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A multi-industry and cross-country comparison of technology contribution to formal and informal knowledge sharing processes for innovativeness

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Abstract

The study explores the impact of organizational information technology (IT) competency on knowledge sharing, both explicit and tacit, in the context of innovativeness of products and processes. Knowledge sharing is then assessed in terms of tacit-to-explicit conversion and the impact of both types of knowledge on organizational innovation. Both process (internal) and product/service (external) innovation are included. As an extension, this IT competency to innovation framework is evaluated in context, both by nation (Poland and the United States) and by industry (IT, construction, and healthcare). The results obtained through the structural equation modeling method (sample size 2168 cases in total) exposed that IT competency dimensions matter for formal and informal knowledge-sharing processes and vary across countries and industries. For instance, in the US IT industry, IT-infrastructure, IT-knowledge, and IT-operations dimensions equally support explicit (formal) and tacit (informal) knowledge sharing. On the contrary, for the same industry in Poland, all dimensions support explicit knowledge sharing but regarding tacit knowledge sharing, only IT-knowledge supports it. Summing up the general findings, this study exposes that for tacit knowledge sharing, the critical IT-competency dimension is IT-knowledge, whereas for explicit- IT operations. Next, it clarifies that tacit knowledge sharing supports the explicit, and both are needed to introduce external innovations thanks to their significant impact on internal processes improvement.

1 | INTRODUCTION

Some studies demonstrated that overall organizational IT competency understood as the entire company's ability to use technologies to support organizational knowledge management (KM) effectively (Tippins & Sohi, 2003), could improve its innovation capability (Acosta-Prado et al., 2021). As organizational management systems today composed of effective IT systems and knowledge assets can be complex, they are worth exploring more in-depth (Garcia-Perez et al., 2020). Specifically, knowledge is generally seen as either highly personal—a tacit form that formal sharing is barely possible, and more easily shared—a codified explicit form of knowledge that sharing can be easily formalized. The IT system's influence may vary regarding its support for tacit and explicit knowledge sharing. Moreover, the character of tacit and explicit knowledge-sharing processes may vary due to the different characteristics of both forms of knowledge. Furthermore, their impact on organizational performance can include several possibilities, from financial outcomes to efficiency or organizational innovation, which also can be further identified as process improvement or the introduction of a new product (good or service)

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development. Basically, employing IT systems to better manage knowledge should lead to more and better innovation performance (Yoshikuni et al., 2021). To make a step forward, this study aims to deepen this relationship by developing the theoretical model of influencing mechanisms of organizational IT competency on formal and informal knowledge sharing processes, and internal (processes and working methods improvement) and external (product or service development and implementation) innovations performance.

Furthermore, based on the recent findings of Kucharska (2021a), the generic framework does not necessarily apply in all national, cultural, or industrial circumstances. Specifically, differences in knowledge management (KM) outcomes between nations have been identified, establishing that differences in objectives, support infrastructure, and culture also play a significant role (Jayaweera et al., 2021). Moreover, different industries also demonstrate various approaches, applications, and results (Kucharska & Erickson, 2020). Therefore, this study explores the influence of organizational IT competencies on formal and informal knowledge sharing processes on internal (processes) and external (product or service) innovations performance in the multinational and multi-industrial context. The study looks at how a generic framework may need to be modified if it is applied to organizations in Poland and the United States and three industries, information technology (IT), construction, and healthcare. It aims to analyze and expose all noticeable similarities and variations in characteristics and outcomes. This approach is vital for a deep understanding of the IT competency contribution to organizational innovativeness thanks to knowledge sharing processes in a broader context.

2 | STUDY BACKGROUND

2.1 | KM and technology

Analysis of knowledge assets and how to better manage them is of significant interest to both researchers and practitioners because of the presumed link between the successful management of knowledge assets and better organizational performance. The underlying theory that supports this link is the resource-based theory (RBV) of the firm (Barney, 1991; Wernerfelt, 1984). The central tenet of the RBV theory of the firm is that access to or possession of a unique resource (or a portfolio of resources) can grant a defensible competitive advantage to a firm (Grant, 1996; Zack, 1999). Support for the appropriateness of this tenet has only grown over time, especially with the advent of big data and successful strategies based on proprietary data and information. Given the view, that innovation is mainly developed thanks to human and relational intellectual capital components and that these components are mostly developed thanks to tacit knowledge sharing (Kucharska, 2021b), this tacit knowledge-sharing process is seen as a fundamental base for any intangible assets development in an organization. It is because the whole knowledge is rooted in tacit knowledge—as Polanyi (1966) said. The importance of knowledge creation and intelligence development based on intellectual capital components is a focus of today's business and scientific world (Handa et al., 2019). Therefore, KM mechanisms have been studied in detail over the years to improve the understanding of the conversion of intangibles into tangible business effects (Tseng & Lee, 2014). However, there is still room for studies that bring a deeper understanding of KM mechanisms and their direct or indirect links to organizational performance through the prism of technology support. This study aims to explore in greater detail the link between organizational IT competency, knowledge processes, and the general innovativeness level.

Establishing that better KM results in better organizational performance, as such a strategic perspective suggests, has been the objective of considerable scholarly work (Bedford & Kucharska, 2021). Different metrics, often based on intellectual capital definitions of knowledge assets as inputs, have been applied to establish appropriate outputs to assess (Garcia-Perez et al., 2019). These outputs have varied from financial metrics such as profitability or return on equity to self-reports on competitiveness or innovation performance (e.g., cites, financial, innovation, and self-reports). Results can be variable, but using a number of these approaches to assessing the impact of KM is common and accepted in the field, and circumstances generally dictate the choice of appropriate measures of organizational performance. The call for innovativeness for sustainability in any country and any sector characterizes the current circumstances. Therefore, this study includes factors such as nation and industry to better understand the focal mechanisms.

Knowledge is a higher level of intangible, with an understanding or learning developing beyond basic information (Ackoff, 1989; Rowley, 2007). As employees learn over time, either from personal experience or sharing it with by others, they develop expertise in performing their jobs. Collectively, this knowledge can lead to superior performance by the entire firm (Cegarra-Navarro et al., 2020; Thomas, 2021). As such, organizations are motivated to identify their knowledge assets and exploit them through sharing. It is important to recognize that knowledge may be classified in a number of different ways. Early on in the literature, the distinction between tacit vs. explicit knowledge (Nonaka & Takeuchi, 1995) was introduced, inspired by the work of Polanyi (1966). Therefore, this study aims to analyze how knowledge processes that have as their underpinning tacit or explicit knowledge influence organizational performance. It is appropriate to consider how such a distinction might be appropriate to a study of how the effective management of knowledge assets influences organizational performance.

Tacit knowledge is more personal, harder to express, harder to share, and harder for the organization to capture and codify. Tacit knowledge lends itself more to person-to-person sharing, whether through apprenticeships, training, communities of practice, demonstrations, observations, storytelling, metaphors, or other such means (Frissen et al., 2019; Sakellariou et al., 2017). These can include information systems, such as those classifying and storing case histories or postmortems, but generally in a more qualitative manner. Tacit knowledge can be extremely valuable, given the personal insights into better performance at its core, but it can be more difficult to share and, especially, to scale across the larger organization (Vanhala &

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Tzafrir, 2021). Therefore, one may assume that tacit knowledge being strictly personal, is generally shared rather informally.

