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Tacit knowledge influence on intellectual capital and innovativeness in the healthcare sector: A cross-country study of Poland and the US

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ABSTRACT

This study provides empirical proof that whole organizational innovativeness is rooted in tacit knowledge due to its potency of human capital creation and, that a learning culture composed of a learning climate and mistakes acceptance component fosters human capital development. The main practical implication is that if the IC components are externally rather than internally determined in the particular organization embedded in the specific healthcare system, human capital's power to create an innovative solution is diminished even if the learning culture is developed. So, practically, private healthcare organizations are more innovative than public. Novelty: This study exposed how tacit knowledge creation driven by learning culture and its mistakes acceptance critical component drives next IC components structure, which influences internal performance innovation in the healthcare sector driven by private and public funds. Findings were obtained from a healthcare industry sample composed of 350 cases from Poland and 365 from the United States. Data were analyzed using the structural equation modeling method using Amos and OLS regression using SPSS PROCESS macro.

1. Introduction

This study was inspired by Paoloni et al. (2020), who reviewed 225 studies on intellectual capital (IC) in the healthcare sector and noted that there is a lack of studies that explain how knowledge is created in this industry. According to Polanyi (1966), whole knowledge is rooted in tacit knowledge. Precisely, tacit knowledge is broadly recognized as a source of innovation (Ganguly, Talukdar, & Chatterjee, 2019; Jisr & Maamari, 2017; Kucharska & Rebelo, 2022; Perez-Luno, Saparito, & Gopalakrishnan, 2019). Since novel knowledge leads then to novel solutions, this study focuses on tacit knowledge awareness and sharing meaning for the healthcare sector that more than any other requires constantly innovative solutions. Tacit knowledge involves know-how that applies dynamically to a particular context and, it is a reason why tacit knowledge is much more significant for innovation creation than explicit (Duan et al., 2022; Kucharska, 2021a,2021b). Therefore, this study explores tacit knowledge meaning for innovativeness in the healthcare industry. Bearing in mind the fact that there is no knowledge without intellectual capital and vice versa (Rastogi, 2000). Therefore, studies exploring more in-depth this bidirectional relationship (Attar, Kang, & Sohaib, 2019; Garcia-Perez, Ghio, Occhipinti, & Verona, 2020) are needed to help organizations formulate their internal policies to support both. So, this study then focuses not only on the beforementioned tacit knowledge but also on the intellectual capital creation (ICc) relations oriented in innovativeness performance in the healthcare sector. Besides, Chuang, Chen and Chuang (2013), and Elango and Dhandapani, (2020) highlighted the need for studies regarding social capital and organizational performance in the various industries context. That is the additional reason justifying the need for study is devoted to tacit knowledge and intellectual capital creation relations in innovativeness performance in the healthcare sector. Especially that, Evans, Brown, & Baker (2015) and Wang and Byrd (2017) noted the increasing importance of organizational aspects related to innovation and IC in the healthcare industry. Summing up, this study aims to fill these knowledge gaps and shed new light on how tacit knowledge drives all IC components to support internal innovativeness in this sector, which must be innovative to fulfill its mission to protect human health.

Precisely this study's methodological logic goes as follows: since tacit knowledge undoubtedly is a source of innovation (e.g., Ganguly et al., 2019; Goffin & Koners, 2011; Goffin, Koners, Baxter, & van der Hoven, 2010; Jisr & Maamari, 2017; Jiménez-Jiménez & Sanz-Valle, 2011; Kodama, 2019; Kucharska, 2021a,2021b; Pérez-Luño et al., 2016; Perez-Luno Alegre, & Valle-Cabrera, 2019; Sakellariou, Karantinou, & Goffin, 2017; Sheng, 2019), it is important to learn how the tacit knowledge that is mostly inaccessible, non-standardized across systems, and

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challenging to understand, use, and share (Attaran, 2022), affects the internal innovations of working methods. The healthcare industry is one where tacit knowledge is constantly and dynamically created and collected in the minds of the medical staff, who interact with patients every day. In other words, knowledge in the healthcare sector is generated "live" through intensive social interactions with patients and workmates. Summing up, this study aims to explore how all IC components—human, relational, structural, and renewal—fed by tacit knowledge awareness and sharing contribute to improvements in working methods in the healthcare industry, thanks to learning culture. Given the COVID-19 health crisis, this kind of exploration is more important than ever.

Fig. 1 below summarizes the aims and the expected novelty of the study.

To achieve this study's aims, Section 2 starts with a theoretical background presentation that introduces the theoretical model of the designed research. Section 3 details all the methods used to deliver the empirical models. Section 4 presents the results, and Section 5 discusses them. Whereas Section 6 offers limitations and further research directions. Section 7 concludes with implications. The final Section 8 closes the investigation with the study summary.

2. Theoretical background and hypotheses development

Tacit knowledge is vital for the healthcare industry. Following Abidi, Cheah, and Curran (2005), Henry (2006); Steininger, Rückel, Dannerer, & Roithmayr (2010); and Burgess and Currie (2013); Panahi, Watson, & Partridge (2016) claimed that from the perspective of healthcare professionals, "experiential know-how"—that is, tacit knowledge—is related to the newest clinical experiences in particular contextual situations. Therefore, practitioners may learn from one another not "how things should work," as they learn from explicit sources, but rather "how it is; what really works and how to make it work" (p. 344). This type of knowledge is precious because it is the essence of achieving proficiency in life and healthcare. Based on ethnographic studies, Collin, Sintonen, Paloniemi, and Auvinen (2011) noted that learning takes place in terms of discovery, experimenting with, and transgressing participatory agency among nurses and residents in the hospital work community. It is vital to examine how tacit knowledge sharing in the medical sector influences all IC components among medical staff, and how it enables them to create innovative solutions. IC is a complex phenomenon in which all components (i.e., human, relational, structural, and renewal) are interrelated (Buenechea-Elberdin, Sáenz, & Kianto, 2017). Therefore, it is important to expand knowledge of the structure of tacit knowledge–ICc-innovations mechanisms.

The first motivation of this research is rooted in humanity and general respect for human life. The more we know about the influence of tacit knowledge mechanisms on IC, the better we can support these processes in medical entities, hospitals, and clinics. The findings of this study will lead to a higher level of medical care in the future. The second motivational prism is rooted in the general economy. Given that IC is a source of social and economic wealth (Stewart, 1997), scientists and practitioners have explored intensively how IC can be supported and developed for more than two decades. Andreeva, Garanina, Saenz, Aramburu, & Kianto (2021) showed that country's environment determines the intellectual capital and its innovation performance. Therefore, this study contributes to the science by presenting a cross-country analysis of the focal mechanisms of tacit knowledge and internal innovativeness performance when mediated by all IC components (i.e., human, structural, relational, and renewal). Cross-country analysis might expose country-specific aspects that influence these relations (Pirozzi & Ferulano, 2016). Poland and the United States (US) are useful for a cross-country comparison because they differ in their economic, social, and cultural views. Poland, as a post-Soviet country, is characterized by a low level of trust and mistakes acceptance visible toward formal relations and institutions, but a high level of collaboration among closely related individuals (Kochanowicz, 2004). In contrast, the US has higher individualism than Poland, but much lower power distance and uncertainty avoidance (Hofstede Insights, 2020). Moreover, the US is dominated by private healthcare, whereas Poland is dominated by public healthcare.

In summary, this study explores how tacit knowledge drives IC, which is composed of human, structural, relational, and renewal components that influence internal performance innovation in the healthcare sector in Poland and the US. Moreover, this study is among the first cross-country studies that merge IC and tacit knowledge factors to determine which configurations of IC components driven by tacit knowledge and moderated by learning culture could benefit healthcare organizations in internal innovation performance. Below, the theoretical frame of the planned research is elaborated according to the specific aims of the study presented in Fig. 1.

RQ: How tacit knowledge drives all IC components to support internal innovativeness in the healthcare sector in Poland and in the US?

GENERAL AIM: This study explores how all IC components—human, relational, structural, and renewal—fed by tacit knowledge contribute to improvements in working methods thanks to the learning culture in the healthcare industry and compares the obtained results in Poland and the US.

SPECIFIC AIMS: to achieve the general aim of this research, this study explores:
1. Innovation performance and tacit knowledge relations.
2. Influence of tacit knowledge on intellectual capital components relations.
3. Interrelations of intellectual capital components.
4. Influence of intellectual capital components on innovativeness.
5. Mediation analysis of intellectual capital between tacit knowledge and internal innovativeness.
6. Moderating effect of company culture components on tacit knowledge and intellectual capital relations analysis.
7. The comparison of all results obtained for Poland and the US.

EXPECTED NOVELTY: understanding the tacit knowledge and intellectual capital relation and meaning for internal innovativeness in the healthcare industry in the light of organizational learning culture (Paoloni et al., 2020; Garcia-Perez et al., 2020; Elango and Dhandapani, 2020; Kucharska, 2021b). Such understanding strengthened by cross-country benchmarking is helpful for organizations to formulate their internal policies supporting innovativeness in the healthcare industry.

