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Tacit knowledge awareness and sharing as a focal part of knowledge production in Polish and US information technology, health care, and construction industries

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**GDAŃSK UNIVERSITY OF TECHNOLOGY**  
FACULTY OF MANAGEMENT AND ECONOMICS

# **TACIT KNOWLEDGE AWARENESS AND SHARING AS A FOCAL PART OF KNOWLEDGE PRODUCTION IN POLISH AND US INFORMATION TECHNOLOGY, HEALTH CARE, AND CONSTRUCTION INDUSTRIES**

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# TACIT KNOWLEDGE AWARENESS AND SHARING AS A FOCAL PART OF KNOWLEDGE PRODUCTION IN POLISH AND US INFORMATION TECHNOLOGY, HEALTH CARE, AND CONSTRUCTION INDUSTRIES

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**Abstract.** In the knowledge economy era, knowledge production and dissemination are of key interest to individuals, organizations, and economies. Tacit knowledge results from experience, leading to innovation. The learning culture can facilitate the transformation of errors into experiences. This study explores whether mistake acceptance facilitates tacit knowledge awareness and sharing in the information technology, healthcare, and construction industries in Poland and the United States. The findings show the influence of mistake acceptance on knowledge production and the differences between countries and industries. The US showed a higher level of mistake acceptance, which was similar across the three industries, than did Poland, which showed differences between sectors. In general, the higher the acceptance of mistakes, the greater the effect of tacit knowledge awareness on sharing. This study shows that there is no knowledge production without learning and no learning without mistake acceptance.

**Keywords:** Knowledge production · Tacit knowledge awareness · Tacit knowledge sharing · Learning culture · Mistake acceptance · Error management

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## 1 Introduction

In the knowledge economy era [1], the production, capture, and dissemination of knowledge is of key interest to individuals, organizations, and economies. How is knowledge produced? According to the SECI (socialization–externalization–combination–internalization) model [2], tacit knowledge is converted to explicit knowledge through socialization and externalization, while explicit knowledge contributes to tacit knowledge through combination and internalization. Thus, given that tacit knowledge is characterized as novel, personal, produced and stored in human mind, and it is the root of one’s entire knowledge [3], the human factor is key in knowledge production. Therefore, any new knowledge is based on tacit knowledge. Unlike the production of tangible assets, the production of knowledge, especially tacit knowledge, is usually not formalized. While explicit knowledge results from structured and sequential analysis, the production of tacit knowledge is unstructured and nonsequential. New ideas are generated in the human mind when it is ready. Therefore, typical error management based on mean values and deviations is not suitable. Since tacit knowledge production is not formalized, then management of mistakes during this production also can’t be formalized. Therefore, managing of it can only rely on company culture that supports critical and creative thinking. The culture of learning, collaboration, and safety is the best what organizations can do to support somehow tacit knowledge production.

The capture and sharing of tacit knowledge are crucial challenges in knowledge management [4]. Mueller [5], [6] notes that while both knowledge and learning cultures are vital, the latter is essential for continuous development. According to Kucharska and Bedford [7], a continuous learning culture includes factors such as a learning climate and mistake acceptance. Zappa and Robins [8] argue that the essence of organizational learning is to identify and modify errors. Therefore, this study explores how tacit knowledge awareness affects tacit knowledge sharing, facilitated by the learning cultural factor of mistake acceptance. Therefore, the research question is: *Does the acceptance of mistakes facilitate tacit knowledge awareness and sharing?* Studies by Farnese et al. [9], [10] have stressed the importance of cultural orientation in learning from mistakes. Vanderheiden and Mayer [11] highlighted the cultural factor of mistake perception. Given that we cannot learn from mistakes if we do not accept them as part of the learning process, mistake acceptance should be included in the organizational culture of learning [7]. Therefore, this study aims to explore cultural perceptions of mistake acceptance in the production of knowledge in the information technology (IT), healthcare, and construction industries in Poland and the United States (US).