Explicit knowledge, on the other hand, is codified, therefore, easier to express and share and easier to capture, including with information systems. Explicit knowledge lends itself well to its representation in the documentary firm to its management and sharing through IT (Matson et al., 2003; Thomas et al., 2001). While tacit-to-tacit knowledge exchanges are possible—as are explicit to explicit, per the SECI framework (Nonaka & Takeuchi, 1995), organizations will often look to convert individual tacit knowledge to more widely sharable explicit knowledge, allowing wider sharing and use of this knowledge resource. Since, by definition, tacit knowledge tends to be unstructured and must be converted to structured explicit knowledge, this process is not necessarily easy, but knowledge amplification must happen if the knowledge is to scale and spread widely enough to have a major impact (Herschel et al., 2001). Therefore, there is an assumption that explicit knowledge is shared mostly formally, whereas tacit knowledge is shared mostly informally.

Strategically managing knowledge considers the nature of the knowledge (tacit or explicit) and the organizational context—internal and external (national, regional, or local). Organizations collect and manage knowledge that is required to compete in a given industry successfully. Moreover, the company is interested in creating conditions in which knowledge can easily circulate. Social capital supported by culture and trust (Bontis, 1998; Nahapiet & Ghoshal, 1998) and structural capital supported by technology is seen as factors that matter the most for its free flow.

Precisely, IT installation and use are a wider category of interest in organizations beyond just knowledge sharing. The wider theory includes well-accepted models such as the Technology Acceptance Model. There, whether an organization is able to incorporate new technology into its processes successfully is determined by ease of use and usefulness (Davis et al., 1989). Other approaches are available, but the main point is that IT "solutions" are not always immediately or widely accepted. Employees must see value in learning and using them to make this tool a part of the business value creation. From this perspective, organizational IT competency, if it supports knowledge processes, may also impact performance (Perez-Lopez & Alegre, 2012).

From that general perspective, KM scholars have also looked at IT applications in the workplace. Previous studies have firmly established the importance of IT systems for effective knowledge sharing and, eventually, superior organizational performance (Santoro et al., 2017). Both the hardware and human side, as just noted, are important. The system itself must be constructed but also needs the human element to function at its highest levels. Tacit knowledge is created and stored in the human mind, and the socialization processes are the only way to make it out. Indeed, under strongly technology-mediated relations, the lack of success in motivating human interaction with technology has been identified as a common culprit when knowledge-sharing initiatives fail to meet expectations (Al-Busaidi & Olfman, 2017). Therefore, this study aims also verify how exactly the company's IT competency introduced by Perez-Lopez and Alegre (2012) as composed of three organizational dimensions: IT-infrastructure, IT-operations, IT-knowledge, influence formal, and informal knowledge processes.

All three dimensions determine the ability of IT competency development in the particular organization. IT-infrastructure dimension relates to the concrete pieces of the system, essentially the IT resources successfully applied to workflows, such as hardware, software, and IT staff. IT-operations dimension refers to executing the operation through the established infrastructure. In other words, this dimension exposes how well the entire system performs thanks to IT usage in daily routines. This dimension in this study exposes how well the IT-supported KM system performs in sharing critical knowledge needed for everyday decision-making. IT-knowledge dimension concerns the acceptance and understanding of the system's potential by users. The more those who might benefit from the KM system perceive and practically apply the advantages of technological support offered by the system, the higher their IT knowledge level is. Taken together, this IT competency three-dimensional perspective helps us understand how the entire KM system powered by a technology works for innovation.

2.2 | National and industrial context of KM studies

How to effectively manage knowledge in organizations, including the recognition that IT resources can be used to enhance sharing, perhaps by turning tacit into explicit knowledge, and stimulate the tacit knowledge generation thanks to explicit knowledge spreading and, as a result, improve the entire organizational performance, it is an interesting topic in and of itself. But the effectiveness of such processes can be complicated by other factors. In particular, considerable literature has developed on differences between industries and differences between countries (Erickson & Rothberg, 2012; Kucharska & Erickson, 2020).

The number of KM articles focusing on a single industry is substantial. But wider studies, including universally available financial metrics to identify knowledge assets available per industry, show considerable variation in the importance of knowledge or other intangible assets to industry success (Erickson & Rothberg, 2017; Kucharska, 2021a). While intuitively obvious, the data demonstrate that some industries require considerable knowledge and effective management in order to compete (pharmaceuticals and IT), while others may not have similar levels of innovation or more regulation, and so require more minor KM applications (utilities and construction). It is why we want to explore the presented relations through the prism of sectors. We want to find out if different sectors', where different types of knowledge dominate, exploit different dimensions of IT competency to perform innovatively. Or is there no difference?

But more specific studies of the details of KM when applied across different industries are scarce. Again, considerable research has been done through focused studies on practice in a given industry but not on how KM differs across industries. However, how IT might impact the development of knowledge (tacit to explicit) and result in

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successful innovation has some precedents in the literature (e.g., Balle & Oliveira, 2018; Ceci et al., 2021), but this does not include direct comparisons of the similarities or differences across industries, including IT competency.

On the one hand, regarding the national level of analysis, many studies have been done concerning the level of knowledge (tacit and explicit) or intellectual capital in nations or regions (e.g., Švarc et al., 2021). Such work established that considerable differences existed between countries but were also conducted on a very macro level, using widely available government or related statistical databases. As such, these types of studies provided an easy comparison of the results of knowledge systems at the national level (or lack of results) but not necessarily much insight into differences in the KM approaches themselves, especially at the firm level (Labra & Sánchez, 2017).

On the other hand, numerous studies have been made regarding KM techniques and applications to innovative interorganizational arrangements in national contexts (e.g., Papa et al., 2021). Since we already know that IT systems and the human element related to their acceptance matter for knowledge sharing and innovativeness (e.g., Dahiyat, 2021) and that those likely differ by country or region, more insight into their actual variance across the environment would be useful to decision-makers. Therefore, the knowledge from the study is needed to examine first how IT competency supports the development of explicit and tacit knowledge; second, to understand the complexity of organizational IT competency dimensions impact on the innovation of internal processes and working methods and, as a consequence also external (product or service) innovations performance enabling to compete successfully.

3 | CONCEPTUAL FRAMEWORK

3.1 | Knowledge gap

Inspired by the above literature, we identified the knowledge gap, that is, a lack of studies exploring the impact of organizational IT competency on knowledge sharing, both explicit and tacit, in the context of innovativeness of products and processes in the national and industry contexts. To fulfill this gap, we formulated the theoretical model focused precisely on the impact of the three-dimensional IT competency (knowledge-infrastructure-operations) on knowledge sharing (tacit and explicit) and the subsequent link to organizational innovativeness: internal (processes) and external (products or services). Furthermore, three different industries (IT, healthcare, and construction) and two foreign countries (Poland and the United States) are involved in the investigation to achieve a better understanding of the impact of the broader context within which knowledge sharing is taking place.

3.2 | IT competency and knowledge sharing (explicit and tacit)

As noted earlier, the success of KM systems is dependent on the development of key knowledge resources through sharing (Akram et al., 2018). We imply that each of the IT competency dimensions may have a role in knowledge sharing. Precisely, IT-infrastructure, IT-operations, and IT-knowledge define the critical aspects of an IT-based organizational knowledge system (Akram et al., 2018; Perez-Lopez & Alegre, 2012), and the existence of the KM supporting system, its operational efficiency, and its users' acceptance will have a role in whether that system is successful in sharing knowledge throughout the organization (Gemino et al., 2015) that should be visible in innovations performance.