Fig. 1. Study aims and expected novelty.

2.1. Innovation performance and tacit knowledge

The theoretical literature has generally agreed that tacit knowledge can help produce novel solutions (Goffin & Koners, 2011; Goffin et al., 2010; Jiménez-Jiménez & Sanz-Valle, 2011; Jisr & Maamari, 2017; Kodama, 2019; Kucharska, 2021a,2021b; Pérez-Luño et al., 2016; Sakellariou et al., 2017; Sheng, 2019). Innovation undoubtedly enhances business performance (Daniel & Raquel, 2011), especially in knowledge-intensive companies. Hagedoorn and Wang (2012) suggested that complementarity exists between internal and external innovativeness, while Wong, Lee, and Foo (2007) and Jiménez-Jiménez, Sanz-Valle, and Hernandez-Espallardo (2008) noted that internal process innovations might increase overall innovativeness. Therefore, this study focuses on internal innovations performance. Besides, it assumes that tacit knowledge boosts organizations' internal innovation performance as a result of IC development. The main aim of this study is to determine how all of the IC components are involved in this process. Specifically, the structure of direct and indirect relations is the center of attention in this study.

From Saint-Onge's (1996) perspective, tacit knowledge is organizational knowledge on a greater level due to its contribution to novelty creation. It is composed of intuition, personal attitudes, mindsets, beliefs and assumptions, values, and experiences at the individual level. Crane and Bontis (2014, p. 1136) defined tacit knowledge as knowledge that is "acquired unconsciously and automatically, but capable of influencing action." Therefore, it is easier to observe tacit knowledge than it is to describe it. Asher and Popper's (2019) "onion" model introduced various layers of tacit knowledge that are related to degrees of tacitness. From their perspective, tacit knowledge has three aspects: a hidden practical layer, a tacit reflective layer, and a demonstrated tacit layer. Olaisen and Revang (2018) advocated for a three-level model that describes the mystery of tacit knowledge. The levels are representable knowing, non-represented knowing, and non-representable knowing. In the presented study, tacit awareness is considered as the stage at which tacit knowledge evolved enough in its early stage to be articulated through metaphors, contextual storytelling, demonstrations, and sharing impressions. As Polanyi (1966) stated, we know more than we can tell, and we know more than we can logically explain (Dörfler & Ackermann, 2015; Koestler, 1971). Therefore, tacit knowledge in its early stage can also be called "intuitive knowledge." According to El-Den and Sriratanaviriyakul (2019), tacit knowledge awareness is the stage at which an individual realizes something new (e.g., opinion/idea) as an example of a tacit knowledge type. At this stage, tacit knowledge can be shared if needed as a voluntary act of the knowledge owner (Kucharska, 2021b). Therefore, the following hypothesis is proposed:

H1: Tacit knowledge awareness influences tacit knowledge sharing.

2.2. Influence of tacit knowledge on intellectual capital

Kucharska (2021b) and Wang, Wang and Liang (2014) demonstrated that the effects of tacit and explicit knowledge on specific IC components differ. These differences are tied to their characteristics. Human capital reflects employees' knowledge, capabilities, education level, soft and professional skills, and other personal characteristics (Bontis, 1998; Stewart, 1997). Structural capital, also called organizational capital, reflects an organization's whole knowledge infrastructure (Hussinki, Ritala, Vanhala, & Kianto, 2017; Kianto, Hurmelinna-Laukkanen, & Ritala, 2010; Roos & Roos, 1997). Relational/social capital is understood as the value derived from internal and external relationships, such as those with customers, suppliers, partners, institutions, and other stakeholders (Kianto & Waajakoski, 2010; Nahapiet & Ghoshal, 1998). Renewal capital (Kianto, 2008) reflects the general organizational ability to learn. So, it seems that renewal capital is the main IC component that influences innovations, but it is only when supported by other components.

In a study of IC and innovativeness in the healthcare industry, Santos-Rodrigues, Faria, Cranfield, & Morais (2013) noted that IC components such as relational and human capital are important for innovation development, whereas relational and structural capital are vital for innovation adoption in the sector. Therefore, these findings show that relational capital is critical. But how does tacit knowledge contribute to relational capital? Tacit knowledge is omitted in their study. Besides, renewal capital, which is a vital IC component for innovativeness (Buenechea-Elberdin et al., 2017), was not included in Santos-Rodrigues et al. (2013) research that is the one of focal – so far study which focuses on IC and healthcare. This lack of attention from researchers has contributed to the lack of understanding of how tacit knowledge drives all IC components to support innovativeness. According to Kianto et al. (2010), renewal capital reflects an organization's ability to learn and acquire new skills and capabilities, which are routine in a learning organization. Following Wahle and Groothuis (2005); Mansingh, Osei-Bryson, & Reichgelt (2009) noted that knowledge management in healthcare requires capturing, storing, sharing, and protecting both explicit and tacit knowledge. Explicit and tacit knowledge can be characterized as declarative knowledge (know what), procedural knowledge (know-how), social knowledge (know-how), and contextual, working knowledge (know when and why), and both are embedded in different sources at the junction of communal–individual possession and interaction. Consequently, to effectively manage knowledge in the medical environment, personal (tacit at any stage: conscious and unconscious) and communal (explicit) knowledge must interact to create organizational IC. Therefore, IC is understood as whole knowledge that is transformed into something of value to the organization. As Lynn (1998) suggested, IC is obtained from knowledge sharing. Moreover, Ujwary-Gil (2017) highlighted that tacit knowledge contextuality and inimitability facilitate a higher level of productivity than explicit knowledge. They presented tacit knowledge as a dynamic, intangible source of IC. Dynamic contextual tacit knowledge that is embedded into existing structural, relational, and human capital is impossible to replicate. Therefore, it provides a potential competitive advantage for companies (Rehman, Hawryszkiewycz, Sohaib, & Namisango, 2020). The healthcare industry uses tacit knowledge more than any other industry because each patient and case create a different context. The new value is created in the healthcare industry every day by transferring tacit knowledge resulting from socialization, internalization, and utilization.

Nonaka and Takeuchi's (1995) SECI (socialization, externalization, combination, and internalization) model highlights the importance of socialization in transforming existing tacit knowledge into new tacit knowledge that is then externalized, combined, and internalized (e.g., learning by doing). Following them, Panahi, Watson, and Partridge (2016), Olaisen and Revang (2018), and Chergui, Zidat, and Marir (2020) highlighted that, as a result of socialization, tacit knowledge can be learned through observation, imitation, examples, metaphors, storytelling, and sharing experiences. Nisula and Kianto (2018) noted that creativity and improvisation often support an organization's capacity to introduce novelty based on individual and communal behaviors. Therefore, although relational capital enables these learnings (the combination stage of the SECI model), the explanation of one's own experiences and ideas (e.g., using analogies, simulations, and models) leads to tightening social ties and relational capital creation. Saint-Onge (1996, p. 10) claimed that "tacit knowledge determines how the organization makes decisions and shapes the collective behaviors of the members." He noted that tacit knowledge has different forms for each component of organizational capital: for human capital, it is reflected in mindsets, assumptions, beliefs, and biases; for relational capital, it is shown in the collective mindsets of meaning perception; and for structural capital, it is reflected in the collective culture, norms, and patterns of behavior (Saint-Onge, 1996, p. 12). De Souza et al. (2020) hypothesized that the knowledge creation process has a positive effect on information technology development in healthcare organizations. Vagnoni and Oppi (2015) stressed that newly created knowledge

influences structural capital, while Sibbald, Wathen, and Kothari (2016) perceived knowledge as the vital IC component that enhances organizational learning flows, human capital, and relational capital. Moreover, inspired by organizational learning theory, Kianto (2008) introduced the concept of IC, which is composed of human, structural, relational, and renewal capital. Evans et al. (2015) conceptualized the IC of healthcare organizations as a blend of intangible resources and the value derived from internal powers and external relationships. The present study focuses on internal organizational mechanisms. Therefore, the following hypotheses have been developed:

H2: Tacit knowledge sharing positively influences human capital.
H3: Tacit knowledge sharing positively influences structural capital.
H4: Tacit knowledge sharing positively influences relational capital.

2.3. Interrelations of intellectual capital components

Organizational learning that enables IC development is a multilevel phenomenon that occurs between the individual, team, and organizational levels, and it requires social interactions (Wiewiora, Smidt, & Chang, 2019). Jiang and Xu (2020) noted that relational factors such as the supervising mechanism, reciprocity, and the penalty of social reputation influence tacit knowledge sharing, learning, and overall organizational efficacy. Moreover, Buenechea-Elberdin et al. (2017) proved that internal and external relational capital has a positive effect on renewal capital. Currie and White (2012) noted that informal social relations support peer-to-peer knowledge brokering above hierarchies in the healthcare sector. Therefore, the following hypotheses are proposed:

H5: Human capital positively influences relational capital.
H6: Relational capital positively influences structural capital.
H7: Relational capital positively influences renewal capital.

