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*Scientific Articles*

## **Influence of Intellectual Capital and Information Technologies on the business performance of SMEs in the downtown of Tamaulipas**

***Influencia del Capital Intelectual y Tecnologías de la Información en el Rendimiento de Pymes zona centro de Tamaulipas***

***Influência do Capital Intelectual e das Tecnologias da Informação no Desempenho das PMEs da região central de Tamaulipas***

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### **Abstract**

The objective of this study was to empirically demonstrate the influence of perceived control of information technology on its usage capacity, along with the impact of intellectual capital on business performance, aiming to address the issue of high business mortality. To achieve this, 108 questionnaires were administered to accountants, owners, and managers of SMEs in the central zone of Tamaulipas, Mexico. Data analysis was conducted using the partial least squares structural equations technique (PLS-SEM). The findings of this study confirmed that intellectual capital has a positive effect on business performance, with human capital making the most significant contribution through the skills and experience of employees. Additionally, the study identified a



high perceived ability of employees to use technologies, particularly in terms of internet and information systems. However, it was observed that this self-efficacy is not fully utilized due to the low implementation of IT in the analyzed SMEs.

**Keywords:** Performance, intellectual capital, use of information technologies.

## Resumen

El objetivo de esta investigación fue el de evidenciar empíricamente cómo el control percibido en tecnologías de la información influye en su capacidad de uso y esto en conjunto con el capital intelectual en el rendimiento empresarial, para enfrentar la problemática de alta mortandad empresarial. Para ello se aplicaron 108 cuestionarios a contadores, propietarios y gerentes de Pymes de la zona centro de Tamaulipas México. Se utilizó la técnica de ecuaciones estructurales por el método de mínimos cuadrados parciales (PLS-SEM) para el análisis de datos. Los hallazgos confirman que el capital intelectual afecta positivamente al rendimiento empresarial, siendo el capital humano el factor con mayor aporte a través de las habilidades y experiencia de los empleados; también se detectó una alta capacidad percibida de los empleados sobre el uso de tecnologías, principalmente en el uso de internet y sistemas de información, sin embargo, esta autoeficacia no se aprovecha al máximo debido a la baja implementación de uso de TI en las Pymes analizadas.

**Palabras clave:** Rendimiento, capital intelectual, uso de las tecnologías de la información.

## Resumo

O objetivo desta pesquisa foi demonstrar empiricamente como o controle percebido nas tecnologias de informação influencia a sua capacidade de utilização e isso em conjunto com o capital intelectual no desempenho empresarial, para enfrentar o problema da alta mortalidade empresarial. Para isso, foram aplicados 108 questionários a contadores, proprietários e gestores de PMEs da região central de Tamaulipas México. Para análise dos dados foi utilizada a técnica de equações estruturais pelo método dos mínimos quadrados parciais (PLS-SEM). Os resultados confirmam que o capital intelectual afeta positivamente o desempenho empresarial, sendo o capital humano o fator com maior contribuição através das competências e experiência dos colaboradores; Também foi detectada uma elevada capacidade percebida dos colaboradores no uso de tecnologias, principalmente no uso da Internet e de sistemas de informação; porém, essa autoeficácia não é aproveitada ao máximo devido à baixa implementação do uso de TI nas PMEs analisadas.

**Palavras-chave:** Desempenho, capital intelectual, uso de tecnologías de informação.

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## Introduction

The presence of small and medium-sized enterprises (SMEs) worldwide continues to increase significantly, employing almost 50% of the working population and producing 33 to 60% of national products and services (Chowdhury et al., 2021; Prasanna et al., 2019). These types of enterprises are recognized as key elements of sustainable economic development in both developed and emerging countries, i.e., a solution to various growth issues such as: poverty, inequality, and unemployment among some others. Additionally, they are considered an instrument to achieve it in a more balanced and stable way, particularly in developing economies (Chege & Wang., 2020). Which is why, performance maximization (financial and non-financial) has been a subject of discussion in the business literature, however, researchers do not have an answer to this (Khan et al., 2019).

In the Mexican context, approximately 75% of new SMEs suspend their operations before reaching two years in the market. This is caused, among other things, by internal weaknesses such as deficiencies in the organizational structure, lack of managerial capabilities, and challenges posed by new technological trends, etc. (Salinas-Reyes et al., 2018). This internal structural weakness puts numerous SMEs in Mexico at a disadvantage, as they are unable to compete on a global scale where human skills and modern technology are vital for achieving business success (Khan et al., 2019). Therefore, the survival, sustainability, or growth of small businesses depend first on overcoming internal issues before facing external challenges and achieving their organizational goals (Sánchez et al., 2022). This is relevant since in the state of Tamaulipas, the SMEs (11 to 250 employees) account for 5.9% of its business establishments, yet they employ 29.3% of the workforce (INEGI, 2019a), this highlights their significance for the entity's economy.