Summarizing all the above as well as presented in the previous sections' literature into pertinent hypotheses, IT competency dimensions can enhance knowledge sharing within organizations (Akram et al., 2018; Kucharska & Erickson, 2020; Perez-Lopez & Alegre, 2012). Moreover, knowledge sharing can be accomplished with tacit and/or explicit knowledge (Herschel et al., 2001; Perez-Luno et al., 2019) as appropriate for the organization. Therefore, based on all the above, the hypotheses have been proposed for each of the three organizational IT-competency dimensions as below:

Hypothesis 1a. Enhanced IT-infrastructure competency positively impacts explicit knowledge sharing.

Hypothesis 1b. Enhanced IT-infrastructure competency positively impacts tacit knowledge sharing.

Hypothesis 2a. Higher IT-knowledge competency positively impacts explicit knowledge sharing.

Hypothesis 2b. Higher IT-knowledge competency positively impacts tacit knowledge sharing.

Hypothesis 3a. More effective IT-operations competency positively impacts explicit knowledge sharing.

Hypothesis 3b. More effective IT-operations competency positively impacts tacit knowledge sharing.

The differences between tacit and explicit knowledge can also be interesting to explore in more depth. Tacit knowledge exchanges can be quite valuable; deeply personal knowledge can be something as minor as a turn of the wrist that improves a process or as substantial as a groundbreaking, inventive idea. But even as valuable as such knowledge might be, the constraints of person-to-person sharing limit its impact. Tacit knowledge can be challenging to scale and share and leverage across the larger organization. Consequently, there is interest in converting tacit knowledge to a more explicit form, enabling considerably greater dispersion and advantage (Frissen et al., 2019; Sakellariou et al., 2017). Inspired by all the above, the hypothesis has been developed as below:

Hypothesis 4. Higher levels of tacit knowledge sharing can lead to more explicit knowledge sharing.

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3.3 | Knowledge sharing (explicit and tacit) and innovation (processes and products)

Finally, the proposed theoretical model examines how the above-hypothesized relations impact organizational performance, including the distinction between internal innovation of working methods and processes and external innovation of market-oriented goods or services (Eidizadeh et al., 2017). We assume that the majority of innovative processes have a tacit idea as their genesis. However, the steps needed to develop, implement them in the organization, and successfully take the innovation to the market generally require a mix of novel, very tacit ideas and a set of explicit common, good practices. It is why we believe that, in any case, more sharing of knowledge of any type has the potential to impact both: internal processes improvement and product/service innovation development. More generally, tacit knowledge sharing is connected to any innovation creation (Kodama, 2019; Kucharska 2021a,b), but explicit knowledge is understood in this case as a set of good practices, and "know-how" is needed to transform any new and brilliant idea into practice. Based on all the above, hypotheses have been formulated for explicit and tacit knowledge as follows:

Hypothesis 5a. Explicit knowledge sharing leads to process innovation.

Hypothesis 5b. Explicit knowledge sharing leads to product/service innovation.

Hypothesis 6a. Tacit knowledge sharing leads to process innovation.

Hypothesis 6b. Tacit knowledge sharing leads to product/service innovation.

Another carryover from previous research is that process innovation and product/service innovation can be related (Kucharska, 2021a,b; Kucharska & Erickson, 2023; Donbesuur et al., 2020). This makes logical sense as often, more incremental process improvements can add up to something more substantial in the product/service itself, smaller process innovations leading to a larger, more evident product/service innovation. Based on this, the hypothesis is proposed as below:

Hypothesis 7. Higher levels of process innovation are related to higher levels of product/service innovation.

3.4 | Control variable

In this study, we consider that industry is one important variable, having a demonstrated relationship to IT competency and knowledge sharing (Kucharska & Erickson, 2020). Moreover, as noted above, studies have indicated substantial differences in knowledge intensity across industries (Erickson & Rothberg, 2012, 2017). IT firms need considerable knowledge assets to compete and are highly innovative, as are at least some of the sectors in healthcare. Construction shows less knowledge intensity (and present knowledge is often thought to be tacit (Leung & Fong, 2011), perhaps in part because of the project nature of the work and required ad hoc networks of collaborators.

As a result, the industry is included first as a CV of the formal part of the initial model, and next, results are cut into industry sectors: IT, construction, and healthcare.

Hypothesis 8a. Industry differences impact explicit knowledge sharing.

Hypothesis 8b. Industry differences impact tacit knowledge sharing.

3.5 | Mediations

Innovation incentives, effort, and outcomes can vary considerably across countries, industries, and firms. Part of that includes the innovation strategy, specifically the objective and the plans to get there. In this study, the common distinction between internal, process-oriented innovation and external, product-oriented innovation has been included, but the two are not necessarily independent. Previous research (and the correlation results here) suggest some overlap in perception among respondents (Kucharska & Erickson, 2023). One explanation might be that process innovations mediate product/service innovations. More formally, expected mediations are:

- Explicit knowledge sharing = >process innovation = >product/service innovation
- Tacit knowledge sharing = >process innovation = >product/service innovation

3.6 | National context

Beyond the formal hypotheses, the study was constructed to specifically examine the model in the context of different industries and different countries. Industries have already been discussed, and the control variables are included in the model. National differences in KM practices and outcomes are also pervasive (Kucharska, 2021a). Moreover, the United States is one of the world's most developed economies, known for entrepreneurship and innovation. A direct comparison with a rapidly growing economy such as Poland could illustrate key differences in adopting and using IT and KM systems and pertinent outcomes.

The identified theoretical model based on all the above hypotheses is illustrated in Figure 1.

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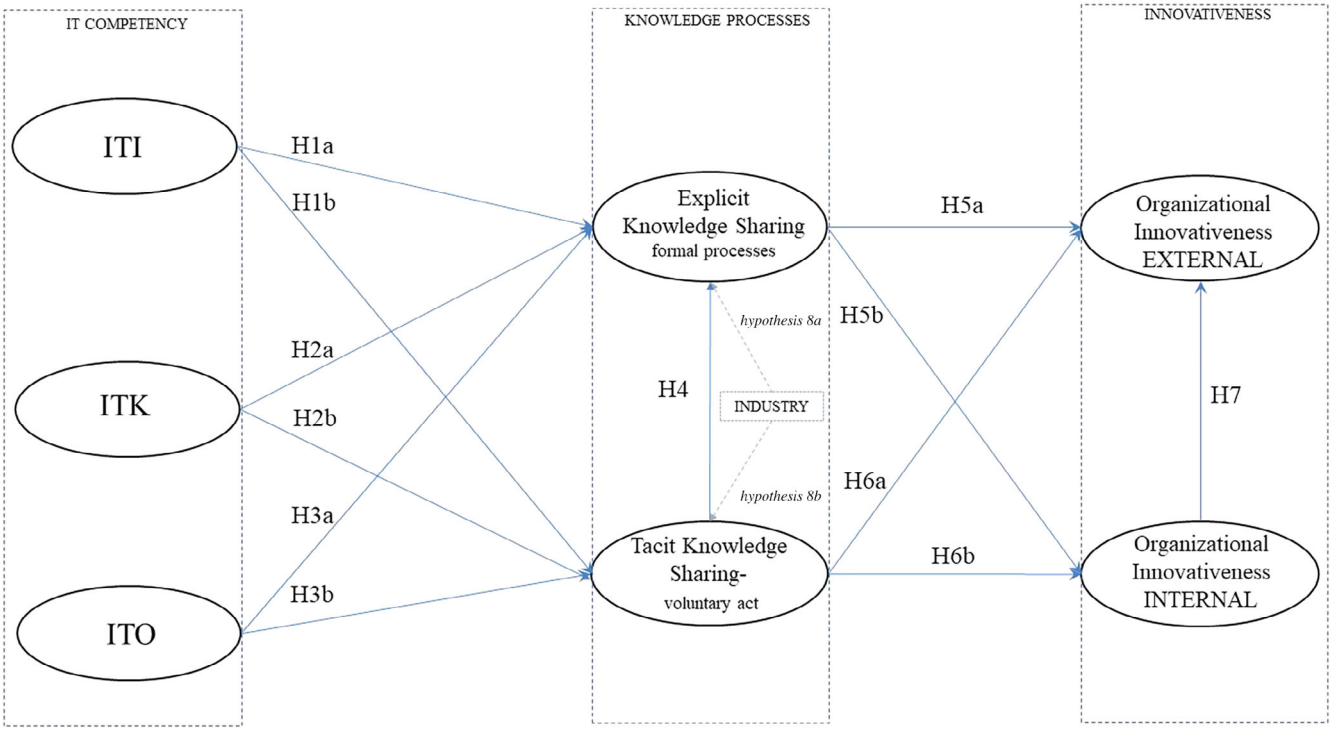

