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Organizational Change in Small and Medium Enterprises: Technological Backwardness

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ABSTRACT

This paper analyses the influence of Information and Communication Technologies (ICT) on organizational change in SMEs that have yet to be internationalized. A Likert scale questionnaire was applied to 78 SMEs in the change process. The significance level was sought in an ANOVA (analysis of variance) by linking variables concerning ICT, on the one hand, and the effects of ICT on organizational change, on the other hand, as well as specific issues that may promote or hinder the implementation of organizational change. The findings of this study show that both the frequency and the intensity of the ICT backlog were the most influential elements in change management. The main conclusion is that backwardness can be advantageous in specific economic contexts, mainly when the SMEs are oriented toward a part of the population with less experience in the use of technologies or the company is in a country where ICT consumption is not maximized because ICT has exceeded the needs and expectations of the population.

KEYWORDS

ICTs; Organizational Change; SMEs Digitalization; E-Business

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1. Introduction

Information and Communication Technologies (ICT) has transformed how we perceive reality, uses, customs, and social interaction (Drake, 1994; Roudometof, 2023). These changes have also transformed companies' operations, organizational culture, and communication channels. In some studies, disadvantages of ICT use have been found, while in other cases, ICT use is favorable (Thrassou et al., 2020; Mushtaq et al., 2022; Gaviria-Marin et al., 2021).

The comparison of results across research is consistent; instead, such results remind us that ICTs are tools and that it depends on the timing, purpose, and manner in which they are used for benefits (Shahadat et al., 2023). The assisted crisis of the last few years showed us this. It also showed us the role ICTs play in keeping the world going despite the prolonged isolation experienced (Zahra, 2021; Li et al., 2021; Wendt et al., 2022).

Most studies focus on transnational corporations (Kwilinski et al., 2020; Bruszt & Langbein, 2020); however, it is crucial to analyze what happens with smaller companies (González-Varona et al., 2021; Koraca, 2021). The latter is a more precise reflection of the local reality in which the transnationals are immersed.

Some studies establish technological advances as a starting point and an essential element for SMEs to adopt ICTs (Eze et al., 2024; Nazir & Khan, 2024; Chandavarkar & Nethravathi, 2023) while addressing technological backwardness as a negative element (Zhang et al., 2023). This work considers that the technological backwardness of SMEs contributes to the adoption of ICTs. The findings presented in this document found that the greater the intensity and frequency of the technological delay, the greater the importance of technological innovation for the entrepreneur to decide to make the change. That is, the greater the awareness of technological backwardness, the easier it is for employees to manage change. If the members of a company are aware of technological backwardness, they will have less resistance to the change caused by the adoption of ICTs.

Studying the causes of change helps companies respond promptly to change procedures. It is also worth mentioning that this is essential in the decision-making process of entrepreneurs, as it helps them manage their companies well.

The market is constantly changing, and there are repercussions when the organization adapts at a different speed than they occur. The technological advances the market offers and companies play an essential role in change processes. Therefore, it is necessary to investigate and understand how ICTs play a role in these organizational changes, either by causing them (Koraca, 2021) or helping to cope with them (Isensee et al., 2020).

Successful change requires an overall change in organizational culture, whereby education and training courses bridge the change process among individuals and systemic change in the organization (Shamir-Inbal & Blau, 2016; Bagga et al., 2023). The entrepreneur becomes the ICT coordinator, a guide for SMEs (Eyal & Yosef-Hassidim, 2012). Indeed, other employees can fill this role (Zoppelletto et al., 2023).

Research shows that internal leadership is central to innovative change, such as in ICT adoption (Avidor-Ungar & Shamir-Inbal, 2013; Shamir-Inbal et al., 2009; Vandelinde et al., 2012) and conversely, technological innovation to promote internal innovation capacity (Zhu et al., 2023). More is needed to be proficient in ICT. One has to possess leadership skills, the ability to provide a role model, greater autonomy, willingness to accept responsibility, and initiative to initiate change (Müller et al., 2024; Alwali, 2023).

The high consumption of smartphones, mobile applications, and social networks **pressures** SMEs to implement ICT (Information Technology) as a driver of innovation and organizational change (Oyewobi et al., 2023).