According to Edvinsson and Malone (1997) and Chen, Zhao, and Wang (2015), human capital is the organization's knowledge, abilities, and motivation as embodied in its employees. Moreover, Kianto et al. (2017) showed that human capital influences not only innovation performance but also structural capital. Thus, it is proposed that:

H8: Human capital positively influences structural capital.
H9: Human capital positively influences renewal capital.

Further, Buenechea-Elberdin et al. (2017) showed that structural capital has an empirically positive effect on renewal capital and innovation performance. Therefore, it is proposed that:

H10: Structural capital positively influences renewal capital.

2.4. Influence of intellectual capital on innovativeness

Peng, Yang, Pike, and Roos (2011), Roos (2013), Hussinki et al. (2017), and Cabrilo et al. (2018) noted the direct, positive influence of IC on innovations. Wu, Su, and Wang (2013) examined the relationship between human capital, information structure, and innovation pattern. Their results suggest that enterprises tend to choose internal innovation form with the degree of the specific human capital increase. Organizations with a more dispersed/horizontal information structure focus on internal innovation forms. Therefore, it is hypothesized that all IC components positively influence internal and external innovations. The justification for each component's influence on innovativeness is presented below.

Human Capital. Human capital is perceived as a vital source of innovation (Leitner, 2011; Martín-de Castro, Delgado-Verde, Amores-Salvadó, & Navas-López, 2013). Buenechea-Elberdin et al. (2017) empirically proved that human capital positively influences organizations' overall innovation performance. Thus, the following hypothesis is proposed:

H11: Human capital positively influences innovation performance (internal).

Relational capital. Kianto et al. (2017) showed that relational capital positively influences innovation performance. Consequently, the below hypothesis has been formulated:

H12: Relational capital positively influences innovation performance (internal).

Renewal Capital. Renewal capital represents employees' learning ability (Kianto, 2008). This reflects Senge's (2006) idea of learning organizations as having a shared vision of firms' aims and that open-mindedness accommodates diverse viewpoints, experimenting, questions existing assumptions and shared beliefs, and promotes continuous innovation (Li, Guo, Yi, & Liu, 2010). Buenechea-Elberdin et al. (2017) empirically proved that renewal capital fosters innovation performance in organizations. Thus, the following hypothesis has been formulated:

H13: Renewal capital positively influence innovations performance (internal).

Structural capital. New technologies in healthcare facilitate the combination, externalization, and internalization of different types of knowledge that emerge by defining innovative business models and making them applicable to complex knowledge systems from various perspectives, such as that of the multiple players involved (Attaran, 2022; Elton & O'Riordan, 2016; Mazzotta, 2018). Buenechea-Elberdin et al. (2017) empirically proved that structural capital positively influences innovation performance. This research assumes that this influence is indirect.

2.5. Expected mediations

Healthcare organizations seek effective IT solutions that will support the consolidation of organizational resources to deliver high-quality services to patients, improve organizational performance, and create new and more effective business models driven by big data, information flow, knowledge, and intelligence (Agarwal, Gao, DesRoches, & Jha, 2010; Goh Gao, & Agarwal, 2011; Ker, Wang, Hajli, Song, & Ker, 2014). Cavicchi (2017) noted that the interdisciplinary dialogue established by relational capital would develop human, social, and structural capital for innovation and sustainability. Moreover, Sankowska (2013) suggested that inter-organizational relations that are based on trust will act as a mediator between knowledge transfer and innovativeness. Furr, O'Keeffe, and Dyer (2016) and, Furr and Shipilov (2018) highlighted that companies often reach out to partners to build a broader ecosystem to help boost their innovativeness and market position. Dameri and Ferrando (2020) showed that human, financial, and organizational capital influence critical business processes and value creation in healthcare companies.

Tacit knowledge is embedded in people's actions, social interactions, commitments, and involvement within a particular context; thus, it can be retrieved through contextual human interactions (Mansingh et al., 2009). Dobrzykowski and Tarafdar (2015) noted that internal relational ties mediate between transforming data into an information exchange between physicians and hospital staff. Kessel, Kratzer, and Schultz (2012) examined how the psychological safety of a team fosters creative behaviors in medical teams working with infrequent diseases. They identified that this relational factor is correlated with information and know-how sharing. Sanford, Schwartz, and Khan (2020) found that, in the case of emerging public health incidents (EPHIs), clinicians rely on internal and external relationships to facilitate decision-making and communication. The uncertainty that characterizes most EPHIs can then

be reduced as a result of communication and informal knowledge sharing. These internal and external relational networks enable medical staff to remain flexible and respond quickly to changing events.

In summary, the following indirect relations are expected:

H_M1: The human component of IC mediates between tacit knowledge sharing and the relational capital component of IC.

H_M2: The relational component of IC mediates between tacit knowledge sharing and the structural capital component of IC.

H_M3: The relational component of IC mediates between human and structural capital relations.

H_M4: The structural component of IC mediates between human and renewal capital relations.

H_M5: The structural component of IC mediates between relational and renewal capital relations.

H_M6: The renewal component of IC mediates between human and internal innovation performance.

H_M7: The renewal component of IC mediates between relational and internal innovation performance.

2.6. Control variables

A control variable is simply a third variable that is considered in a relationship between independent and dependent variables. It may act as a confound, a moderator, or a suppressor (MacKinnon, Krull, & Lockwood, 2000; Spector & Brannick, 2011).

The methodology of control variables imputation enables extraneous variables to be included in the model. These variables are not the focal point of the study but remain theoretically important (Becker et al., 2016; Kish, 1959; Nielsen & Raswant, 2018). Okoroafor (2014) noted that organizational culture might be a key barrier to tacit knowledge sharing, and Pirozzi and Ferulano (2016) noted that a healthcare organization's culture has a significant effect on IC development. Sanchez-Polo, Cegarra-Navarro, Cillo, and Wensley (2019) noted that knowledge barriers and continuous learning issues are related to healthcare organizations. Kianto et al. (2010), noted that constant improvement is vital for service firms, along with critical thinking, thinking outside the box, and accepting the alternative to routinely used methods of acting. Therefore, learning culture is considered a moderator that should be included in the study.

Learning culture. Watkins and Marsick (1996) 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. And the process must be continuous because becoming a learning organization is a never-ending journey" (p.4). In light of this definition, it seems clear that effectively transforming tacit knowledge into IC requires both a positive learning climate and acceptance of mistakes. Therefore, based on the above, a learning culture composed of mistakes acceptance, next to a learning climate (Kucharska & Bedford, 2020), has been included in the study as two control variables, specifically as moderators that facilitate tacit knowledge awareness and sharing. The present study aims to verify how components of learning culture (learning climate and mistakes acceptance) influence tacit knowledge awareness and sharing. Becker et al. (2016) suggested including control variables in hypotheses; thus, the following hypotheses are proposed:

$H_{MM}1$: Learning climate moderates relation between tacit knowledge awareness and sharing.

$H_{MM}2$: Mistakes acceptance moderates relation between tacit knowledge awareness and sharing.

Based on the above hypotheses, the general theoretical framework for this study is formulated and presented in Fig. 2. This model is in line with the theoretical assumptions of Kianto et al. (2014), supported by Rossi, Cricelli, Grimaldi, and Greco (2016), that IC mediates between knowledge management practice and organizational performance. The present study focuses on the influence of tacit knowledge on innovativeness due to ICc. Thus, the proposed theoretical model in Fig. 2 assumes that IC mediates between tacit knowledge sharing and organizational innovative performance. Moreover, organizational learning culture is considered a critical moderator that facilitates tacit knowledge sharing.

In summary, this study assumes that tacit knowledge boosts the internal innovation performance of organizations due to ICc. It aims to determine how the internal mechanisms (direct and indirect) of all IC components boost internal innovation performance as a result of gained and shared tacit knowledge. The focus of the study is the structure of direct and indirect relations leading from novel knowledge to novel methods of acting. Fig. 3 presents a detailed visualization of the entire theoretical model structure based on all the above-presented hypotheses.

2.7. Cross-Country study

Given all of the individual, organizational, social, and cultural aspects of evolving, realizing, and sharing tacit knowledge, it is important to determine how national differences affect tacit knowledge sharing and the innovativeness of the healthcare industry as a result of ICc. Inkinen, Kianto, Vanhala, and Ritala (2017) noted the potential differences in IC's underlying categorizations between mostly European (except Russia) developed countries (e.g., Finland, Italy, Russia, Serbia, and Spain); surprisingly, they found no significant differences. The current study focuses on tacit knowledge, which is personal and therefore probably more culture-sensitive. Thus, the national culture factor may be important for the above-presented structure of relations.