FIGURE 1 Theoretical model. ITI, IT-infrastructure dimension; ITO, IT-operations dimension; ITK, IT-knowledge dimension. [Colour figure can be viewed at wileyonlinelibrary.com]

4 | METHODOLOGY

All the focal constructs involved in the theoretical model were measured by adapting scales existing in the literature measurement scales listed in Appendix Table A1. The measurement instrument quality was evaluated for invariance across the two countries: Poland and the United States, and across three sectors (Table 1), applying MCFA. With both sample sizes above 300, the more liberal global fit indices, CFI and RMSEA, were used (Chen, 2007). Details of invariance measurement are presented in Table 2. Measure change is under 0.009 (CFI) and under 0.05 (RMSEA), showing the national invariance of the adapted data-gathering instrument (Raudenska, 2020).

4.1 | Samples

Data were collected from samples in the IT, healthcare, and construction sectors of both the United States ($n = 1118$) and Poland ($n = 1050$). Online panels were sampled by Qualtrics (USA) and ASM (Poland) based on a quota plan, providing the necessary randomness for statistical reliability and appropriate coverage of select demographics. The samples are described in Table 1. One distinct and evident difference is the distribution of companies by size, likely reflecting the more mature US economy with considerably more large and medium firms present.

Samples quality was evaluated by the Kaiser-Meyer-Olkin test with high readings (0.863 Poland and 0.942 the United States), indicating good quality (Hair et al., 2010; Kaiser, 1974). The Harman single-factor tests confirmed the influence of a variety of factors, not just one (Podsakoff & Organ, 1986), also supported by the common method bias results.

4.2 | Measurement model

After positive verification of samples and questionnaire quality, confirmatory factor analysis (CFA) was used to assess the convergent and discriminant validity of the empirical results based on the theoretical model presented in Figure 1. CFA was completed separately for Poland and the United States. 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 >0.7, average variance extracted (AVE) was assessed with a test statistic >0.5 and composite reliability >0.7 (Hair et al., 2010), all establishing scale validity. Discriminant validity was assessed by comparing the AVE square root against correlations with other constructs (Fornell & Larcker, 1981). All AVE root squares were appropriately larger than constructs correlations except for the highlighted correlation in the Polish sample between process innovation and product/service innovation (more on that later). Results from IBM SPSS AMOS software are presented in Tables 3 and 4.

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TABLE 1 Samples structure.

Characteristic	Total Poland/USA (n = 1050/1118)	Industry		
		IT (n = 350/379)	Construction (n = 350/373)	Healthcare (n = 350/366)
C-suite	3%/3%	3%/3%	3%/3%	3%/3%
Top managers	7%/7%	7%/7%	7%/7%	7%/7%
Middle managers	23%/23%	23%/23%	23%/23%	23%/23%
Professionals	67%/67%	67%/67%	67%/67%	67%/67%
Company size				
Micro (<10 employees)	2%/5%	3%/2%	3%/10%	1%/1%
Small (10–50 employees)	57%/13%	77%/6%	93%/26%	57%/8%
Medium (51–250 employees)	12%/33%	11%/25%	3%/30%	33%/40%
Large (>250 employees)	29%/49%	9%/66%	1%/34%	9%/52%
Age				
18–24	0%/1%	1%/2%	0%/10%	0%/0%
25–34	21%/32%	19%/27%	14%/45%	9%/38%
35–44	32%/43%	49%/50%	38%/45%	26%/43%
45–54	23%/15%	21%/16%	27%/0%	32%/16%
55–64	17%/5%	9%/6%	15%/0%	30%/2%
65 and over	7%/1%	2%/1%	6%/0%	4%/1%
Gender				
Female	50%/49%	50%/49%	50%/49%	50%/50%
Male	50%/50%	50%/50%	50%/51%	50%/49%
Other	0/1%	0/1%	0/1%	0/1%
Kaiser-Meyer-Olkin	0.863/0.942	0.843/0.928	0.836/0.923	0.864/0.934
Harman single factor test	27%/40%	27%/39%	26%/39%	29%/41%
Total variance explained	76%/74%	76%/73%	79%/77%	77%/74%
CMV	16%/2%	21%/17%	17%/1%	7%/8%

TABLE 2 Invariance measures.

MCFA models	TLI	CFI	RMSEA
Unconstrained model	0.972	0.976	0.028
Loading measurement equality–measurement model (Δ)	0.961 (0.011)	0.967 (0.009)	0.033 (0.005)
Factor covariances equality–structural model (Δ)	0.947 (0.014)	0.954 (.013)	0.047 (0.014)

5 | RESULTS

The results verify much of the hypothesized model for both nations. A visualization of the model, with correlation results, is shown in Figure 2. A table with the hypotheses, correlation results, and summary statistics for the model is provided in Table 5. Differences are apparent and interesting in the individual relationships, the overall model, and in the distinct industry and national contexts. Before delving into the details, however, it is important to note that the broad conceptual framework of IT competencies, tacit and explicit knowledge sharing, and innovation is confirmed.

Considering the national results and ignoring the industry segments (for now); the Polish model shows significant relationships between all the IT competencies and explicit knowledge sharing, as expected. On the tacit knowledge side, however, only IT-knowledge competency is observed as significant, not the infrastructure or operational variables. Tacit knowledge sharing's impact on explicit knowledge sharing is clear and highly significant. The links to innovation are varied. Both tacit and explicit knowledge sharing significantly influence the internal innovation of methods of working and processes. Alternatively, explicit knowledge sharing is not associated with product/service innovation, and tacit knowledge is less significant. And, as we will see, that is, true for only one of the three industries (construction). Finally, a strong connection exists between process innovation and product innovation in Poland. R^2 for the Polish model is 0.54. It means that the entire model explains external innovations in Poland in 54%. It means that the other 46% can be explained by variables not included in the model. For the United States, $R^2 = 79\%$.

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TABLE 3 Correlations and root square of AVE-Poland.

