcare is the industry whose full potential – as opposed to the remaining industries under analysis – is derived from the existing formal and informal knowledge in order to develop intellectual capital. It does it the most effective in the country. Therefore, the practical implication for the healthcare industry in Poland is to invest in it, which should allow this industry in Poland to obtain even more spectacular performance results.

Limitations and further research directions

Going back to the missing external relational capital issue, it is worth highlighting that all the presented findings should be considered an overview of all internal micromechanisms based on the internal resources of the organization that link transformational leadership with external innovativeness. Missing external relational capital is absolutely vital for external innovativeness. All knowledge-intensive service organizations must be externally oriented. Still, the internal-oriented approach discussed in this paper enabled the exposure of internal deficiencies and reserves, which is important for developing these organizations. Without a

doubt, the exploration of this subject, including external capital issues, is a promising direction for further studies.

Moreover, all of the included samples are characterized by gender balance – any gender does not dominate. Still, based on very similar findings obtained for the IT and construction industry, some readers may be under the impression that IT and construction industries, however gender-equally represented in this study, are not similarly represented in the reality of these industries, as men dominate them. Therefore, all answers provided by the IT and construction industry respondents referred to the "men worlds". For this reason, the issue of whether the domination of knowledge culture over learning culture and the lack of acceptance of mistakes are related to masculinity to a greater extent than to femininity deserves further in-depth investigation. This issue serves as another exciting direction for further research.

In addition, this study revealed that tacit knowledge sharing supports human capital and relational capital to a greater extent than formalized explicit knowledge processes. It was exposed as an empirical explanation of the "knowledge paradox" (Mabey and Zhao, 2017). But the opposite direction of causality, namely well-developed human capital and good internal relations, can be a prerequisite or facilitator for tacit knowledge sharing. This may serve as another approach to explore the mentioned "knowledge paradox". The relationship between intellectual capital and knowledge processes is bidirectional (Rastogi, 2000; Garcia-Perez *et al.*, 2020). Therefore, this opposite direction deserves further in-depth investigation.

Furthermore, considering the results of the present study in the context of the "knowledge paradox" proposed by Mabey and Zhao (2017), it seems that the IT industry should be studied in greater depth because it appears to have very unique results. The sector of digital technologies regularly delivers innovative tools for the growth of both corporations and individuals (Schoenfelder and Harris, 2004). So, on the one hand, the presented findings are controversial in the global trend context. On the other hand, this sector is formalized by logical and mathematical rules, and this is reflected by the presented findings. This study demonstrated that (formal and informal) knowledge processes and their effect on external innovativeness can be industry-specific and are worth investigating further in the IT industry context. In addition, the mistake acceptance component of learning culture seemed to be characterized by controversial results that may help leaders, so this component should also be explored further. Therefore, further consideration should, indeed, focus on the IT industry, which is the most innovative but also the most formalized out of the four examined industries.

To sum up, the existing differences between different industries leave significant room for further studies in gender or national contexts and their interpretation. The issue of why exactly tacit knowledge sharing in the IT industry is apparently weaker than in the healthcare and HE industries but the IT industry is still one of the most innovative industries remains unexplored. Is leadership the essence of IT success? Strong leaders found giants such as Apple, Microsoft, Facebook, or Amazon. It might be that the main reason is the one mentioned above – the nature of work (clear rules, mathematical algorithms, and logic), in which case the "industry" control variable becomes the primary determinant for the type of knowledge sharing (explicit vs. tacit, formal vs. informal) and could imply different patterns of creation of IC and its relation to the innovativeness of the company – depending on the industry sector. It might also be that the national context, including national culture or the maturity level of a particular industry, is extremely important in terms of further findings. With this in mind, this issue is undoubtedly fascinating and deserves further investigation.

The principal limitation of the study, apart from the omission of external relational capital and the potential effect of the existing domination of men in the IT and construction sectors, is that this study was conducted in the context of only one country. Thus, the results may not be generalizable to another country's context. Future research could include a cross-country study to shed new light on the explored mechanisms of the effect of transformational leadership on company culture, knowledge processes, intellectual capital, and innovativeness in knowledge-intensive organizations.

8. Conclusions

The essence of this study was the exposition of the overall relationship between leadership and innovativeness. Therefore, the current study presented the "big picture" of all intellectual capital creation micromechanisms linking transformational leadership with organizational innovativeness and, thanks to doing this - explained empirically the "knowledge paradox" identified by Mabey and Zhao (2017, p. 43), according to which "the more knowledge is formally managed, the less likely effective knowledge exchange will occur". The idea behind the explanation of this paradox is that intellectual capital components are created informally (i.e., human, and relational) and formally (i.e., structural).

The presented research revealed that organizations that focus too much on formal knowledge processes may lose the tacit knowledge created by informal processes. To avoid this, leaders must support both: knowledge culture and learning culture. This study revealed that learning

culture encourages tacit knowledge sharing, vital for intellectual capital's human and relational components growth. Therefore, leaders need to implement an authentic learning culture to use the full potential of organizational development through innovativeness. At the same time, knowledge culture fosters formal knowledge processes for structural component development. Therefore both knowledge and learning culture should be supported by leaders. Besides, Kucharska and Bedford (2020) exposed differences between knowledge culture and learning culture, proving that they do not overlap with one another and that knowledge culture supports learning culture. However, this study took a step forward and firmly exposed that learning culture is fundamental for tacit knowledge creation and organizational innovativeness. Still, all the organizational learning effort is simply ineffective without knowledge culture.