## 2 Theoretical Framework

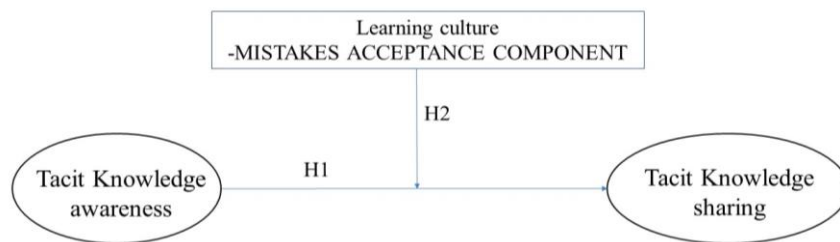
The theoretical framework for this study is based on Olaisen and Revang’s [12] study of tacit knowledge. Tacit knowledge is gained from personal experience, repeated on-the-job activities, and those who are willing to share their knowledge. Asher and Popper’s [13] “onion” model posits different layers of tacit knowledge and describes knowledge as a matter of degree along a single axis, being more explicit at one end and more tacit at the other, with elements of both comprising the middle. Knowledge

ranges from being explicit and explainable at one end to being virtually impossible to explain and only demonstrable (perhaps verging on insight/intelligence) at the furthest reaches of the tacit end. Kucharska and Erickson [14] show that the awareness of tacit knowledge affects the sharing of such knowledge. Moreover, recent studies by Farnese et al. [9], [10] have demonstrated the importance of cultural orientation in learning from errors. Kucharska and Bedford [7] have proposed a scale that measures the mistake acceptance factor in the learning culture. Love and Smith [15], [16] and Love et al. [17], [18] assume that the learning culture can transform error events into experiences, leading to tacit knowledge [12]. Therefore, based on all of the above, the following hypotheses are proposed:

*H1: Tacit knowledge awareness fosters sharing.*

*H2: Mistake acceptance as a learning culture factor enhances the relationship between tacit knowledge awareness and sharing.*

Figure 1 presents the conceptual framework of the current research.



**Fig. 1.** Theoretical framework

### 3 Method

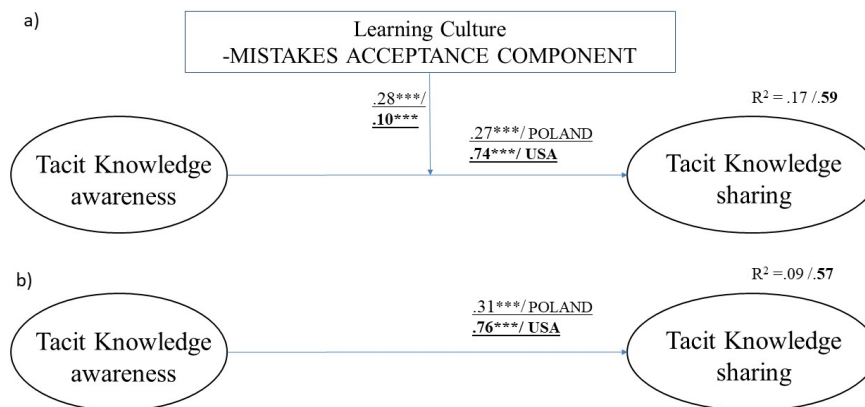
To verify the hypotheses and answer the research question, the collected data were analyzed using structural equation modeling and visualized using the PROCESS macro in SPSS version 3.4 [19]. Data were collected from January to February 2020 using Qualtrics (US) and ASM (Poland). Knowledge workers, employees whose main input and output of work is knowledge; in other words: they produce new knowledge using existing knowledge; the mind is their key tool, and knowledge is their key resource when working, were targeted. Specifically, knowledge workers from the IT, healthcare, and construction industries in both countries were invited to participate in the survey. Final sample sizes exceeded 1,000 cases for each country. The questionnaire began with a short introduction providing an overview of the study, including a definition of tacit knowledge to ensure respondents understood what they were being asked. All constructs were measured on a 7-point Likert scale based on the items presented in the appendix. Assessment of sample quality began with invariance, followed by the Kaiser–Meyer–Olkin test of sampling adequacy (Poland = .789, US = .871) [20], [21] and Harman’s one-factor test [22]. Both achieved an acceptable result, with 31% and 38% for Poland and the US, respectively, and a common method bias of 19%

and 30% for Poland and the US, respectively. Total variance extracted exceeded 68% for both samples, confirming that sample quality was good and enabling further analysis.

Based on recommendations for large groups [23], [24], the measurement tool was verified to be nationally invariant:  $\Delta$  comparative fit index (CFI) = 0.02;  $\Delta$  Tucker–Lewis index (TLI) = 0.03;  $\Delta$  root-mean-square error of approximation (RMSEA) = 0.01. The validity and reliability of applied measurement scales and quality of the model were confirmed: CMIN/df = 3.7 and 4.61, CFI = .971 and .971, TLI = .948 and .959, and RMSEA = 0.51 and 0.57 for Poland and the US, respectively [25].