Construct	Mean value	SD	AVE	CR	Cronbach alpha	ITI	ITO	ITK	TKS	EKS	PI	PSI
(a) Total Poland ($n = 1050$)												
ITI	3,9	2,2	0,90	0,97	0,96	**0,951**						
ITO	5,6	1,4	0,78	0,92	0,91	0,515	**0,885**					
ITK	5,5	1,3	0,60	0,82	0,81	0,604	0,595	**0,773**				
TKS	5,9	1,1	0,50	0,74	0,72	0,178	0,157	0,253	**0,708**			
EKS	5,1	1,6	0,79	0,94	0,93	0,622	0,709	0,515	0,38	**0,886**		
PI	5,2	1,2	0,50	0,75	0,73	0,184	0,198	0,179	0,303	0,552	**0,710**	
PSI	5,5	1,1	0,57	0,84	0,84	0,132	0,138	0,139	0,286	0,378	0,684	**0,758**
(b) IT industry ($n = 350$)												
ITI	4,7	2,2	0,87	0,95	0,95	**0,934**						
ITO	5,7	1,4	0,76	0,90	0,91	0,234	**0,871**					
ITK	5,8	1,1	0,58	0,81	0,81	0,199	0,478	**0,762**				
TKS	5,8	1,1	0,52	0,76	0,74	0,128	0,182	0,332	**0,722**			
EKS	5,1	1,6	0,75	0,92	0,92	0,315	0,436	0,326	0,251	**0,868**		
PI	5,3	1,3	0,53	0,77	0,76	0,13	0,181	0,165	0,24	0,391	**0,727**	
PSI	5,6	1,1	0,53	0,82	0,84	0,129	0,18	0,175	0,287	0,38	0,722	**0,730**
(c) Construction industry ($n = 350$)												
ITI	3,0	1,9	0,88	0,96	0,95	**0,936**						
ITO	5,3	1,6	0,82	0,93	0,93	0,227	**0,905**					
ITK	5,1	1,5	0,62	0,83	0,83	0,312	0,508	**0,790**				
TKS	5,6	1,3	0,54	0,77	0,75	0,121	0,024	0,222	**0,737**			
EKS	4,7	1,7	0,82	0,95	0,94	0,13	0,373	0,329	0,196	**0,903**		
PI	5,2	1,2	0,50	0,75	0,73	0,066	0,117	0,148	0,285	0,342	**0,704**	
PSI	5,5	1,1	0,62	0,87	0,87	0,056	0,064	0,116	0,328	0,212	0,662	**0,789**
(d) Healthcare industry ($n = 350$)												
ITI	4,08	2,17	0,94	0,98	0,96	**0,967**						
ITO	5,74	1,22	0,75	0,90	0,90	0,22	**0,867**					
ITK	5,36	1,17	0,54	0,77	0,76	0,301	0,592	**0,733**				
TKS	5,97	0,98	0,50	0,74	0,73	0,104	0,283	0,325	**0,705**			
EKS	5,61	1,25	0,75	0,92	0,92	0,208	0,468	0,484	0,336	**0,868**		
PI	5,25	1,14	0,52	0,77	0,75	0,101	0,244	0,263	0,44	0,432	**0,723**	
PSI	5,46	1,14	0,58	0,85	0,84	0,073	0,177	0,192	0,337	0,308	0,756	**0,763**

Note: Root square of AVE-bolded.
Abbreviations: EKS, explicit knowledge sharing; ITI, IT-infrastructure dimension; ITO, IT-operations dimension; ITK, IT-knowledge dimension; TKS, tacit knowledge sharing; PI, organizational innovativeness (internal processes); PSI, organizational innovativeness (external: product or service).

For the United States, on the other hand, all three IT competencies are significantly correlated with both types of knowledge sharing, with the notable exception of the IT infrastructure dimension and explicit knowledge sharing (though that once again varies by industry). Tacit knowledge sharing does have a significant connection to explicit knowledge. The knowledge sharing to innovation results are interesting. Explicit knowledge sharing is associated with process innovation (internal) but not necessarily with product/service innovation (external). Tacit knowledge sharing is the opposite, linked to product/service innovation but not process. Similar to the Polish results, internal innovations strongly influence external innovations.

The control variable results for the overall national models are also included. For both nations, the industry difference showed no significant influence on explicit knowledge sharing. The industry difference was substantial for both for tacit knowledge sharing, highly significant in the case of the United States. Those results verify the potential for further insights in looking at the model by industry in both nations. Results are shown in the table and will be discussed shortly.

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TABLE 4 Correlations and root square of AVE-USA.

Construct	Mean value	SD	AVE	CR	Cronbach alpha	ITI	ITO	ITK	TKS	EKS	PI	PSI
(a) Total USA ($n = 1118$)												
ITI	5,72	1,47	0,64	0,84	0,82	**0,801**						
ITO	5,86	1,16	0,60	0,82	0,82	0,626	**0,774**					
ITK	5,76	1,20	0,66	0,85	0,85	0,663	0,774	**0,811**				
TKS	6,17	0,95	0,55	0,79	0,79	0,343	0,528	0,462	**0,743**			
EKS	5,81	1,26	0,62	0,87	0,87	0,53	0,787	0,735	0,564	**0,786**		
PI	5,70	1,21	0,64	0,84	0,84	0,371	0,551	0,515	0,411	0,698	**0,802**	
PSI	5,86	1,15	0,64	0,88	0,88	0,36	0,537	0,497	0,479	0,667	**0,818**	**0,800**
(b) IT industry ($n = 379$)												
ITI	6,24	0,92	0,54	0,78	0,77	**0,735**						
ITO	6,05	1,06	0,59	0,81	0,81	0,611	**0,765**					
ITK	6,06	1,04	0,57	0,80	0,79	0,676	0,764	**0,757**				
TKS	6,18	0,98	0,56	0,79	0,79	0,638	0,601	0,596	**0,745**			
EKS	5,93	1,19	0,62	0,87	0,85	0,445	0,788	0,756	0,609	**0,785**		
PI	5,88	1,13	0,63	0,83	0,83	0,288	0,589	0,579	0,376	0,77	**0,792**	
PSI	5,92	1,13	0,62	0,87	0,87	0,335	0,606	0,597	0,456	0,772	**0,892**	**0,790**
(c) Construction industry ($n = 373$)												
ITI	5,04	1,84	0,72	0,89	0,88	**0,850**						
ITO	5,55	1,34	0,65	0,85	0,85	0,55	**0,809**					
ITK	5,34	1,37	0,71	0,88	0,88	0,64	0,763	**0,842**				
TKS	6,13	0,96	0,54	0,78	0,77	0,18	0,43	0,326	**0,737**			
EKS	5,54	1,42	0,66	0,89	0,86	0,492	0,765	0,689	0,504	**0,812**		
PI	5,51	1,30	0,69	0,87	0,87	0,296	0,473	0,42	0,373	0,613	**0,832**	
PSI	5,71	1,23	0,67	0,89	0,89	0,264	0,443	0,386	0,442	0,567	**0,853**	**0,819**
(d) Healthcare industry ($n = 366$)												
ITI	5,98	1,47	0,55	0,78	0,75	**0,739**						
ITO	5,98	1,32	0,53	0,77	0,80	0,705	**0,726**					
ITK	5,87	1,05	0,60	0,82	0,81	0,546	0,705	**0,772**				
TKS	6,21	0,90	0,58	0,80	0,81	0,569	0,59	0,576	**0,759**			
EKS	5,95	1,11	0,57	0,84	0,85	0,623	0,734	0,741	0,617	**0,754**		
PI	5,76	1,13	0,54	0,78	0,77	0,47	0,547	0,551	0,498	0,732	**0,738**	
PSI	5,91	1,06	0,63	0,87	0,86	0,472	0,54	0,541	0,558	0,696	**0,84**	**0,791**

Note: Root square of AVE-bolded.
Abbreviations: EKS, explicit knowledge sharing; ITI, IT-infrastructure dimension; ITO, IT-operations dimension; ITK, IT-knowledge dimension; TKS, tacit knowledge sharing; PI, organizational innovativeness (internal processes); PSI, organizational innovativeness (external: product or service).