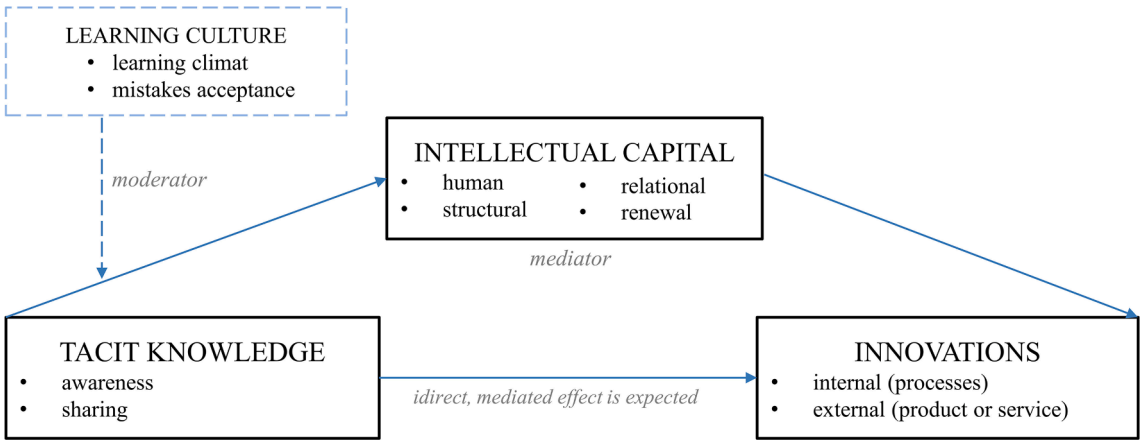

Fig. 2. Theoretical Framework—General.

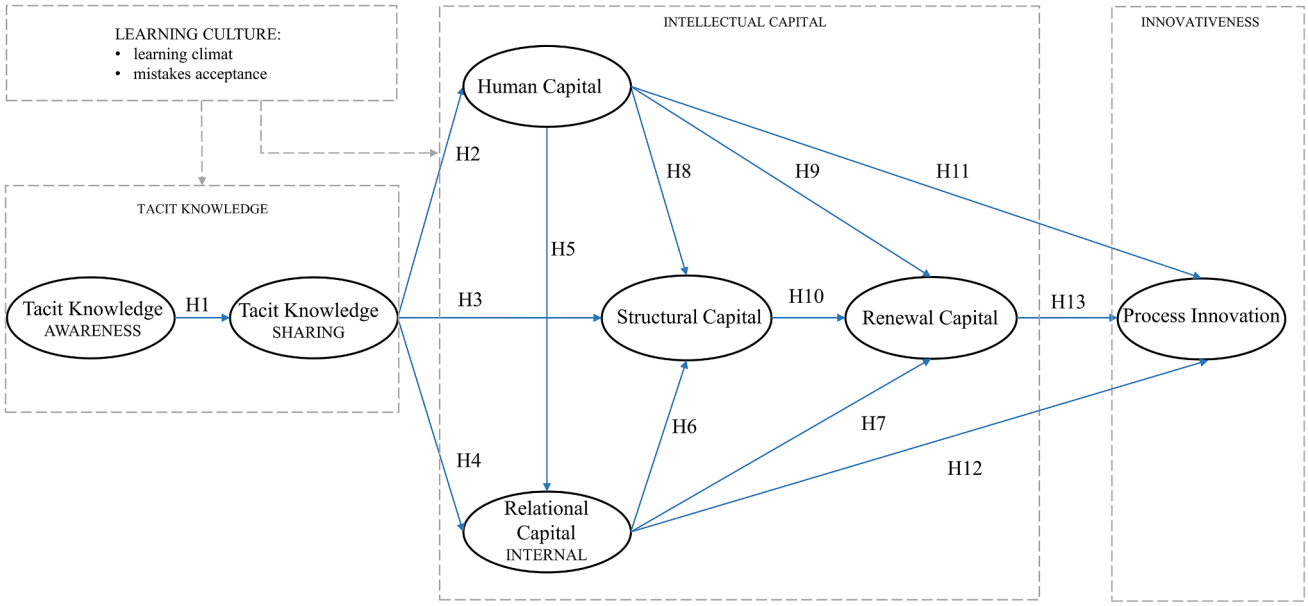

Fig. 3. Theoretical Framework—Detailed.

Mercier-Laurent (2011), in the context of innovativeness, noted that such national characteristics as institutional development, infrastructure, macroeconomic conditions, healthcare, and education levels influenced intellectual capital development. Besides, she characterized Poland as having high but not fully exploited innovative potential. So, since this study focuses on tacit knowledge creation and sharing as a root of innovativeness, the planned comparison between Poland and the country with not fully exploited innovativeness potential with the innovativeness leader - seems to be interesting. So, Poland and the US, which are the subjects of the comparison in this study, differ in their economic, social, and cultural views. Poland, as a post-Soviet country, has a low level of trust and mistakes acceptance in formal relations and institutions, but a high level of collaboration among closely related individuals (Kochanowicz, 2004). In contrast, the US has higher individualism than in Poland, but much lower power distance and uncertainty avoidance (Hofstede Insights, 2020). Another reason to compare the presented theoretical model based on samples from the US and Poland is that the former is a highly developed, mature economy. Moreover, healthcare is mainly public in Poland and mostly private in the US, which might have some interesting implications for the findings of this study that might determine structural capital. Bearing in mind Andreeva et al.'s (2021) findings that a country's environment determines the intellectual capital and innovation performance, it is worth verifying how particular IC components driven by tacit knowledge awareness and sharing influence innovativeness in Poland and the US. No further hypotheses are proposed, but differences between the two countries will be reported to support the hypotheses already presented.

3. Methodology

3.1. Sample

The sampling process focused on knowledge workers staff working in the healthcare industry. Given that the healthcare industry is broadly represented by pharmacy and bio pharmacy, and by medical technology devices (Mason & Manzotti, 2009), we focused on medical staff working in hospitals and clinics (both public and private), excluding administrative staff. This enabled us to learn how the tacit knowledge sharing of medical staff who interact with patients every day influences working methods' internal innovations.

Data were collected in January and February 2020. The Qualtrics.com platform in the US and Poland by the ASM Center of Market Research and Analysis company was selected to complete the data collection order. Both companies followed the same procedure. Potential participants who fit the target group (knowledge workers employed in the healthcare sector) were invited to participate in the survey. Data were collected as long as they achieved the assumed quota per country (350 cases as a minimum), with such requirements as a gender balance and the representation of the positions. The sample structure is presented in Table 1. The sample usually fits both countries' underlying populations, e.g., gender and positions were planned thoroughly based on the Bureau of Labor Statistics (2020) and Statistics Poland (2017). While some differences were evident in the underlying populations, they were not valid enough to justify varying the quota targets. Therefore, the Polish quota structure was used as a pattern for the samples for both

Table 1
Sample structure.

Characteristic	Poland (n = 350)	USA (n = 365)
C-suite	3%	3%
Top managers	7%	7%
Middle managers	23%	23%
Professionals	67%	67%
Company size		
Micro (<10 employees)	1%	1%
Small (10–50 employees)	57%	8%
Medium (51–250 employees)	33%	40%
Large (>250 employees)	9%	52%
Sector		
public	69%	5%
private	31%	95%
Age		
18–24	0%	0%
25–34	9%	38%
35–44	26%	43%
45–54	32%	16%
55–64	30%	2%
65 and over	4%	1%
Gender		
Female	50%	51%
Male	50%	49%
Other	0	1%
KMO	0.908	0.940
Harman single factor test	35%	41%
Total Variance Explained	78%	77%
CMV	37%	14%

countries.

The survey started with qualification questions to establish the minimum of a year of work experience and status as a "knowledge worker." Respondents were given a brief introduction to the essence of "tacit knowledge definition" to ensure they understood the study's core. Next, they were asked to respond to statements using a seven-point Likert scale to assess their attitudes regarding these statements (details in Appendix 1). Finally, only fully completed questionnaires with SD > 0.4 were accepted for further analysis.

The total variance of the samples was extracted at the 78% (Poland) and 77% (US) levels, and a Kaiser–Meyer–Olkin (KMO) test of the samples' adequacy at the 0.908 and 0.94 levels, respectively, confirmed the samples' good quality (Cerny & Kaiser, 1977; Hair, Anderson, Babin, & Black, 2010). Further, a Harman single-factor test (Fuller, Simmering, Atinc, Atinc, & Babin, 2016; Harman, 1976; Podsakoff, MacKenzie, & Podsakoff, 2012) was run, and the 37% (Poland) and 41% (US) result did not exceed 50%, thereby confirming the quality of the data set. Common method variance was detected at 37% (Poland) and 14% (US), confirming the accepted level of bias and enabling further analysis.

3.2. Measures

To conduct cross-country analysis, the two samples required adequacy tests to verify whether the measurement instrument operated properly across both populations. The scales were then validated and checked for national invariance. As indicated in Table 2, the scales' agreement with the constructs was assessed using multi-group confirmatory factor analysis (Byrne, 2016). Both sample sizes were above 300, so the more liberal model of global fit approach (CFI, root mean square error of approximation [RMSEA]) was applied (Chen, 2007). The measured change in model fit was around 0.01 or less for CFI and TLI and 0.015 or less for RMSEA, confirming the national invariance of the applied measurement instrument (Byrne, 2016; Chen, 2007; Raudenská, 2020). Table 2 presents details of the invariance measurement.