Lastly, it is important to emphasize that competition in technology usage enhances job satisfaction and facilitates knowledge transfer. Thus, this competence can be considered a key element for the sustainability of SMEs (Kucharska & Bedford, 2019; Guana et al., 2021). Some research demonstrates that the perceived behavioral control of IT is a critical factor in technology usage. Studies conducted by Troise et al. (2021), Gómez-Ramírez et al. (2019), and Huang & Ge (2019) have shown significant impacts of self-efficacy on IT usage. However, it's worth noting that most of these studies were conducted in European and Asian countries.

Therefore, the objective of this study is to analyze how the perceived control of information technologies influences their usability and this, jointly with intellectual capital in business performance, it is considered that the data analyzed will help managers and owners of SMEs to sustain or increase their performance and thus avoid having to close their operations prematurely to the detriment of the parties that depend directly and indirectly on them. To achieve this, the paper includes a theoretical section and a hypothesis defense section. Subsequently, the method applied is described, while the results show the analysis of the data collected. Finally, the conclusions obtained are presented and the limitations of the study are explained, as well as the proposed future lines of research.

### **Theoretical basis and formulation of the proposed research model**

The business environment of the 21st century has been mainly characterized by uncertainty, growing competition, and rapid technological change. Therefore, staying in the market represents the main challenge that SMEs face (Al-Jinini et al., 2019). Based on this, the present research is grounded in two theories: first, the dynamic capabilities theory by Teece et al. (1997), and second, the Theory of Planned Behavior (TPB), which is an extension of the Theory of Reasoned Action (TRA) proposed by Fishbein & Ajzen (1975). Firstly, the dynamic capabilities theory postulates that effectiveness lies in an organization's ability to reconfigure itself to maximize the efficiency of VRIN resources (valuable, rare, inimitable, and non-substitutable). Understanding how these resources evolve within an organization allows converting competitive advantages into sustainable advantages over time (Nieves & Haller, 2014). Therefore, this theory is ideal for analyzing the variables of intellectual capital and information technology usage, as they provide solid support for maintaining high performance in dynamic environments (Barney, 1991).

Secondly, the Theory of Planned Behavior (TPB) is used to predict planned and deliberate behavior. According to this theory, when people have time to plan their behavior, the main predictor of that behavior is the intention, which is subject to three factors: attitude, subjective norms, and perceived behavioral control. Thus, the TPB postulates a direct relationship between perceived behavioral control and behavior or behavioral performance. An individual who believes they have a high level of perceived behavioral control regarding a specific behavior is more likely to perform it and overcome any obstacles that may arise, compared to someone with a low level of perceived behavioral control (Arifin et al., 2022). Therefore, the TPB enables the prediction of an individual's behavior, which aligns with the study, where perceived behavioral control is suitable

for measuring employees' perceived capacity or self-efficacy regarding the use of information technologies in SMEs.

Perceived behavioral control refers to an individual's belief in possessing the necessary opportunities and resources or facing the difficulty to perform a behavior (Ajzen, 1985; Ajzen, 2020). This perception is based on past experiences, personal preferences, or information from close contacts. Having control over performing a function or behavior is a significant element in forming intentions, and without actual power, people cannot execute a specific behavior (Pramono et al., 2021), as is the case with using information technologies (Hajli et al., 2015). Several empirical studies (e.g., Tárraga et al., 2017) have demonstrated the impact of perceived behavioral control on the use of information technologies (Hsieh et al., 2015).

Some recent contributions include the work of Troise et al. (2021), who, in evaluating the use of online platforms, found that subjective norms and perceived behavioral control are the strongest predictors in determining actual behavior. Other researchers who also used TPB theory to evaluate technologies are; Gómez-Ramírez et al. (2019), who assert that increasing the degree of favorability of observable variables will increase the use of technologies, while Scuotto et al. (2020), claim that behavioral control and beliefs are determinants of technology use and Bayraktaroglu et al. (2019), who found that perceived behavioral control has the strongest impact in predicting IT use behavior; in contrast, Yeap et al. (2016), in their findings state that subjective norms have a greater effect, followed by perceived behavioral control, so they suggest putting more emphasis on capitalizing on the aspects of subjective norms and improving perceived control.