Therefore, transformational leaders should equally support learning culture and knowledge culture – and, thanks to this effort - formal and informal knowledge processes to develop intellectual capital holistically. It is vital for innovativeness and organizational development as a whole.

Furthermore, the presented findings revealed that internal micromechanisms of intellectual capital and knowledge processes, connecting leadership with innovativeness, are industry-specific. Therefore, to develop detailed guidelines and policies, more-in depth industry-specific studies are needed.

Appendix 1. Measurement Scales of Constructs with Sources and Their Reliabilities

Construct	Items (Authors' own elaboration based on sources noted)
Tacit knowledge awareness Kucharska and Erickson (2021)	<ul style="list-style-type: none"> • I can create and explain new ideas or insights. • Even if my idea is hard to explain, I am able to express or demonstrate it. • Sometimes I am absolutely sure about a new idea but I find it difficult to express. • As I have accumulated experience, I find it easier to express.
Tacit knowledge sharing Kucharska and Erickson (2021)	<ul style="list-style-type: none"> • I share knowledge learned from my own experience. • I have the opportunity to learn from the experiences of others. • Colleagues share new ideas with me. • Colleagues include me in discussions about the best practices.
External innovations Kucharska and Erickson (2021)	<ul style="list-style-type: none"> • We constantly improve the way we work. • We are good at managing change. • We are highly disposed to introduce new methods and procedures. • We are highly disposed to accept new rules.
IC: human capital Kianto <i>et al.</i> (2017)	<ul style="list-style-type: none"> • Our employees are highly skilled at their jobs. • Our employees are highly motivated in their jobs. • Our employees have a high level of expertise.
IC: structural capital Kianto <i>et al.</i> (2017)	<ul style="list-style-type: none"> • Our company has efficient and relevant information systems to support business operations. • Our company has tools and facilities to support cooperation between employees. • Our company has a great deal of useful knowledge in documents and databases. • Existing documents and solutions are easily accessible.
IC: relational capital (internal) Buenechea-Elberdin <i>et al.</i> (2018)	<ul style="list-style-type: none"> • Different units and functions within our company (e.g., research and development, marketing, production) understand each other well. • Our employees frequently collaborate to solve problems. • Internal cooperation in our company runs smoothly.
IC: renewal capital Buenechea-Elberdin <i>et al.</i> (2018)	<ul style="list-style-type: none"> • Our company has acquired a great deal of new and important knowledge. • Our employees have acquired many important skills and abilities. • Our company can be described as a learning organization. • The operations of our company can be described as creative and inventive.
LC: climate Kucharska and Bedford (2020)	<ul style="list-style-type: none"> • All staff demonstrates a high learning disposition. • We are encouraged to engage in personal development. • We are encouraged to implement new ideas every day. • We are encouraged to engage in seeking new solutions.

LC: mistakes acceptance Kucharska and Bedford (2020)	<ul style="list-style-type: none"> • People know that mistakes are a learning consequence and tolerate it up to a certain limit. • Most people freely declare mistakes. • We discuss problems openly without blaming others. • Mistakes are tolerated and treated as learning opportunities.
Knowledge culture Kucharska and Bedford (2020)	<ul style="list-style-type: none"> • All employees perceive knowledge as valuable. • We have a common language to support knowledge exchange. • We are encouraged to share knowledge, ideas, and thoughts. • We care about the quality of knowledge that we share.
Knowledge processes (formalized) (Author's own scale)	<ul style="list-style-type: none"> • Identification of knowledge sources • Knowledge capturing • Knowledge storage • Knowledge distribution • Knowledge security
Transformational leadership Yi <i>et al.</i> (2019)	<ul style="list-style-type: none"> • The firm's management is always looking for new opportunities for the organization. • The firm's management has a clear view of its final aims. • The firm's management succeeds in motivating the rest of the company. • The firm's management always acts as the organization's leading force. • The organization has leaders who are capable of motivating and guiding their colleagues on the job.

Appendix 2. Descriptive statistics

construct	TOTAL POLAND		INDUSTRY							
	mean value	SD	CONSTRUCTION		HEALTHCARE		IT		HE	
			mean value	SD	mean value	SD	mean value	SD	mean value	SD
L	5.37	1.30	5.20	1.44	5.31	1.23	5.23	1.35	5.15	1.29
KC	6.24	.91	6.20	0.97	6.27	.83	6.23	0.92	6.05	1.08
LA	5.48	1.21	5.40	1.29	5.52	1.09	5.51	1.22	5.28	1.27
LM	5.15	1.40	5.06	1.48	5.15	1.35	5.23	1.36	4.5	1.47
TKS	5.89	1.10	5.74	1.21	6.05	0.96	5.89	1.07	5.62	1.2
TKA	5.83	1.00	5.87	0.96	5.73	1.06	6.02	0.91	5.41	1.37
KP	5.12	1.56	4.71	1.65	5.61	1.25	5.05	1.62	4.97	1.28
HC	5.51	1.18	5.34	1.32	5.60	1.05	5.60	1.14	5.72	1.06
RI	5.72	1.12	5.63	1.28	5.72	0.98	5.81	1.06	5.38	1.17
SC	5.68	1.23	5.5	1.4	5.64	1.08	5.88	1.15	5.27	1.28
R	5.92	0.98	5.92	0.99	5.84	0.96	5.99	0.99	5.61	1.11
PSI	5.52	1.12	5.50	1.14	5.46	1.14	5.60	1.05	5.29	1.20

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