All of the above constructs represented by latent variables were measured using attitude scales. Appendix 1 presents details of the measurement scales of the constructs along with the scales' sources and obtained reliabilities. The scale validation procedure usually requires a minimum of two separate samples to verify reliability and validity (DeVellis, 2017; Meek, Ryan, Lambert, & Ogilvie, 2019). Thus, the above invariance procedure enabled us to verify the whole measurement tool. The sampling plan included independent samples composed of healthcare professionals from Poland (n = 350) and the US (n = 365). Measured constructs reached indicator loadings (standardized) above the reference level of > 0.6 (Fornell & Larcker, 1981; Hair et al., 2010). Internal consistency of the constructs was assessed using Cronbach's alpha and a critical level of > 0.7 (Francis, 2001). 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 & Larcker, 1981; Hu & Bentler, 1999). All AVEs were appropriately larger. Table 3 presents the results from IBM SPSS AMOS software.

Table 2
Invariance measurement.

MCFA models	CFI	TLI	RMSEA
Unconstrained model	0.951	0.941	0.037
Loading measurement equality, measurement model (Δ)	0.945 (0.006)	0.936 (0.005)	0.039 (0.002)
Factor covariances equality, structural model (Δ)	0.934 (0.011)	0.928 (0.008)	0.041 (0.002)

3.3. Procedure

The analysis procedure began with the construction and assessment of the structural model (for Poland and the US separately), whereby learning culture was included as a control variable. Learning culture was imputed as a composite variable separately for the "learning climate" and "mistakes acceptance" dimensions. Including control variables generally reduces statistical power (Carlson & Wu, 2012). Therefore, both dimensions obtained at the SEM model stage that were not significant for the particular IC component were not included in the analysis. "Mistakes acceptance" was identified as significant only for tacit knowledge sharing (Poland), and structural capital (Poland and the US), while "learning climate" was noted to have a significant effect on tacit knowledge sharing (TKS), structural capital (SC) and renewal capital (RC) for both Poland and the US. Subsequently, based on the significance of the direct and indirect (mediated) effects analyzed using SEM and employing SPSS AMOS, the expected, moderated effects of significant control variables were analyzed using PROCESS software for SPSS Version 3.4 (Hayes, 2018). Based on model 2 of the PROCESS procedure, the moderated effects of learning culture were assessed for TKS and each IC component separately for Poland and the US. The results are presented below.

4. Results

Both SEM models (Poland and the US) achieved good quality. Namely, CMIN/df = 2.35/2.34 and RMSEA = 0.062/0.061; CFI = 0.930/0.936; TLI = 0.916/0.924, respectively follow the requirements (Byrne, 2016; Hair et al. 2010). Therefore, the obtained findings can be presented and discussed. So, the first hypothesis regarding the influence of tacit knowledge awareness on sharing was confirmed for both samples. It is worth noting that this relation was much stronger for the US sample (0.23***/0.59*** POLAND/US). The influence of TKS on human capital was positively verified and revealed to have a strong, positive influence for both samples (0.56***/0.61***), whereas the direct influence on structural capital (H3) was significant only for Poland (0.17*). In contrast, an indirect, fully mediated by the relational and human capital effect of TKS on SC was observed for the US sample, but no mediation for TKS->ReC/HC->SC was noted for Poland. Thus, the influence of TKS on SC in the US was due to human capital. For Poland, human capital did not matter as much for this relation as matter the relational capital (ReC) - no direct (H3), nor indirect TKS->ReC/HC->SC influence is observed, but the existing direct influence of TKS on SC for Poland is however weak (0.17*), but supported by significant mediated relations: TKS->HC->ReC (complementary mediation) and HC->ReC->SC (full mediation). The direct influence of TKS on ReC (H4) was positive and equally significant for both samples (0.21***). In contrast to the US, the above findings suggest that Poland's structural capital (which is a critical source of innovativeness in public healthcare in Poland) is not as much human capital dependent as relational capital dependent.

Obtained (R^2 =.34POLAND/0.66 the US) for SC confirms that presented model quite good, explained SC for the US, whereas for Poland SC was explained only in 34%. This suggests that the other 66% can be explained by factors determining structural capital in healthcare organizations in Poland that are not included in this model. Since healthcare in Poland is public, it might be an, e.g., access to public funds. Continuing hypotheses verification, the influence of human capital on renewal capital (H9) was positive and significant for Poland and the US (0.40***/30***). Additionally, for the US, this relation was supported indirectly by structural capital. Whereas no mediation was observed for Poland. For relational capital and renewal capital (H7), the strong effect (0.37***) for the US was observed to be positive and significant, but it was comparably weak for Poland (0.18*). Further, relational capital influence on internal innovation performance (PI) was significant only for the US. For Poland, the influence of human capital and relational

Table 3
Means, standard deviations, and bivariate correlations (Poland/US).

a) Poland

	Mean	SD	Cronbach α	CR	AVE	MA	LC	TKA	TKS	HC	ReC	SC	RC	PI
MA	5.69	1.25	0.86	0.86	0.86	**0.801**								
LC	5.65	1.04	0.86	0.87	0.65	0.474	**0.807**							
TKA	5.73	1.06	0.78	0.69	0.57	0.191	0.417	**0.756**						
TKS	6.05	0.96	0.75	0.75	0.50	0.485	0.628	0.749	**0.708**					
HC	5.60	1.05	0.85	0.84	0.63	0.272	0.381	0.454	0.607	**0.797**				
ReC	5.72	0.98	0.91	0.85	0.65	0.271	0.38	0.454	0.606	0.78	**0.807**			
HSC	5.64	1.08	0.84	0.81	0.58	0.420	0.485	0.439	0.599	0.702	0.774	**0.763**		
HRC	5.84	0.96	0.79	0.85	0.66	0.355	0.594	0.466	0.645	0.763	0.787	0.723	**0.812**	
PI	5.35	1.12	0.75	0.78	0.54	0.283	0.405	0.413	0.558	0.755	0.782	0.664	0.765	**0.732**

b) USA

	Mean	SD	Cronbach α	CR	AVE	MA	LC	TKA	TKS	HC	ReC	SC	RC	PI
MA	5.90	1.13	0.83	0.81	0.58	**0.763**								
LC	6.18	0.92	0.80	0.79	0.58	0.337	**0.763**							
TKA	5.98	1.01	0.80	0.80	0.57	0.363	0.417	**0.756**						
TKS	6.26	0.85	0.76	0.75	0.50	0.388	0.627	0.749	**0.708**					
HC	6.00	0.98	0.84	0.82	0.60	0.239	0.380	0.454	0.606	**0.774**				
ReC	5.87	1.12	0.85	0.85	0.65	0.239	0.380	0.454	0.605	0.78	**0.807**			
HSC	5.91	1.04	0.81	0.81	0.58	0.386	0.486	0.441	0.601	0.701	0.772	**0.763**		
HRC	6.00	0.79	0.87	0.84	0.60	0.325	0.667	0.48	0.67	0.746	0.77	0.74	**0.774**	
PI	5.84	1.07	0.83	0.77	0.53	0.242	0.439	0.422	0.572	0.756	0.781	0.675	0.769	**0.731**

Note: LC – learning climate; TKA- tacit knowledge awareness; TKS- tacit knowledge sharing; HC – human capital ReCi- relational capital SC- structural capital; RC-renewal capital; PI-process innovation.

capital on PI was fully mediated by renewal capital (Table 5). Whereas the direct influence of renewal capital on innovation performance (H13) was positive and significant for both countries (0.63***/0.30**). Further, the direct relation between human capital and ReC (H5) was positive and equally strong for both Poland and the US (0.63***/0.65***). It is worth noting that human capital in both countries indirectly influenced internal innovations performance due to renewal capital. Therefore, human capital and relational capital are undoubtedly the focal components of internal innovativeness in the healthcare industry in Poland and the US. Still, in Poland, relational capital matters more because it mediates between human and structural capital directly significant in the US. However, while the direct and indirect influence of human capital and relational capital on innovation performance was noted for the US, only an indirect influence was observed for Poland. Another difference was the relation between SC and RC (H10), which was significant only for Poland. This confirms the dominant human capital and relational capital components of IC in the US and Poland for the overall internal innovativeness. Thus, the main difference between Poland and the US concerning internal innovation performance in the healthcare industry relates to structural capital and requires a more in-depth discussion.

Fig. 4 shows the results of the general SEM estimations, while Table 4 presents a verification summary of all hypotheses. Table 5 presents details of the expected mediation verifications.