Based on the literature review conducted, it was found that perceived behavioral control regarding the use of information technologies lacks conclusive information, especially concerning SMEs, as these types of organizations often lack sufficient resources. However, it is noted that the degree of IT usage in SMEs is increasing (Bermeo-Giraldo et al., 2020). Therefore, further research is suggested to investigate the influence of perceived behavioral control to determine if it proves to be a relevant variable in the use of IT in SMEs. This is important because the technological capabilities (skills and experience) of employees can add value to the organization, as some authors argue that the ability to effectively apply technologies can represent a source of competitive advantage (Chae et al., 2014, Alemán et al., 2020). The following hypothesis is proposed considering the above:

***H1. Perceived behavioral control in IT significantly influences the usage of information technologies.***



On the other hand, intellectual capital (IC) is considered an essential intangible resource that companies must effectively develop to generate corporate strategies, especially because it is seen as a crucial element for business performance (Bontis et al., 2018). IC encompasses all the knowledge within the organization, residing in the skills and experience of employees, organizational processes and routines, and relationships with stakeholders (Bontis et al., 2018). It is utilized to create value and competitive advantage. This research considers intellectual capital in its tripartite dimension: human, structural, and relational capital, as it is the most widely accepted dimension among researchers interested in the subject (Ibarra et al., 2020).

Furthermore, previous studies have demonstrated that the effectiveness of intellectual capital significantly contributes to business performance (Smriti & Das, 2018; Alves et al., 2021; Bayraktaroglu et al., 2019; Xu & Li., 2019; Liu et al., 2021). In this regard, Torre et al. (2021), Boon et al. (2018), and Barpanda & Bontis (2021) consider that companies with above-average human capital that invest in skills lead to more efficient processes, resulting in a strong structural capital and fostering increased relational capital. This, in turn, is achieved through good and close external relationships, facilitating knowledge transfer, communication, the ability to handle delicate situations, and promoting cooperation to achieve business goals and objectives.

The findings reveal that in recent years there has been a greater emphasis on investing in human capital, attributing it greater relevance because it is considered a driving force for knowledge creation and an integrative element of IC dimensions (Kianto et al., 2017). Thus, higher development in intellectual capital will result in a greater impact on IT usage and an increase in perceived capabilities of employees regarding technology. He et al. (2020) and Faisol et al. (2021) conclude that organizations should promote continuous education and training of employees, particularly related to the use of technologies, information systems, and cybersecurity, to keep them updated and able to perform valuable behaviors in their roles.

Finally, the literature recognizes that intellectual capital comprises unique and difficult-to-imitate resources, making it a fundamental element for the growth of any organization. Thus, it is evident that IC plays a pivotal role in a company's survival (Xu & Wang, 2018), and it is crucial to continue studying SMEs and analyze the IC variable and its possible relationships with other factors within the company. Based on the above, the following hypotheses are formulated:

**H2.** *Intellectual capital positively influences perceived behavioral control in IT.*

**H3.** *Intellectual capital positively impacts the usage of information technologies.*

**H4.** *Intellectual capital significantly influences business performance.*

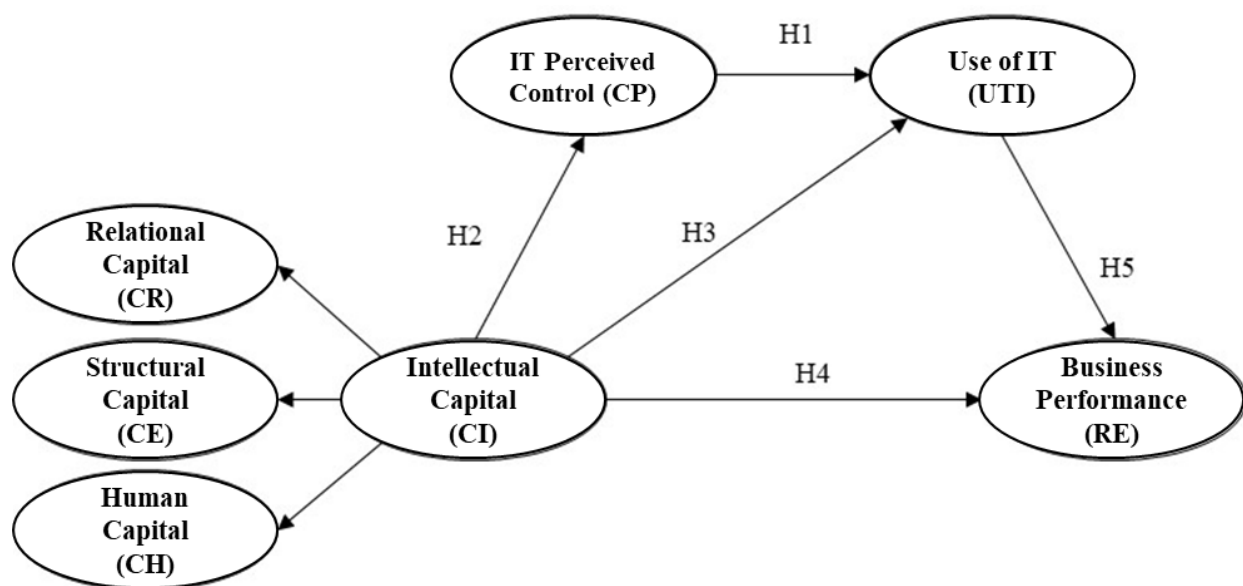
Regarding information technologies, they are defined as technological tools, hardware, and software that allow us to access, organize, manipulate, store, and automate information through electronic means. IT plays an important role in communication and knowledge transfer (Chege & Wang, 2020; and Guana et al., 2021). Consequently, the usage of IT refers to the extent to which employees utilize technological tools to perform their work (Torre et al., 2021). A solid IT infrastructure facilitates the coordination of various business functions, improving internal processes and information flows. In effect, increased IT usage facilitates the dissemination of internal knowledge within organizations, resulting in higher levels of profitability, productivity, and resource efficiency (Cleary & Quinn, 2016; Torre et al., 2021). Similarly, an increased use of technology can lead to the collection of valuable information for the organization (Oliva et al., 2018).