## 4 Results

Tacit knowledge awareness was strongly related to tacit knowledge sharing in the US ( $\beta = .74, p < .001$ ) and weakly related to tacit knowledge sharing in Poland ( $\beta = .27, p < .001$ ). However, in Poland, this relationship was more strongly moderated by mistake acceptance ( $\beta = .27, p = .001$ ) compared with the US ( $\beta = .10, p < .001$ ). This was because the acceptance of mistakes as part of the learning culture is lower in Poland than in the US. The mean value of this variable for Poland was 5.14 ( $SD = 1.4$ ) compared with 5.66 ( $SD = 1.34$ ) for the US. Mean tacit knowledge awareness was 5.83 ( $SD = 1$ ) for Poland and 5.93 ( $SD = 1.06$ ) for the US, while mean tacit knowledge sharing was 5.90 ( $SD = 1.09$ ) for Poland and 6.18 ( $SD = 0.94$ ) for the US. Figure 2 presents the general results, while Figure 3 details how mistake acceptance influenced this relationship for each industry studied.



**Fig. 2.** Results for Poland and United States: a) CMIN/df = 3.7/4.610; CFI = .971/.971; TLI = .948/.959; RMSEA = 0.51/0.57; b) CMIN/df = 4.45/5.07; CFI = .971/.971; TLI = .944/.962; RMSEA = 0.57/0.60

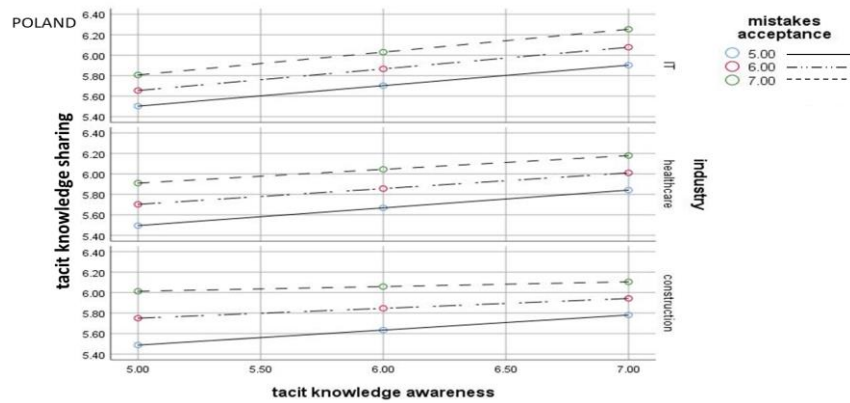
Note: Poland ( $n = 1,050$ ); United States ( $n = 1,118$ ), ML-standardized results. CMIN/df; CFI: comparative fit index; TLI: Tucker–Lewis index; RMSEA: root-mean-square error of approximation. \*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$ .

**Table 1.** Basic statistics, correlations, and root square of average value explained.

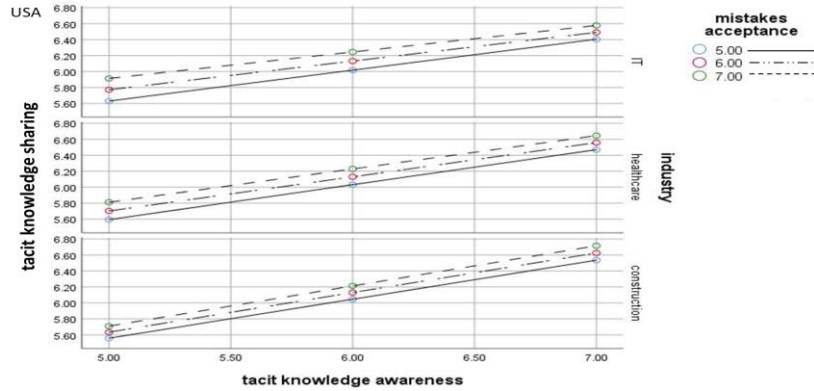
Variable	Mean	SD	Cronbach's $\alpha$	CR	AVE	MA	TKA	TKS
MA	5.14/5.66	1.4/1.34	.86/.84	.87/.82	.66/.53	<b>.825/.729</b>		
TKA	5.83/5.93	1.0/1.06	.70/.76	.74/.77	.50/.53	.143/.327	<b>.708/.728</b>	
TKS	5.90/6.18	1.1/0.94	.71/.81	.74/.80	.55/.56	.319/.324	.310/.723	<b>.742/.743</b>

Note: MA: mistake acceptance; TKA: tacit knowledge awareness; TKS: tacit knowledge sharing.