The effects of learning culture, composed of "learning climate" and "mistakes acceptance," were included in the research as potential facilitators. The positive influence of learning climate on TKA and TKS (0.19** for Poland; 38*** for the US), was noted for both countries. But the positive influence of mistakes acceptance on TKA and TKS relation (0.35***/ns) was significant only for Poland. This showed that mistakes acceptance is a strong facilitator that encourages people to share ideas in Poland. Figs. 5a-b visualizes these effects. Regarding learning climate,

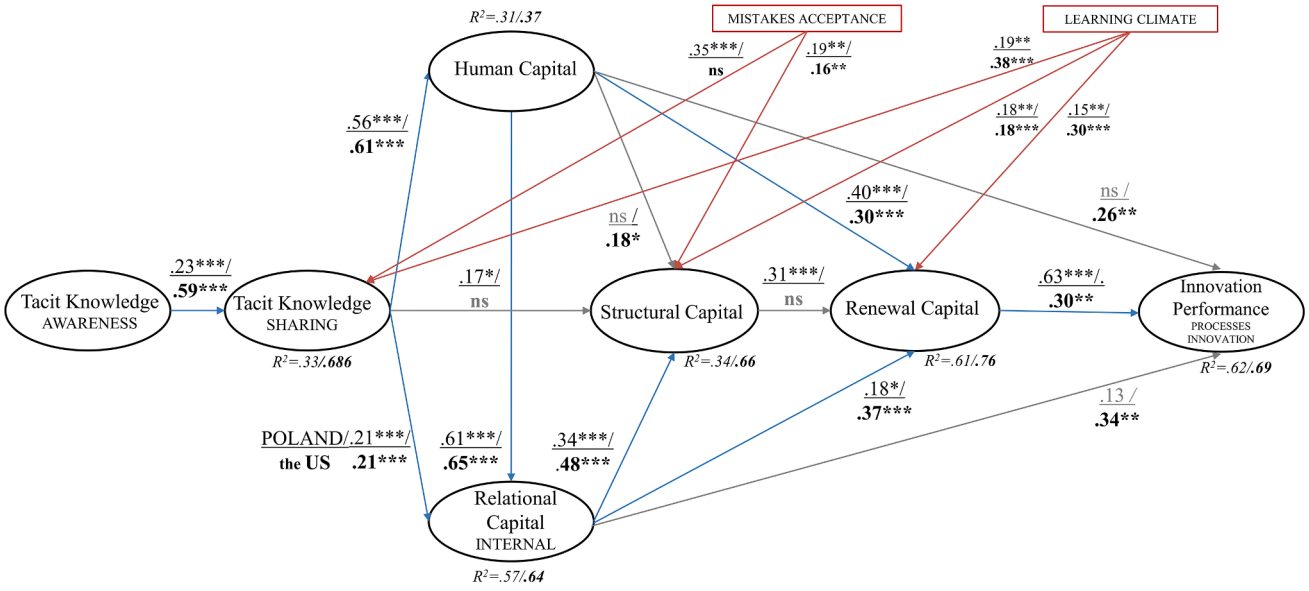

Fig. 4. Results Visualization.

Table 4
Results.

Hypothesis		β	t-value	Verification
H1		0.23*** / 0.59***	3.5 / 8.5	sustained / sustained
H2		0.56*** / 0.61***	7.3 / 8.79	sustained / sustained
H3		0.17* / 0.04(0.58)	2.0 / 0.54	sustained / *rejected*
H4		0.21*** / 0.21***	3.3 / 3.19	sustained / sustained
H5		0.61*** / 0.65***	9.4 / 9.21	sustained / sustained
H6		0.34*** / 0.48***	3.66 / 5.29	sustained / sustained
H7		0.18* / 0.37***	2.09 / 3.97	sustained / sustained
H8		−0.12(0.214) / 0.18*	−1.2 / 1.99	*rejected* / sustained
H9		0.40*** / 0.30***	4.5 / 3.78	sustained / sustained
*H*10		0.31*** / 0.09 (0.28)	4.7 / 1.07	sustained / *rejected*
*H*11		0.09(0.38) / 0.26**	0.86 / 2.66	*rejected* / sustained
H12		0.13(0.14) / 0.34**	1.46 / 3.16	*rejected* / sustained
H13		0.63***/ 0.30**	5.9 / 3.17	sustained / sustained
$H_{MM}1$	TKA-TKS/ LC	0.19** / 0.38***	5.1 / 7.14	sustained / sustained
$H_{MM}2$	TKA-TKS/ MA	0.35***/ 0.05 (0.25)	5.3 /1.13	sustained / *rejected*

note: POLAND / the US.
POLAND: n = 350 $\chi^2(211) = 495.850$, CMIN/df = 2.35, ML, standardized results,
RMSEA = 0.062, 90% CI [0.055, 0.069], CFI = 0.930, TLI = 0.916, ***p <.001 **p <.01.
*p <.05.
the US: n = 365, $\chi^2(212) = 497.818$, CMIN/df = 2.34, ML, standardized results,
RMSEA = 0.061, 90% CI [0.054, 0.068], CFI = 0.936, TLI = 0.924, ***p <.001 **p <.01.
*p <.05.

Table 5
Mediations analysis.

Mediation expected		effects		Mediation type observed
		direct	indirect	
H_M1	TKS->HC->ReC	0.21(**) /0.21(**)	0.34(***) /0.40(***)	complementary /complementary
H_M2	TKS->HC/ ReC ->SC	0.16(ns) /0.04(ns)	0.12(ns) /0.41(***)	*no mediation* / indirect-only (full)
H_M3	HC->ReC->SC	−0.12(ns) / 0.18(ns)	0.21(**) / 0.32(***)	indirect-only (full)/ indirect-only (full)
H_M4	HC->SC->RC	0.40(**) /0.30(*)	0.14(ns) /0.29(**)	*no mediation* / complementary
H_M5	ReC-> SC->RC	0.18(ns) /0.37(*)	0.11(*) /0.04(ns)	indirect-only (full) / *no mediation*
H_M6	HC->RC->PI	0.09(ns) /0.26(ns)	0.42(**) /0.39(**)	indirect-only (full) / indirect-only (full)
H_M7	ReC-> RC->PI	0.13(ns) /0.34(*)	0.18(**) /0.13(*)	indirect-only (full) / complementary

note: POLAND / the US; Bootstrap bias-corrected method: two-tailed significance (BC).
POLAND: n = 350 $\chi^2(211) = 495.850$, CMIN/df = 2.35, ML, standardized results,
RMSEA = 0.062, 90% CI [0.055, 0.069], CFI = 0.930, TLI = 0.916, ***p <.001 **p <.01 *p <.05.
the US: n = 365, $\chi^2(212) = 497.818$ CMIN/df = 2.34 ML, standardized results,
RMSEA = 0.061, 90% CI [0.054, 0.068], CFI = 0.936, TLI = 0.924, ***p <.001 **p <.01 *p <.05.

results indicated that the overall learning climate is a more efficient facilitator of tacit knowledge sharing in the US than in Poland (Fig. 5a).

Presented LC values visualize +/- SD from the mean LC values.

5. Discussion

The results show that human capital is a vital component of IC and influences the healthcare industry's internal innovativeness due to tacit knowledge creation. Tacit knowledge represents personal knowledge; therefore, it is not surprising that human capital both directly and indirectly stimulates the creation of other IC components' when driven by tacit knowledge sharing. This is particularly visible in the US model, which reflects private healthcare. Structural capital in the US sample was obtained fully from TKS due to human capital, and it is explained in 66% (R-sq) by human and relational capital. For Poland, this variable is explained only 34% of tacit knowledge sharing and relational capital directly. The healthcare sector in Poland is public and controlled by the government. Therefore, according to Bontis's (1998) definition, structural capital supports employees in their search for intellectual excellence trough such structural capital elements as databases and repositories supported by technology, procedures and routines, general strategies, and tactics support infrastructure for knowledge dissemination. So, based on the presented results for Poland this support is lower than in the US. For public healthcare organizations in Poland, structural capital might depend more on external (e.g., government funds) than internal forces (e.g., employee relations or intellectual dispositions to use it e.g., technology). It is also observed that for public healthcare organizations in Poland, human and relational capital do not influence innovations, as is evident as it is visible in private healthcare organizations in the US. Still, innovation performance is fully mediated by renewal capital supported by human, relational, and structural capital. But, human and relational capital have a direct influence on innovativeness in the US, and indirect influence in Poland.

As the advantage to former studies, this one presented the structure of IC components that influence internal innovative performance in the healthcare industry driven by tacit knowledge. Buenechea-Elberdin et al. (2017, 2018) examined the human and renewal components of the influence of IC on general innovativeness in Spanish high-tech firms and identified that the direct influence of human capital is not significant. As expected, renewal capital is a powerful, direct innovation performance influencer.

Regarding IC and innovation performance studies is worth also mention the Kianto et al. (2017) study, who also, next to Buenechea-Elberdin et al. (2017, 2018) examined the Spanish high-tech sector, including the influence of IC components such as human, structural, and relational capital on innovation performance. Their also noted an insignificant direct influence of human capital on innovativeness and pointed to the relational and structural components as the main sources of innovation performance. Their model explained innovativeness in 26.5%. This highlights the importance of tacit knowledge for innovativeness. Kianto et al. (2017), similarly to Buenechea-Elberdin et al. (2017, 2018), did not consider tacit knowledge in their models. This study model that considers tacit knowledge influence on innovation performance mediated by IC explains innovation performance in 62% for Poland and 69% for the US, that is a good result that confirms this study contribution. However, this fact also suggests that other factors could be identified to explain the remaining 40%. So, further studies are needed.