The literature contains a significant amount of research related to the positive impact of information technology usage on business performance. For instance, Bernal & Rodríguez (2019) assert that technologies enable companies to evolve and achieve sustainable competitiveness, adding value to the business. Similarly, research by Kumar et al. (2020) suggests that SMEs with better technological equipment and the use of digital tools, such as social media, e-commerce, and business intelligence with the aid of IT, have a better market focus and achieve higher levels of financial performance.

Fernández-Portillo et al. (2020) consider that IT usage is an essential factor in increasing sales, suggesting that companies should integrate IT as a primary part of their structure. Other research studies by Awamleh & Ertugan (2021), Kucharska & Erickson (2019), Jiang et al. (2018), Singh et al. (2017), and Bourdeau et al. (2021) indicate that IT usage is crucial for the growth and development of competitive advantage in businesses. Therefore, increased IT usage can serve as a valid conduit to generate sustainable competitive advantage. Based on these considerations, it is evident that IT usage is a relevant element that can lead to an increase in SMEs' performance. Consequently, the following hypothesis is formulated, and the graphical representation of the research model is shown in Figure 1. It should be noted that the proposed model may suggest the existence of some mediating or moderating effects between variables; however, the present research does not analyze these relationships.

***H5. The usage of information technologies positively influences business performance.***

**Figure 1.** Proposed research model.



Source : Own elaboration based on Bontis et al. (2018), Andreeva et al. (2021), Torre et al. (2021), Ajzen (1985), Hajli et al. (2015), Huh et al. (2009), Troise et al. (2021), Bernal & Rodriguez, (2019), and Saldaña-De Lira et al. (2021).

## Method

The present research had a quantitative, exploratory, correlational, and explanatory scope, classified as non-experimental and cross-sectional. The unit of analysis was SMEs in the central zone of the state of Tamaulipas, including the cities of Victoria and Mante. For data collection, an instrument was designed based on a review of specialized literature on the main subject, and an adaptation of the initially proposed measurement scales was carried out (Table 1). For this purpose, the instrument validity was verified by referencing the criteria established by Casaló et al. (2011). This approach verifies the determination of whether the measurement scale is valid and comprehensible from the respondent's perspective. This process enabled a thorough filtering of items by various researchers and experts specialized in the field (involving four experts), thus ensuring satisfactory results (Straub, 1989). The outcome was a final version comprising 8 sociodemographic questions and 33 items representing the studied constructs, all utilizing a five-point Likert scale.

Data collection was carried out from February to April 2023, utilizing both a web-based questionnaire and face-to-face, through convenience sampling, derived from recent pandemic restrictions. In total, 108 questionnaires were collected, comprising 83 online and 25 face-to-face responses. However, the target population was 1,309, leading to an expected sample size of 298



observations (with a 95% confidence level). Therefore, the collected data represents only 36% of the total required, which is less than initially expected. Therefore, an analysis was conducted to determine if the collected data would yield statistically significant values. Following Chin and Newsted's (1999) suggestion for a more accurate assessment of a multivariate model, it is necessary to specify an effect size ( $f^2$ ) for each regression analysis and compare it with Green's 1991 power tables. This was calculated using Faul et al.'s (2009) criteria, which propose a statistical test for multiple linear regressions. The test was conducted using the G\*Power 3.1.9.7 tool, with parameters set at a power of 0.95, an Alpha of 0.05, and an effect size ( $f^2$ ) of 0.15 (medium), considering two predictors. The results indicated that a minimum of 107 observations is required to achieve significant results. Therefore, the collected data (108 observations) is deemed sufficient to proceed with the analysis. Finally, the multivariate SEM-PLS technique was employed to assess the relationships between the constructs.

## Results

Firstly, a descriptive analysis of the SMEs in the sample was carried out, which indicated that of the 108 enterprises, 54 belong to the service sector, 54 to the commercial sector, and 66 are small enterprises with between 11 and 50 employees, and 42 are medium-sized enterprises with between 51 and 250 employees, identifying the seniority of the studied companies, where 78.5% of the total sample have been operating for more than 7 years in the market, which, according to INEGI (2019b), increases their chances of sustained success due to having consolidated processes and work activities, making them suitable units of analysis. Additionally, 79% of the surveyed sample hold managerial positions such as owners, managers, assistant managers, or accountants. These individuals are the ones who use relevant data to measure business performance and are knowledgeable about investment and IT usage aspects (Torre et al., 2021), which aligns with the study's needs.