5.1 | Identified mediations

Mediated effects are included in Table 6. As shown, for all three industries in both countries, explicit knowledge sharing has a largely insignificant direct relationship with product/service innovation. But when mediated by the process innovation factor, the strength of the indirect relation is clear for all industries in both countries. For tacit knowledge sharing, the results are also interesting. Some direct relationship exists for most of the industries in both nations, but the mediation shows a more significant direct impact in Poland, with full mediation observed for both IT and healthcare sectors. For the United States, the effect is more mixed, with some direct relationship already for each industry, complemented by process innovation for construction and healthcare but with no mediation for IT.

5.2 | Industries

The industry results are considered in more detail from each country's perspective (H8a, H8b verification). Table 5 includes details of this analysis.

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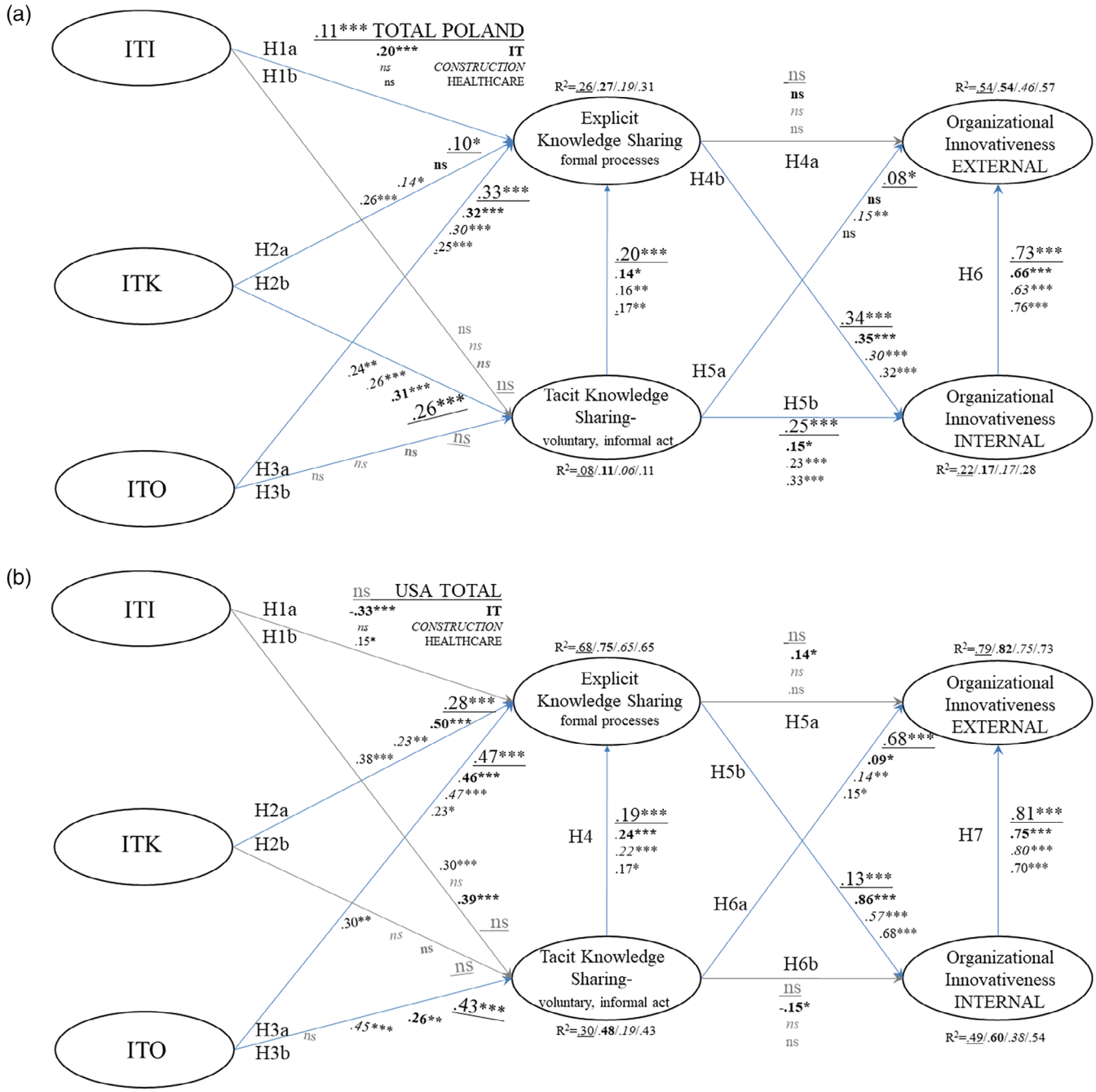

FIGURE 2 Empirical model (a) Poland; (b) the United States. ITI, IT-infrastructure dimension; ITO, IT-operations dimension; ITK, IT-knowledge dimension; ns, not significant effect. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$; models quality details Table 5. [Colour figure can be viewed at wileyonlinelibrary.com]

For the IT industry in Poland, none of the IT competency dimensions are significant for tacit knowledge sharing except the IT-knowledge dimension, but all dimensions do link positively to explicit knowledge. Tacit knowledge sharing does significantly influence explicit knowledge sharing. Both types of knowledge sharings (formal and informal) support internal processes innovations. But when it comes to external product/service innovation, it is supported mostly indirectly. Namely, explicit knowledge supports external innovativeness thanks to its influence on the internal innovativeness of processes. There is a substantial connection between process innovation and product/service innovation.

Continuing industries effects obtained for Poland, the results for construction and healthcare are noticeably different from the discussed IT. All the IT competency dimensions do support explicit knowledge sharing except for IT-infrastructure dimensions. At the same time, no dimension supports tacit knowledge sharing except IT-knowledge. Nevertheless, the observed tacit-to-explicit connection is again solid. Furthermore, for the construction industry, tacit

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TABLE 5 Hypothesis verification details.

Hypothesis	Total Poland/USA with CV	Industry		
		IT Poland/USA	Construction Poland/USA	Healthcare Poland/USA
n	1050/1118	350/379	350/373	350/366
R^2	54%/79%	54%/82%	46%/	57%/73%
Industry- > EKS	ns/ns	–	–	–
Industry- > TKS	0.09*/0.12***	–	–	–
χ2	788 (234)/667,547 (234)	458,360 (215)/488,735 (215)	437,134 (215)/366,96 (215)	369,070 (215)/488,475 (215)
CMIN/df	3.37/2.85	2.13/2.27	2.03/1.71	1.71/2.27
RMSEA	0.051/0.050	0.057/0.058	0.054/0.049	0.049/0.059
CFI	0.966/0.977	0.952/0.942	0.961/0.972	0.972/0.936
TLI	0.960/0.966	0.944/0.932	0.954/0.968	0.967/0.925
Hypothesis 1a	0.11***/ns	0.20***/−0.33***	ns/ns	ns/0.15*
Hypothesis 1b	ns/ns	ns/0.39***	ns/ns	ns/0.30***
Hypothesis 2a	0.10*/0.28***	31***/0.50***	0.14*/0.23**	0.26***/0.38***
Hypothesis 2b	0.28***/ns	ns/ns	0.26***/ns	0.24***/0.30**
Hypothesis 3a	0.33***/0.47***	0.32***/0.46***	0.30***/0.47***	0.25***/0.23*
Hypothesis 3b	ns/43***	ns/.26**	ns/.45***	ns/ns
Hypothesis 4	0.20***/0.19***	0.14*/0.24***	0.16**/0.22***	0.17**/0.17*
Hypothesis 5a	ns/ns	ns/.14*	ns/ns	ns/ns
Hypothesis 5b	0.34***/0.13***	0.35***/0.86***	0.35***/0.57***	0.32***/0.68***
Hypothesis 6a	0.08*/0.68***	ns/0.09*	0.15**/0.14**	ns/0.15*
Hypothesis 6b	0.25***/ns	0.15*/−0.15*	0.23***/ns	0.33***/ns
Hypothesis 7	0.73***/81***	0.66***/0.75***	0.63***/0.80***	0.76***/0.70***

Abbreviation: ns, not significant effect.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

TABLE 6 Mediations verification.