Moreover, discussing the non-significant direct influence of human capital on innovativeness in light of Kianto et al. (2017), similarly to Buenechea-Elberdin et al. (2017, 2018) studies – it might be a general European feature, but further studies are needed that involve not only other European countries but also different industries. Shujahat et al. (2019) focused on knowledge workers' productivity rather than IC and noted that the productivity of human capital does not support knowledge sharing and innovation. The current study's findings contribute to

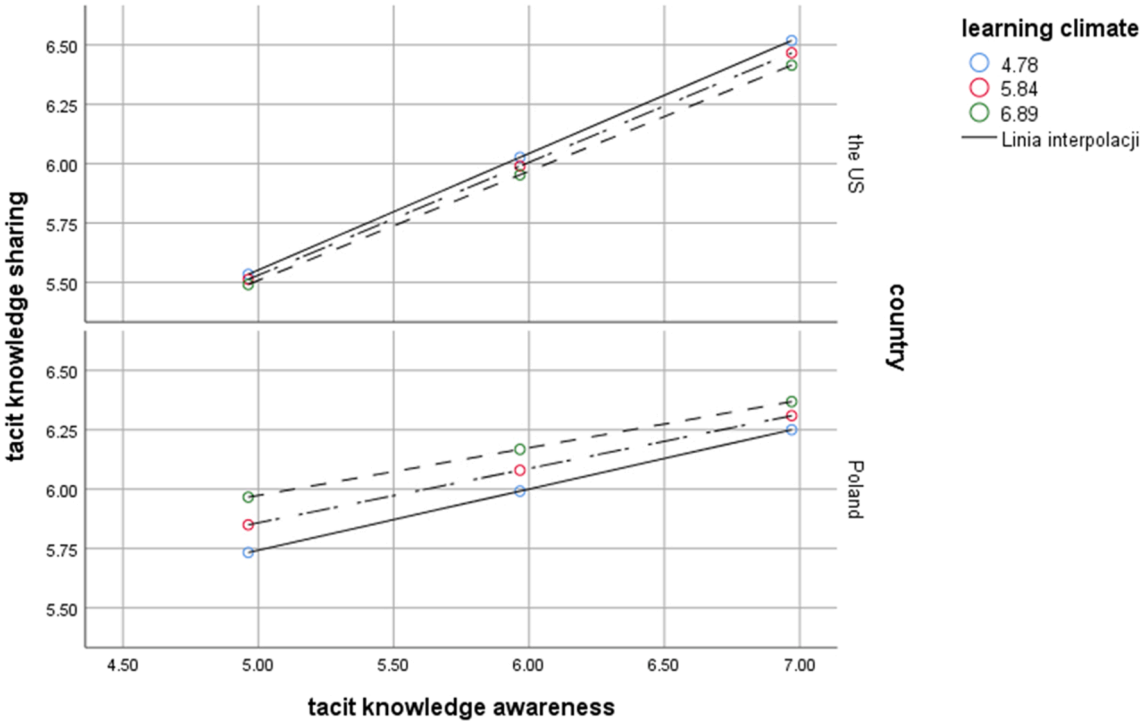

Fig. 5a. Learning Climate as Moderator of Tacit Knowledge Awareness and Sharing.

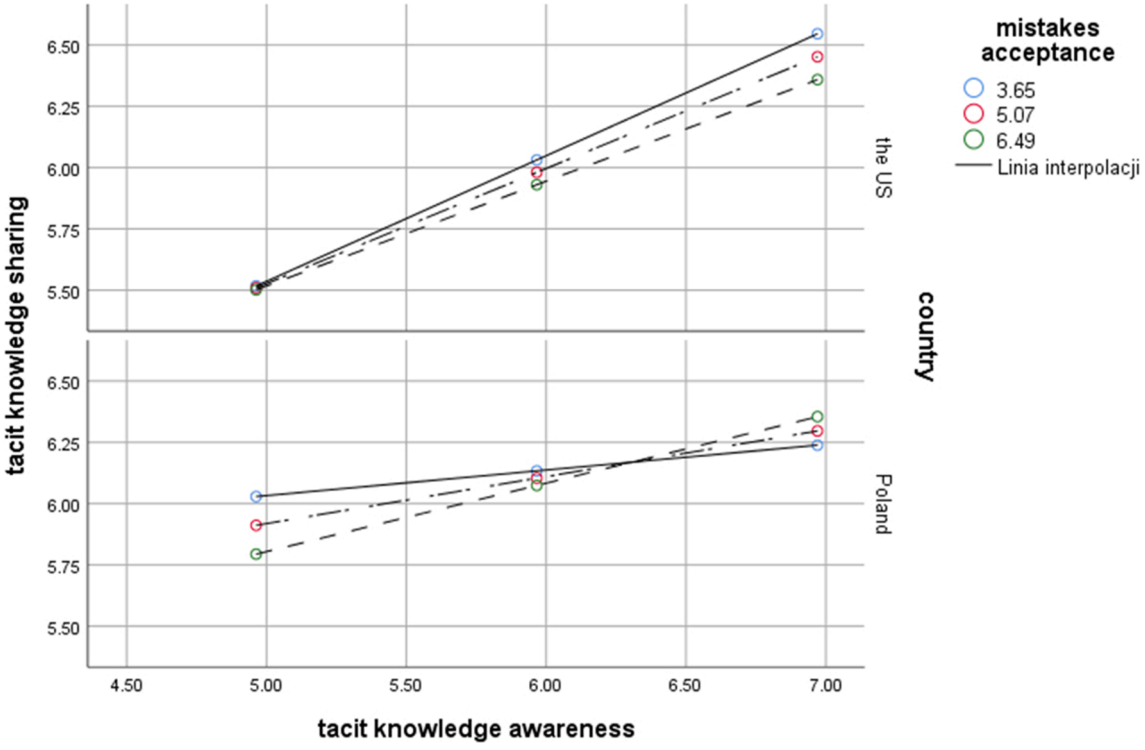

Fig. 5b. Mistakes Acceptance as Moderator of Tacit Knowledge Awareness and Sharing.

the above literature by delivering empirical evidence that knowledge sharing is a power that supports human capital's influence on innovativeness, and this knowledge is tacit (rather than explicit). The presented study reveals that tacit knowledge is a vital source of innovation and that human capital significantly supports innovation both directly (US) and indirectly (Poland). Such findings were also reported by Kucharska's (2021b) study. Still, the advantage of this research is that it focuses on internal innovativeness and exposes constant learning culture components (learning climate and mistakes acceptance) as significant moderators shaping tacit knowledge sharing.

An interesting finding concerning human capital was obtained from the in-depth analysis of learning climate and mistakes acceptance facilitating power. The Polish sample exposes that top thinkers are "climate-resistant" and learn even when the learning climate is not

favorable. Andersson, Moen, and Brett (2020) stressed that organizational learning and innovativeness depend on the overall organizational climate, including psychological safety. Mistakes acceptance gives psychological safety. Paradoxically, Polish employees also share tacit knowledge more effectively in conditions where mistakes acceptance is low. It might seem to be strange. It is easier to understand this situation in light of the study by Kucharska and Bedford (2020), who studied Polish knowledge workers from various industries. They found that the Polish employees' intelligence improved by learning from their mistakes, but this did not improve organizational intelligence. The Polish employees adapted to the existing conditions to make their job more bearable and to survive. Their cooperation increased their collective intelligence as a result of learning how to endure, but not how to support the company. As Kochanowicz (2004) noted, Poland, as a post-Soviet country, is characterized by a low level of trust and mistakes acceptance visible toward formal relations and institutions, but a high level of collaboration among closely related individuals. It would be interesting to determine whether this phenomenon is specific to Poland or general post-Soviet countries or whether it is a European phenomenon. To find out the, further studies are needed.

6. Limitations and further research

This study is limited to one industry (healthcare) and two countries (Poland and the US). There are clear differences between the countries, ranging from economic maturity to national culture. Future research could extend the results by gathering data from additional industries and countries. Moreover, the human capital and structural capital components of IC should be investigated in greater depth regarding their influence on innovativeness driven by tacit knowledge. It would be interesting to determine why a direct influence of human capital on innovativeness was observed in the US, but an indirect influence was observed in Poland and Spain (based on the discussion section).

Further, a question arose in relation to how configurations of IC components driven by tacit knowledge and moderated learning culture could improve the internal and external innovation performance of healthcare organizations. Additionally, future research could examine how learning culture is composed of climate and mistakes acceptance facilitates this process in other sectors than the examined in the current study. This study focused on internal factors that influence internal innovation performance. However, external factors also affect tacit knowledge, and these should be included in future investigations.