The analysis also observed the tenure in the current position and age of the survey participants. The results indicated that 64% have been in their current position for more than 6 years, and 57% of the individuals are over 36 years old, which falls within an acceptable range for providing reliable information according to Nava (2016). Moreover, having more than 6 years of experience in the position creates a sense of belonging to the company and is a reliable indicator for being subjects of study (Lucas & Ureta, 2019).

The statistical treatment was carried out through Partial Least Squares (PLS) structural equation modeling based on variance. To evaluate a second-order reflective-reflective higher-order

construct (HOC) model, with repeated indicators as in the present research, the approach suggested by Sarstedt et al. (2019) was followed. The initial step involved designing the model with all constructs in first order (LOC). The next step was to assess the measurement model by examining the reliability of the indicators and the convergent and discriminant validity of the constructs. To accept the reliability of the indicators, they should have a minimum factor loading of 0.707 (Henseler et al., 2009). Only the indicators CE5, CH4, CR3, UTI5, and RE4 did not meet this requirement. On the other hand, to meet the internal reliability criteria of the constructs, composite reliability ( $\rho_c$ ), and Cronbach's alpha ( $\alpha$ ) should have a minimum value of 0.7 (Hair et al., 2017; Ringle et al., 2009). Finally, for convergent validity recognition (AVE) of the constructs, the values should be above 0.5 (Chin, 2010; Ringle et al., 2009), and as observed in Table 1, all constructs meet the established criteria.

**Table 1.** Reliability and convergent validity of indicators and LOC constructs.

Construct	Item	Load	Question	Authors	Internal Consistency LOC		
					$\alpha$	$\rho_c$	AVE
Structural Capital (CE)	CE1	0.810	Knowledge is documented in databases or manuals.	Torre et al. (2020) Reed et al. (2006) Al-Jinini et al. (2018)	0.879	0.912	0.613
	CE2	0.810	Processes and work routines are clearly defined and standardized.				
	CE3	0.835	Software and computer systems are adapted to the needs of employees.				
	CE4	0.794	Vital knowledge and information is protected to avoid economic losses in case employees leave.				
	CE6	0.853	Projects are documented for use in future projects.				
Human Capital (CH)	CH1	0.786	Employees are professionally skilled in their jobs and functions.	Torre et al. (2020) ; Al-Jinini et al. (2018) ; Kale et al. (2000)	0.843	0.895	0.681
	CH2	0.837	Employees have adequate work experience to successfully perform their jobs.				
	CH3	0.848	Employees are able to develop new ideas and knowledge to improve their work.				
	CH5	0.828	Employees are able to find solutions to complex problems.				

Relational Capital (CR)	CR1	0.835	We are aware of the needs of our customers and suppliers.	Torre et al. (2020) ; Reed et al. (2006) ; Al-Jinini et al. (2018) ; Sekhar et al. (2017)	0.894	0.922	0.702
	CR2	0.817	Customer feedback guides our activities.				
	CR4	0.835	The company is characterized by mutual trust among employees.				
	CR5	0.867	The company is characterized by friendship among all employees.				
	CR6	0.834	The company is concerned with increasing employee performance.				
Intellectual Capital (HOC)	CE	0.854	-----		0.823	0.894	0.738
	CH	0.878	-----				
	CR	0.844	-----				
IT Perceived Control (CP)	CP1	0.841	Employees have a sufficient level of knowledge to use computers efficiently.	Cheon et al. (2012); Al-Debei et al. (2013); Dholakia et al. (2004)	0.887	0.917	0.688
	CP2	0.808	Employees are familiar with using cell phones in company activities.				
	CP3	0.721	Employees are proficient in the use of social networks.				
	CP4	0.904	Employees are proficient in the use of the internet for company activities.				
	CP5	0.864	Employees have control over the use of the company's information system(s).				
Use of IT (UT)	UTI 1	0.785	The company has a website and uses it for company functions.	Torre et al. (2020) ; Seyal et al. (2002)	0.755	0.844	0.574
	UTI 2	0.748	The company uses technology to consult databases for personal or professional use.				
	UTI 3	0.763	Social networks are used to maintain communication with employees and clients.				
	UTI 4	0.735	Technology is used to create useful content for the organization (budgets, planning, financial information).				
Business Performance (RE)	RE1	0.887	Higher profitability than other competitors in the market.	Thanh et al. (2020) ; Torre et al. (2020); Sekhar et al. (2017)	0.890	0.924	0.754
	RE2	0.894	Higher quality products or services than other competitors.				
	RE3	0.903	Increased efficiency in operations.				