Mediation expected	Industry	Direct relation		Indirect relation		Mediation observed	
		Poland	USA	Poland	USA	Poland	USA
EKS- > PI- > PSI	IT	0.10 (ns)	0.14*	0.23***	0.64***	Full mediation	Full mediation
	Construction	−0.035 (ns)	0.07 (ns)	0.19***	0.45***	Full mediation	Full mediation
	Healthcare	−0.024 (ns)	0.09 (ns)	0.24***	0.48***	Full mediation	Full mediation
TKS- > PI- > PSI	IT	0.10 (ns)	0.09*	0.15**	0.08 (ns)	Full mediation	No mediation
	Construction	0.15**	0.14**	0.17***	0.17***	Complementary mediation	Complementary mediation
	Healthcare	0.10 (ns)	0.15*	0.29**	0.15*	Full mediation	Complementary mediation

Abbreviation: ns, not significant effect.
***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

knowledge sharing is strongly linked to process innovation but not to product/service, and explicit knowledge sharing is significant for both. Moreover, no significant relationship exists between explicit knowledge and product/service innovation observed for healthcare. As with all industries in both countries, the link between process and product/service innovation is positive and strong.

For the US IT industry, all IT competencies are significant for both tacit and explicit knowledge sharing except for IT-knowledge competency, which does not support tacit knowledge sharing. Similar to Poland's observations, tacit knowledge sharing in the United States also does significantly influence explicit knowledge sharing. Besides, tacit (informal knowledge sharing) is strongly related to product/service innovation, but, interestingly, the influence is negative for internal processes innovation. The explicit (formal knowledge sharing processes) is the opposite: it supports internal processes innovation but is not significant for external innovation development. The internal processes innovation influence on product/service innovation is again very strongly linked.

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The construction industry in the United States has clearly different results. IT-infrastructure competency for the United States construction industry supports neither type of knowledge sharing, the IT-knowledge dimension shows a relationship with explicit but not with tacit knowledge sharing, and finally, the IT-operations dimension impacts both tacit and explicit knowledge sharing. The tacit-to-explicit influence is, as earlier observed, significant. Nevertheless, tacit knowledge sharing is not observed as a significant influencer for process innovation (explicit is), but both are vital supporters of product/service innovation. Finally, the process-to-product/service innovation relation is again observed for the United States sample as significant.

The healthcare industry shows more of a relationship with IT than with the construction industry in the United States. All are significant for both types of knowledge sharing except for the IT-operations dimension that does not support tacit knowledge sharing. Tacit knowledge sharing does significantly influence explicit knowledge sharing. Moreover, the knowledge sharing to innovation relationship is the same as what is observed in the construction industry. Process innovations support to product/service remains substantial.

In short, the key relationships of tacit to explicit knowledge sharing and internal processes innovations to external product/service innovation are vital and consistent across all industries. There are pronounced differences in which IT competency is associated with which types of knowledge sharing. There are also pronounced differences in which type of knowledge sharing processes (formal or informal) particular competency is connected. The discussion will put more clarification on these results.

6 | DISCUSSION

A natural way to structure the discussion is according to the facets of the model, with added detail concerning the context aspects. The results of the structured equation model are presented in Tables 5 and 6, visualized in Figure 2a,b, and elaborated above. Still, they could perform much better with a more in-depth explanation, enabling the further formulation of practical implications.

6.1 | IT competency supports stronger explicit than tacit knowledge sharing

The initial aspect of the model is that all three IT competency dimensions: IT-infrastructure, IT-knowledge, and IT-operations—can be important inputs into effectively managing knowledge within the organization. Each can be related to whether tacit or explicit knowledge is applied to good purpose. As noted, the hardware/software infrastructure can be an effective tool but must be recognized as friendly by users and then should also operate efficiently.

The Polish results show that the whole IT competency contributes to explicit knowledge, while none except IT knowledge is connected with tacit knowledge. Based on that, one can conclude that knowledge systems employ IT primarily for explicit KM and sharing. IT knowledge systems are less commonly applied for tacit KM and sharing. Moreover, more specifically, in the IT industry, no connections at all exist between IT competencies and tacit knowledge, reinforcing that conclusion for the most knowledge-intensive sector. Construction and healthcare mirror the overall Poland results, but the lack of the IT-infrastructure dimension as a support for explicit knowledge sharing is visible. It might be that those industries lack specialized infrastructure. Note that these results do not mean knowledge is not shared or that KM systems are absent. Instead, these results showed that knowledge is managed with dedicated IT systems to lesser than expected degrees.

Discussing the overall US results, the IT competency is all present for explicit knowledge sharing except for its infrastructure dimension. For tacit knowledge sharing, the only significant dimension is IT-operations. Differences are apparent between the industries. All dimensions are significant for the IT industry except for the IT-knowledge impact on tacit sharing. The construction industry has the same pattern as the overall US results, while healthcare exposes a strong impact of all IT competency dimensions except for IT operations' impact on tacit knowledge sharing. Compared with Poland, more of the full IT competencies are in place, especially for explicit knowledge sharing. Indeed, given the strength of the higher-level IT competency for explicit sharing, it may be that the IT-infrastructure dimension is simply not recognized or is an afterthought. Perhaps, they are taken as a given. Alternatively, IT support for tacit knowledge development has a more prominent role in the United States than in Poland, even if it is still not fully employed.

That view is borne out by the control variables, testing for industry differences in tacit and explicit knowledge sharing. For both countries, explicit knowledge sharing level depends on industry differences. Tacit knowledge sharing, when it comes to IT-competency, seems not to be industry-specific. Namely, explicit knowledge sharing is more universally supported with IT competency, while tacit knowledge sharing via technology is generally very problematic. This conclusion aligns well with the other results.

6.2 | Tacit knowledge sharing supports explicit knowledge sharing

As noted earlier, knowledge can be shared without being changed from tacit to explicit. Tacit knowledge can be shared usefully as tacit knowledge. Explicit can be shared usefully as explicit knowledge. The motivation to capture tacit knowledge and turn it into explicit is in impact. Person-to-person tacit exchanges, though effective, do not scale well. Explicit knowledge can more easily be shared far and wide (particularly when IT systems are employed). As a result, the potential impact of explicit knowledge can be considerably more important to the firm.

In this study, the results are consistent across both nations and all industries.

6.3 | Tacit knowledge sharing supports innovations creation in Poland

The overall Polish results are interesting and somewhat surprising. Tacit knowledge sharing is associated with internal processes and external product/service innovations, while explicit knowledge sharing

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supports only processes leading to internal innovations. The industry results show only a little variance. The construction industry mirrors the overall results, while IT and healthcare have the same explicit/innovation and tacit/process innovation results, but the lack of the direct tacit knowledge sharing connection to product/service innovation is noted. It suggests that the indirect (mediated) effect should be more-in depth explored and elaborated to find a deep understanding of this relation. Indeed, the presented in Table 6 mediated effects confirm that the innovation of internal processes fully mediates the relationship of external innovation and formal and informal knowledge sharing. It is observed for all industries except the construction industry, where the mediated effect is partial when it comes to tacit knowledge sharing (informal).