The results confirm the influence of mistake acceptance in knowledge awareness and sharing in Poland and the US. All hypotheses were supported. The model using “mistake acceptance” (see Figure 2a) as a control variable fit the data better compared with the model without the control variable (Figure 2b), justifying the control variable imputation [26]. Moreover, R-squared obtained for the US (59%) was much higher than that obtained for Poland (17%). The difference in R-squared between the models with and without the mistake acceptance factor was larger for Poland (9%/17%) than for the US (57%/59%). This means that mistake acceptance in the learning culture in Poland is more problematic (imputation of this factor makes a difference) than in the US. Therefore, the acceptance of mistakes contributes more significantly to tacit knowledge awareness and sharing in Poland than in the US.



a)



b)

**Fig. 3.** Results for each industry: a) Poland; b) United States

Note: Level of confidence for all confidence intervals in output: 95.0000.

## 5 Discussion

The findings confirm that the acceptance of mistakes in a learning culture is vital in the relationship between tacit knowledge awareness and sharing. So, it matters for the learning organizations [27]. This study has been empirically shown that there is no learning without mistakes [28]; thus, by accepting mistakes, we can learn faster, which was confirmed by the presented results. Moreover, tacit knowledge is a source of innovation [29], [30], [31]; therefore, individuals in industries that shift their learning cultures and include mistake acceptance in their policies will learn faster and develop and share tacit knowledge more effectively, thus will be more innovative. The findings show that mistake acceptance enhances tacit knowledge awareness and sharing in the IT, healthcare, and construction industries in Poland and the US. In the US, where the general level of mistake acceptance is higher, this transformation is smooth for all industries. In contrast, in Poland, there are differences in the level of mistake acceptance between industries. Specifically, the highest level of tacit knowledge sharing via tacit knowledge awareness was observed in the construction industry, but only for the lowest level of mistake acceptance. When mistake acceptance was high, tacit knowledge sharing was similar for each awareness stage (as measured on a 7-point Likert scale). Thus, mistakes are perceived in mostly negative way in Poland's construction industry, and employees were likely to collaborate on how to avoid them but not how to learn from them. So, they are more focused on error prevention than on learning from their occurrence at the organizational level. For the healthcare and IT industries, the higher the level of tacit knowledge awareness, the higher the sharing of knowledge, a process that was supported by the acceptance of mistakes. The acceptance of mistakes was slightly higher in the IT industry than in healthcare, while tacit knowledge awareness and sharing was generally greater in healthcare than in IT. In conclusion, mistake acceptance influences tacit knowledge production and, as a



potential source of learning for novelty, competitive advantage, and the overall innovativeness, is a source of worthy of more in-depth investigation across nations and industries.

## 6 Limitations and Conclusions

The findings of this study show that the higher the level of mistake acceptance, the stronger the effect of tacit knowledge awareness on knowledge sharing. This effect was similar for all industries in the US but differed between industries in Poland. The US economy is undoubtedly more innovative than that of Poland; thus, accepting and learning from mistakes may support innovation because of the authenticity of learning. Learning cultures that ignore mistakes waste the opportunity to learn through mistakes and it is critically important. As Kucharska and Bedford [7] note, if an organization's learning culture is inauthentic and ignores mistakes, employees may learn from their mistakes to avoid problems but will learn poorly or not at all. Moreover, in the Polish model, the relationship between tacit knowledge awareness and sharing moderated by the mistake acceptance factor obtained R-sq was 17% compared with 59% for the US. This shows the existence of cultural differences in the perception of mistake acceptance. Namely, other factors in Poland may contribute to the unexplained 83% factors influencing tacit knowledge production (compared with only 41% unexplained factors for the US). Thus, further studies are encouraged. The study's main limitation was that it involved a comparison of only two nations and three sectors. The presented findings empirically show that accepting and learning from mistakes is complex and depends on national culture. Thus, more in-depth investigations into the phenomenon are warranted. This study has shown that there is no knowledge production without learning and no learning without mistake acceptance.

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## Appendix: Measurement of Constructs

Construct	Source	Items (authors' compilation based on source)
Tacit knowledge awareness	Kucharska and 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 sure about a new idea but find it difficult to express. As I have accumulated experience, I find it is easier to express.
Tacit knowledge sharing	Kucharska and 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.
Learning Culture -mistake acceptance factor	Kucharska and Bedford (2020)	People know that mistakes are learning consequences and tolerate it up to a certain limit. Most people freely declare mistakes. We discuss problems openly without blaming. Mistakes are tolerated and treated as learning opportunities.

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