	RE5	0.785	Increased number of new customers and better retention of existing ones.				
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Source: Own elaboration.

The next step in the analysis of the proposed model is to determine its discriminant validity using the HTMT criterion, which is suggested for this type of analysis by Henseler et al. (2015). In Table 2, it can be observed that each of the indices has values below 0.90, demonstrating that there is discriminant validity in the first-order measurement model.

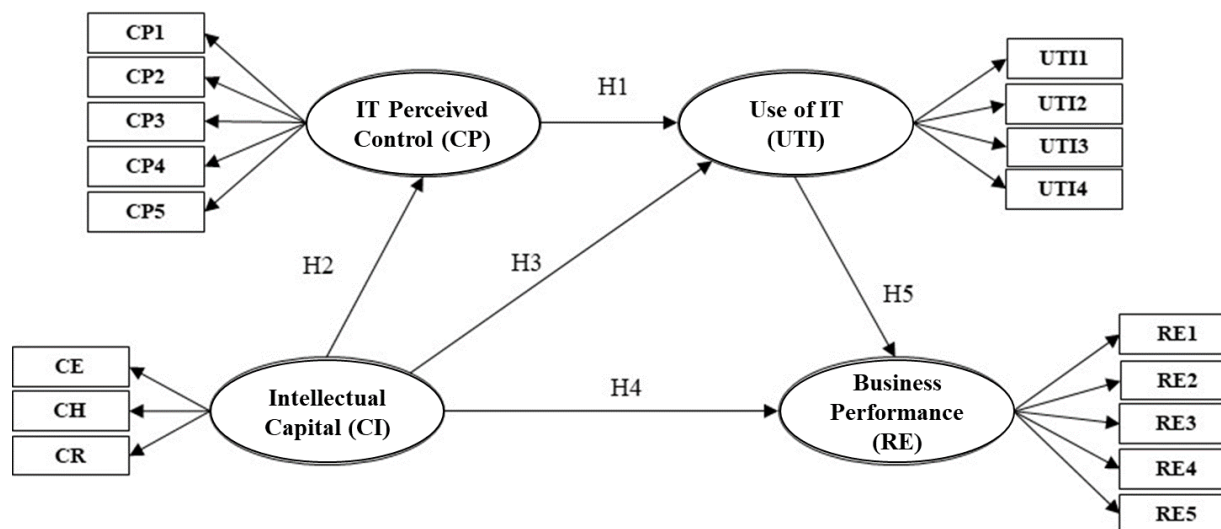
**Table 2.** Discriminant validity of indicators and first-order constructs.

	CP	CE	CH	CR	RE	UTI
IT Perceived Control (CP)	---					
Structural Capital (CE)	0.530					
Human Capital (CH)	0.670	0.726				
Relational Capital (CR)	0.438	0.571	0.766			
Business Performance (RE)	0.542	0.725	0.699	0.785		
Use of IT (UTI)	0.438	0.703	0.362	0.305	0.533	---

Source: Own elaboration.

Now, when evaluating the first-order measurement model, we also obtained the factor loadings for the factors (CE, CR, CH) that constitute the second-order construct (HOC) Intellectual Capital. This allows us to re-specify the model as shown in Figure 2 and, with that, continue with the analysis of results.

**Figure 2.** Proposed second-order model (re-specified).



For the analysis of the re-specified model, it is necessary to validate the measurement model again. As shown in Table 3, all indicators adhere to the suggested values (Hair et al., 2017). This

indicates that the measurement model demonstrates acceptable reliability and validity, supporting the suitability of the model for further analysis.

**Table 3.** Reliability estimation and convergent validity of the respecified model.

Construct	Items	Load	Internal Consistency			R <sup>2</sup>
			$\alpha$	$\rho_c$	AVE	
Intellectual Capital (CI)	CE	0.852	0.823	0.894	0.738	---
	CH	0.890				
	CR	0.834				
IT Perceived Control (CP)	CP1	0.841	0.887	0.917	0.688	0.331
	CP2	0.807				
	CP3	0.720				
	CP4	0.904				
	CP5	0.865				
Use of IT (UTI)	UTI1	0.787	0.755	0.844	0.574	0.220
	UTI2	0.747				
	UTI3	0.764				
	UTI4	0.733				
Business Performance (RE)	RE1	0.887	0.890	0.924	0.754	0.594
	RE2	0.894				
	RE3	0.903				
	RE5	0.785				

Source: Own elaboration.

Meanwhile, for the analysis of discriminant validity, the HTMT criterion was also examined. As shown in Table 4, each of the indices has values below the suggested thresholds for this test (Henseler et al., 2015).