6.4 | Process innovation highly supports product/service innovation in the United States

For the United States, this particular mediated effect described above, is similar for explicit knowledge and slightly different for tacit. Namely, for the informal knowledge sharing, there is no mediation for IT and for healthcare and construction industries—the focal mediation is partial. Therefore, the entire US pattern based on the direct relations is slightly different than presented for Poland, with explicit sharing associated only with process innovation while tacit sharing is associated only with product/service innovation. That pattern is the same for construction and healthcare. The IT industry differs in that each type of knowledge sharing is connected to both types of innovation (though negatively in the case of tacit and process innovation).

The relationship between the two types of innovation is quite strong, with the highest level of significance across both countries and all industries. Process innovation highly supports product/service innovation. The previous literature suggests this is likely to be in the direction of a process leading to product/service innovation—small steps internally leading to something more substantial and external (Kucharska, 2021a,b).

The presented mediation analysis supports that conclusion. But, again, that shows explicit knowledge sharing does impact product/service innovation when fully mediated by process innovation.

7 | PRACTICAL IMPLICATIONS

One key conclusion from the study is that innovation is complex, a conclusion easy to predict from the literature but emphatically confirmed here. A second is that knowledge sharing is also complex, again with readily available support from the literature, and so again, not surprising. However, the complexity is ramped up when adding in additional context variables such as industry type and nationality. So, what story comes out of all this complexity?

The national environments potentially impact the stages presented in this model. Studies of countries and Innovation have a substantial history with evidence of considerable differences in innovation inputs and outputs. The circumstances affecting innovation by IT, as included in streams of research such as national innovation systems or the Triple/Quadruple Helix (Carayannis & Campbell, 2009; Etzkowitz & Leydesdorff, 2000), are made up of structural factors such as government, education, and industry as well as softer aspects such as national culture. Similarly, as noted in the literature review, considerable study has also gone into national differences in knowledge assets and management systems.

Here, the United States possesses one of the world's most developed innovations and KM systems, mature governance systems, highly developed education opportunities, and competitive, entrepreneurial business culture. Since opening to Europe three decades ago, Poland has moved rapidly toward becoming a market economy since joining the European Union (EU). EU initiatives related to innovation and learning economies have helped to drive this movement, as have Poland's own capabilities with a solid educational system and public financing to support innovation.

Poland does have strong innovation outcomes, but studies have shown a preponderance of patents attributable to external multinational enterprises (MNE's) with Polish subsidiaries (Lengyel et al., 2015). If these are product/service innovations, Polish employees may not see the connection between their knowledge exchanges and those innovation outcomes. Similarly, another recent study looked at innovation inputs and outputs, noting similar inputs between Poland and the United States but a lower level of outputs, attributed to less creativity and available capital (Jankowska et al., 2017) and perhaps a more risk-averse culture.

Add all of that up, and a different approach to information systems and KM makes some sense. The Polish results may reflect a system more inclined to distribute knowledge than capture it. Incremental, local process improvements may be recorded, but product/service innovation is more likely to happen externally and then be shared through the organization, perhaps another reason not to see differences between the two types of innovation. KM is done but may be less likely to be supported by integrated IT systems and may not result in the more radical innovations seen elsewhere.

Known industry differences have already been reviewed, with IT and healthcare identified as very knowledge-intensive sectors and construction as also knowledge-driven but less so. The explanation for some of these differences has to do with the nature of each industry, the type of knowledge important to success, and the place where it might be located in the organization—operations, production, R&D, marketing, etc. (Erickson & Rothberg, 2017). IT is an industry dependent on operational execution, incremental improvements in processes, and a culture of sharing best practices. It makes sense that it would fit the suggested model best, including using IT competencies, essentially an example of it eating its own cooking.

Construction has aspects of this same operational execution as it also has minimal room for mistakes or not following regulated best practices. However, innovation is less prominent, and while individuals may have considerable knowledge, chiefly tacit, about how to perform their own jobs best, that is not necessarily widely shared. Construction is more of a project-oriented industry; the trust and constant

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organizational learning culture needed for knowledge development and sharing are not as present as expected. And IT competency, in such a business context, may not be present, at least for knowledge-sharing purposes.

Healthcare is an odd beast. Most of the respondents in this study were from medical care more than tangential sectors such as insurance, retail pharmacies, or pharmaceutical manufacturing. Healthcare has been targeted for better collection and use of data, and the industry is getting better at such processes (and knowledge sharing) but still has issues with physicians and others finding the time to fully capture their activities, experiences, and learnings in knowledge systems. IT is often available, but a gap remains in terms of use. Again, much like construction, that leads to less informal knowledge sharing, and less innovation as a consequence. IT systems are more prevalent than construction but less than IT, but they are also not necessarily used to their full potential, providing some of the outcomes seen in this study's results.

8 | LIMITATIONS

The main limitation of this study is that it provided a comparison between two totally different countries (including one of the most innovative globally) and one industry (also the most innovative globally). Further Asian and European countries' studies, including other post-soviet countries, can bring an interesting perspective to this subject. National cultural context matters for organizational studies. This fact can determine that the same phenomenon can be perceived differently considering national cultures lens. Still, the obtained $R^2 = 54\%$ (Poland) suggests that some other variables are not included in this study but might be significant for a better understanding of the explored issues in Poland. For the United States, $R^2 = 79\%$. So, the applied structure seems to be quite accurate. This fact justifies further cross-country studies. Different factors might be focal to explain the phenomenon in national cultures. So, knowing them enables us to broaden the existing body of knowledge.

9 | CONCLUSIONS

The study results demonstrate that IT competency dimensions do contribute to the knowledge sharing that next foster organizational innovativeness. When tacit knowledge is developed, turning it into explicit knowledge is something that appears to support external innovation through both tacit and explicit knowledge contributions to internal processes and working methods improvements.

This article has advanced some reasons why we see these patterns and the differences between the United States and Poland, as well as those between industries. Future research could delve more deeply into these factors, providing more detailed explanations for what we see in specific industries in different nations but including both as a basis for comparison.

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DATA AVAILABILITY STATEMENT

Data available if requested.

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APPENDIX A

TABLE A1 Measurement scales and their sources.

Construct	Items (Authors' compilation based on sources noted)
Tacit knowledge sharing (Kucharska & Erickson, 2023)	• I share knowledge learned from my own experience. • I have the opportunity at work to learn from others' experiences. • Colleagues share new ideas with me. • Colleagues include me in discussions about best practices.
Explicit knowledge sharing (Kucharska, 2021b)	My organization has installed effective procedures to: • Identify internal and external sources of useful, data, information, and knowledge. • Gather valued data, information, and knowledge. • Store data, information, and knowledge. • Share data, information, and knowledge.
Product/service innovations (Kucharska & Erickson, 2023)	• 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.
Process innovations (Kucharska & Erickson, 2023)	• 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.
IT-knowledge (Perez-Lopez & Alegre, 2012)	• Overall, our staff is knowledgeable when it comes to computer-based systems. • Our firm possesses a high degree of computer-based technical expertise. • We are very knowledgeable about new computer-based innovations.
IT-infrastructure (Perez-Lopez & Alegre, 2012)	• Our company has a formal MIS department. • Our company employs managers responsible for IT infrastructure. • Our firm creates customized software when necessary to manage information.
IT-operations (Perez-Lopez & Alegre, 2012)	• We routinely use computer-based systems to access information from outside databases. • We use computer-based systems to analyze information. • We use decision-support systems frequently when managing information.

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