Moreover, regarding identified differences between the US and Poland according to structural capital meaning for all above innovation creation processes, it is worth examining the more-in depth how private and public ownership influence innovativeness in healthcare. Finally, this study exposed the mechanism of tacit knowledge influence on innovativeness due to ICc and empirically proved that tacit knowledge sharing is worth the scientific and managerial effort to make it a focal point of interest in learning organizations, but further studies are needed to help understand how to facilitate tacit knowledge awareness and sharing. This study stressed that learning culture is a key facilitator; therefore, further studies are needed to explain how to implement, manage, and develop a constant learning culture that includes learning climate and mistakes as a natural part of the learning process to support tacit knowledge sharing in organizations.

Besides, this study focuses on internal innovations. Still, it is worth highlighting that the successful introduction of novelty to the market is more complex than having the initial brilliant idea gained thanks to tacit knowledge, as the presented model simplifies it. Production, distribution, promotion, and other developments are needed to achieve market success in the complex business reality. Furthermore, such organizational factors as, e.g., innovation culture, innovation capacity, absorptive capacity, cognitive flexibility, or individual factors such as creativity, risk-taking personality, or trust and openness to others may also light all explored mechanisms' efficacy of internal and external innovations implementations. But it requires further studies.

7. Implications

The essential learning from the US and Poland comparison is that relational and structural capital influence internal innovativeness the most when analyzed through the prism of different countries in the healthcare sector. Moreover, the findings of this study contribute to the literature by providing empirical evidence that tacit knowledge is a substantial source of innovation due to its potent power in IC creation. So, tacit knowledge is vital for intellectual capital creation, which directly influences innovations. The study revealed mechanisms of innovation creation in the healthcare industry that are rooted in tacit knowledge awareness and facilitated by learning climate and mistakes acceptance, leading to an increase in tacit knowledge sharing. Crane and Bontis (2014, p. 1136) defined tacit knowledge as knowledge that is "acquired unconsciously and automatically, but capable of influencing action". So, to support internal innovations, healthcare organizations should secure their smooth flow. The learning culture that includes both components: learning climate and mistakes acceptance, fosters tacit knowledge sharing.

Mistakes acceptance in the healthcare industry may sound controversial. Obviously, this acceptance culture concerns incidents that happen even if all the diligence and procedures are respected. Learning culture development is not equal to accepting the lack of diligence. But, at the same time, fear before the mistake can't discourage employees from taking risky actions because innovativeness needed to change adaptability usually is tied with a certain risk. So looking for the balance between risky innovativeness and safe and perfect repetition of the same actions, we can create systems to avoid risky mistakes by analyzing those we already made. Mistakes can give valuable lessons and, as a result, protect human life. It is worth highlighting studies of Jung et al. (2021), Kalender, Tozan, and Vayvay (2020), Anderson and Abrahamson (2017), and Zhao and Olivera (2006), who noted that the critical problem of organizational learning from mistakes is a lack of reporting. Therefore, they highlighted the need for organizations to change their attitude towards errors. Based on Ferguson (2017), Zabari and Southern (2018), and Robertson and Long (2018), the reporting problem in healthcare might stem from the organizational "culture of blame and shame." If mistakes stay hidden, they can't be a lesson for anybody except the person who made them. Mind stimulative learning culture, including not only the learning climate but also the mistakes acceptance component, is a vital factor because, as Rothberg and Erickson (2017, p.283) say, "culture is the key ingredient in shifting from knowledge to intelligence." Tacit knowledge awareness and sharing are tied with intelligence level. Therefore, tacit knowledge gained from mistakes deserves more attention from managers and researchers who are actively interested in innovation performance instead of the observed focus on passive usage of existing explicit knowledge.

Besides, from the knowledge-based view, the patient is a source of data, and an exceptionally self-conscious patient - is a source of information. So, technically, patients, by telling us about the symptoms and effects of treatment, provide us with information. Next, the physician's mind transforms these data or information into knowledge, usually strongly contextual - therefore tacit. Physicians, sharing their contextual knowledge, foster IC development and, as a result, improve the internal innovativeness that concerns methods of working. Knowledge sharing is more problematic when it involves knowledge gained from mistakes than from successful actions, but the value is equally precious. So, the ignorance of knowledge gained from mistakes is a waste everywhere, but in medicine, it might cost a human life. Mohsin, Ibrahim, and Levine (2019) suggest that error reporting should be a standard learned at medical schools. However, Anderson, Ramanujam, Hensel, and Sirio (2010) revealed that mistakes reporting is not enough for learning and transforming reporting into improvements is much more complex. So formal error management that stops instead of starting on reporting is

not efficient. The learning climate and critical thinking (Kucharska, 2021a) seem to be essential factors supporting the acceptance of mistakes as a source of learning. So, to take full advantage of mistakes reporting the learning culture and critical thinking must be included in organizational reality.

Further, this study revealed that human and relational capital are vital IC components that influence innovativeness driven by tacit knowledge. Therefore, the productivity issues of human and relational capital require particular attention. Whole organizational innovativeness is rooted in tacit knowledge. Therefore, a learning culture composed of climate and mistakes acceptance that facilitates human–knowledge interactions is essential for innovation processes to be developed, improved, and nurtured in organizations that have ambitions regarding constant learning and innovativeness.

Tacit knowledge sharing is a social process. Therefore, social facilitators should encourage employees to interact and cooperate to attract new ideas and increase the organization's overall innovation performance. Tacit knowledge sharing is a focal challenge for organizations today. It is produced and stored in employees' minds and can only be shared as a pure, voluntary act. Therefore, the more we know about this process, the better we can manage working conditions to make the workplace "tacit knowledge awareness and sharing-friendly." So, internal policies supporting innovativeness in the healthcare industry should be rooted in the authentic learning culture, where the organizational climate motivates workmates to learn constantly and share their personal knowledge gained from successes and failures.

8. Conclusion

This study empirically revealed that human capital and relational capital, directly and indirectly, influence both structural capital and renewal capital, which in turn supports innovations. Thus, tacit knowledge deserves more attention from managers and researchers. Knowledge-driven economies focus on innovations to improve performance. Consequently, as a root of innovations, tacit knowledge should absorb the attention of innovations theory and practice. If managers and leaders want to make their teams, divisions, organization, or the whole nation truly innovative, they must turn their attention toward improving tacit knowledge awareness and sharing. Moreover, the presented cross-country study revealed that relational and structural capital influence internal innovativeness in the healthcare industry the most when it is analyzed through the prism of different countries. So, if the IC components are externally rather than internally determined in the particular organization embedded in the specific healthcare system, therefore the power of human capital to create an innovative solution is diminished.

9. Author note

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CRediT authorship contribution statement

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

Declaration of Competing Interest

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

Appendix A. Measurement scales of constructs with sources and their reliabilities

Construct	Items (authors' compilation based on sources noted)	Reliabilities
Tacit knowledge awareness Kucharska & Erickson (2021)	• I can create and explain new ideas or insights. Even if my idea is hard to explain, I am able express it or demonstrate it. Sometimes I am absolutely sure about a new idea but find it difficult to express. As I have accumulated experience, I find it is easier to express.	Cronbach α = 0.78 CR = 0.69 AVE = 0.57
Tacit knowledge sharing Kucharska & Erickson (2021)	• I share knowledge learned from my own experience. I have the opportunity to learn from others' experiences. Colleagues share new ideas with me. Colleagues include me in discussions about best practices.	Cronbach α = 0.75 CR = 0.75 AVE = 0.57
Internal innovations Kucharska & Erickson (2021)	• We constantly improve the way we work. We are good at managing changes. We are highly disposed to introduce new methods and procedures. We are highly disposed to accept new rules.	Cronbach α = 0.75 CR = 0.78 AVE = 0.54
IC–human capital Kianto et al. (2017)	• Our employees are highly skilled at their jobs. Our employees are highly motivated in their jobs. Our employees have a high level of expertise.	Cronbach α = 0.85 CR = 0.84 AVE = 0.63
IC–structural capital Kianto et al. (2017)	• 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.	Cronbach α = 0.84 CR = 0.81 AVE = 0.58
IC–relational capital— Buenechea-Elberdin et al. (2018)	• Different units and functions within our company understand each other well. Our employees frequently collaborate to solve problems. Internal cooperation in our company runs smoothly. External cooperation in our company runs smoothly.	Cronbach α = 0.91 CR = 0.85 AVE = 0.65
IC–renewal capital Buenechea-Elberdin et al. (2018)	• 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.	Cronbach α = 0.79 CR = 0.85 AVE = 0.66
LC–climate (atmosphere) Kucharska & Bedford (2020)	• All staff demonstrate a high learning disposition. We are encouraged to personal development.	Cronbach α = 0.86 CR = 0.87 AVE = 0.65

(continued on next page)

(*continued*)

Construct	Items (authors' compilation based on sources noted)	Reliabilities
	We are encouraged to implement new ideas every day.	
	We are encouraged to new solutions seeking.	
LC–mistakes acceptance Kucharska & Bedford (2020)	• People know that mistakes are learning consequence and tolerate it up to a certain limit.	Cronbach α = 0.86
	Most people freely declare mistakes.	CR = 0.86
	We discuss problems openly without blaming.	AVE = 0.86
	Mistakes are tolerated and treated as learning opportunities.	

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