**Table 4.** Discriminant validity of the re-specified model.

Construct	CP	CI	RE	UTI
IT Perceived Control (CP)	---			
Intellectual Capital (CI)	0.658			
Business Performance (RE)	0.542	0.891		
Use of IT (UTI)	0.438	0.546	0.533	---

Source: Own elaboration.

Continuing with the process, the next step involves estimating the model fit (Ringle et al., 2015). To achieve this, the bootstrapping process was performed with 5000 sub-samples, providing fit values, confidence intervals, and t-student statistics. The results for the model fit can be found in Table 5, and overall, the values are adequate, allowing the data analysis to proceed.



**Table 5.** Re-specified model fit.

Fit Measures	Model	Obtained value	Confidence Intervals		Comment
			95%	99%	
SRMR	Saturated	0.083	0.077	0.085	Adequate
	Estimated	0.084	0.081	0.088	Adequate
d_ULS	Saturated	0.942	0.816	0.977	Adequate
	Estimated	0.951	0.889	1.052	Adequate
d_G	Saturated	0.445	0.456	0.521	Optimal
	Estimated	0.446	0.459	0.523	Optimal

Source: Own Elaboration.

Regarding the evaluation of the structural model, we begin with the assessment of multicollinearity through the internal model's variance inflation factor (VIF) values. Table 6 shows that all VIF values are below 3, confirming the absence of collinearity among the constructs under study. The next analysis pertains to determining the explanatory power of the model, i.e., the amount of variance ( $R^2$ ) generated in the dependent construct through the independent constructs. As seen in Table 3, the organizational performance construct exhibits a variance of 0.594. This means that the combined effect of perceived behavioral control of IT (CP), IT usage (UTI), and intellectual capital (CI) explains 59% of its variance, with intellectual capital contributing the most to the explanation of the organizational performance construct.

**Table 6.** Multicollinearity statistics of the re-specified model.

	CP	RE	UTI
IT Perceived Control	---	---	1.495
Intellectual Capital	1.000	1.252	1.495
Use of IT		1.252	---

Source: Own Elaboration.

The final phase of the structural model estimation involves calculating the path coefficients, which quantify the relationships between the constructs and allow testing the proposed hypotheses. To do this, we assess the algebraic sign (+ or -), the magnitude (the closer to one, the greater the relevance of the independent construct on the dependent one), and significance (Hair et al., 2018). The results are shown in Table 7.

**Table 7.** Hypothesis test results.

Hypothesis	Path	T statistics	P values	Confidence Intervals		
				5.00%	95.00%	
H1	IT Perceived Control → Use of IT	0.169	1.689	0.046	0.002	0.307
H2	Intellectual Capital → IT Perceived Control	0.576	5.294	0.000	0.363	0.731
H3	Intellectual Capital → Performance	0.703	7.635	0.000	0.532	0.829
H4	Intellectual Capital → Use de TI	0.351	2.593	0.005	0.091	0.538
H5	Use de TI → Performance	0.131	1.324	0.093	-0.039	0.283

Significance level : t (95%) > 1.965 \*; t (99%) > 2.586 \*\*; t (99.9) > 3.310 \*\*\*

Source: Own Elaboration.

## Discussions

Hypothesis H1, proposing a positive impact of employees' perceived control on IT use, was rejected ( $B=0.169$ ), contrasting with the findings of Scuotto et al. (2020) and Troise et al. (2021). These studies observed a significant impact of technological tool usage and confirmed that a strong belief in their own capabilities motivates behavior. This result contradicts the TPB assertion that perceptions of behavioral control stimulate and explain behavioral intentions. It appears that employees, despite believing in their high proficiency with technology, do not demonstrate a positive impact on IT usage. This may be due to the low implementation of technological resources in the studied SMEs, limiting more intensive use within the company. Nonetheless, there is an opportunity for SMEs in the investigated area. With employees already trained in technology use, there is potential for efficient application in their work functions, highlighting the value of implementing IT.

The findings confirm hypotheses H2 ( $B=0.576$ ), H3 ( $B=0.703$ ) and H4 ( $B=0.351$ ), demonstrating that intellectual capital significantly impacts employee capabilities, business performance, and IT usage. These findings align with the dynamic capabilities approach. This theory posits that detecting changes and opportunities in a business environment requires generating new knowledge through learning, training, and process reconfiguration. Within this framework, human capital is emphasized as the key element contributing most significantly to value creation. The H2 results are like those of He et al. (2020), indicating that employee experience, perception, beliefs, and workplace training have a positive effect. Thus, it is recommended for SME managers and owners to continue training employees and maintain a trusting environment, as greater management of intellectual capital leads to increased self-efficacy

among employees, resulting in more efficient performance of their tasks with the acquired and perceived skills.

Regarding hypothesis H3, which expresses the positive relationship between intellectual capital and business performance, the findings are consistent with research conducted in countries such as Italy, Pakistan, and Vietnam, analyzing companies in the healthcare sector, food, technology, manufacturing, textiles, among others (Torre et al., 2021; Khan et al., 2019; Nhon et al., 2020). Their results reveal that human capital represents the most significant factor contributing to performance and conclude that intellectual capital is of great importance in dynamic environments. The above findings demonstrate that the SMEs investigated in this study invest in the development of robust intellectual capital, as it is considered vital for the company's smooth operation, success, and economic growth in the regional ecosystem, aligning with the global era of knowledge.

Regarding hypothesis H4, which relates to the relationship between intellectual capital and the use of information technologies, the results suggest that when employees in SMEs increase their capacity in terms of skills, knowledge, and experience in their roles, they find it easier to use technological tools in their work area, adding value to the company. This result is to Faisal et al. (2021), which also emphasizes the importance of human capital as the primary creator of value since it is the one that makes use of technology. Thus, the importance of employees' technological skills and capabilities in achieving greater efficiency and intensity in technology use becomes evident.

In contrast, hypothesis H5, which expresses the relationship between the use of technologies and business performance, obtained values ( $B=0.131$ ) that indicate that the use of technologies does not influence the performance of the surveyed companies. Therefore, the hypothesis is rejected as it did not meet the expectations of the research. This finding contradicts various studies on the use of technologies, which show a positive and significant relationship with business performance (Torre et al., 2021; Kucharska & Erickson., 2019; Saldaña-De Lira et al., 2021). These studies consistently demonstrate that increased technology use in business processes leads to higher performance and value creation while promoting knowledge exchange. It is worth noting that most of these studies were conducted in developed countries or emerging economies with more favorable social, economic, and cultural contexts than those examined in the present research. Therefore, it can be inferred that these factors may have negatively influenced the outcomes in this area. Nevertheless, it is crucial to emphasize that SMEs that do not implement the use of information technologies in their processes may risk reducing their competitive advantage.

## Conclusions

Statistical data from both national and international sources, along with previous research findings, have confirmed the significant role of SMEs in Mexico concerning social, economic, and sustainable aspects. Therefore, the main objective of this study was to determine whether perceived control over information technologies (IT) influences their usage capabilities, and in conjunction with intellectual capital in its tripartite form (human, structural, and relational), impacts business performance. The empirical results indicate that the performance of SMEs is influenced by variables such as perceived control over IT and its use, as well as intellectual capital, with the latter being identified as the most influential factor. Therefore, it's important to note that the primary contribution of this research is its addition to the literature, particularly considering the scarcity of such studies in the emerging Latin American context, focusing on SMEs in the commerce and service sectors.

The findings also reveal that employees perceived behavioral control over technology usage, while high, particularly regarding internet and information system use for company functions, does not significantly impact the use of IT in the company due to the low implementation of IT in SMEs. Therefore, it is suggested that business owners encourage an increase in self-efficacy through continuous training in using information systems and other digital tools. This way, employees can maintain or enhance their high level of expertise in technologies and align them effectively when implementing these tools within SMEs.

Additionally, in the analysis of the usage of information technologies and its impact on business performance, it is evident that the studied context presents a low level of implementation. As a result, this sector is at a disadvantage when compared to larger companies or SMEs from other geographical contexts with better management and usage of IT. Numerous studies have empirically demonstrated that using information technologies allows companies to enhance their business processes, reduce costs, and expand their market reach, reaching new regional, national, or even international markets without significant investments. Hence, it is advisable for managers and business owners in the central region of Tamaulipas to carefully analyze the advantages that can be gained by implementing IT in their business processes.

Furthermore, the findings confirm that human capital represents the most relevant factor of intellectual capital. Knowledge generates value through employees' skills and experience when performing their tasks, followed by structural capital as the analyzed SMEs focus on well-defined processes and routines, contributing to increased value and performance. Lastly, relational capital plays a role in fostering knowledge transfer through trust and good relationships among employees,

as well as effective communication with clients and external stakeholders. This reveals that an SME that manages its intellectual capital in a balanced manner tends to generate higher performance. Additionally, a constant focus on human capital management can lead to a high level of perceived employee capabilities, translating into increased usage of IT, which further streamlines processes and establishes communication channels with the local, regional, and national environment.

On the other hand, among the limitations and future lines of research, it is noted that the sample investigated included only SMEs located in the central area of Tamaulipas, which represents a limitation of the study, due to the inclusion of companies from nearby cities may represent greater diversity in data. Another is the analysis of the use of technologies, as only the perceived behavioral control factor was taken in consideration, which reduces its perspective. It should also be mentioned that the sample size and sampling type were another limitation, therefore caution should be considered when generalizing the results. To confirm the potential applicability of the proposed model with the variables of intellectual capital and IT usage on performance, future research should consider testing the model in government or educational organizations. Moreover, modifying the model to include all three factors of the TPB and exploring aspects related to strategic management, innovation, and marketing would expand the scope of analysis.

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