The implementation of ICT in SMEs is related to reform projects designed to decrease inefficiencies (Tian & Shao, 2023; Accounts, 2008; Clegg, 2007). Investments made in information systems are usually related to organizational changes designed to improve efficiency and effectiveness (Hariyati et al., 2023; Fountain, 2001; Gil-García & Pardo, 2005; Kamarck, 2007).

Different investigations have studied ICT-stimulated organizational change in different organizational contexts

(Pettigrew et al., 2001; Fay & Luhrmann, 2004; Scott & Van, 2004; Iyengar et al., 2010; Volkoff et al., 2007). However, the transformative effects of ICT are different in all SMEs.

Barrett et al. (2006) point out that many organizational interventions planned and designed to bring about change with ICTs succeeded in being significant, widespread, and often unforeseen organizational changes.

ICTs cause the organizational structure to become thinner both horizontally and vertically. Through ICT, there is a phenomenon of loss of intermediaries in the organizational structure and an inclination towards centralized leadership. It improves operational performance. It brings about profound changes in personnel and companies' socio-cultural environment. In short, ICT is a factor that actively participates in a change process (Chege et al., 2020).

Moreover, ICTs lead the organization toward constructing digital business environments (Hanelt et al., 2021). They create new internal communication dynamics while opening up an external communication channel that leads to new customers and transactions that break with local logic to offer products beyond their territory.

The adoption of ICT is fundamental to the decision to change; however, when the company intends to innovate because of an environmental commitment, either by its own decision or incentivized by governmental support, ICT becomes a determinant for the change process (Zhang et al., 2020).

Some researchers (Hock et al., 2021) found that SEM results indicate that external knowledge management capabilities mainly stimulate business model innovation. This relationship is strengthened for firms with a high risk-taking tolerance. For this reason, it is crucial to calculate risk at every moment (Baptista et al., 2020).

2. Conceptual Framework

Analyzing the adoption of ICTs and their effect on SMEs leads to discussing technological backwardness. It is therefore important to emphasize that the disadvantages of inherited technological backwardness in the Latin American region are relative. When the term backwardness is used, it refers to comparing characteristics and circumstances with a developmentalist or gradualist approach. If smaller firms are compared with others in their locality and are found to be technologically backward about others, this is a sign of disadvantage. It is not necessarily the case when the benchmark is at the country or regional level.

A lag for one region relative to another can be advantageous because it can grow and develop faster than the more developed region. In other words, smaller firms' late adoption of ICTs in regions such as Latin America is not necessarily a disadvantage. However, resistance to using ICTs and needing more knowledge about how they contribute to organizational change can be disadvantageous.

The latter is provided that the other local companies they interact with are acquiring ICTs and applying them to manage organizational change (Gerschenkron, 2015). According to Vu and Asongu:

"[…]it is plausible that ICT penetration, for which internet adoption is a key indicator, has a significant effect on growth in developing countries, especially through enhancing their capabilities to exploit the backwardness advantage […]." (Vu & Asongu, 2020, p. 2).

Hence, it is essential to understand the role of ICTs in organizational change in smaller firms in developing countries. As shown in Table 1, the theory of ICT influence considers changes, whether favorable or unfavorable, on 1) technological backwardness; 2) the decision to change; 3) the process to be followed; 4) risk management; 5) knowledge management; 6) transforming communication processes; and 7) organizational culture.

Table 1. ITC-related aspects involved in organizational change in commercial SMEs.

Authors	Contribution to the study
Vu and Asongu (2020); Gerschenkron (2015).	Technological backwardness
Tidd and Bessant (2020)	Technological innovation was central to the company's decision to change

Zhang et al. (2020)	ICTs are determinants in the change process
Hock et al. (2021)	ICTs involve accepting to take calculated risks
Hock et al. (2021); Koh and Maguire (2004)	The organization is increasingly aware of its knowledge base.
Pfister and Lehmann (2022); Belyaeva and Lopatkova (2020)	The company is managed based on quantifiable figures.
Attia (2022); Al-Sharafi et al. (2020); Naab and Bans-Akutey (2021)	The e-business is decisive for changes in organizational culture.
Khan (2023); Islam (2022)	The availability of information is timely and accurate
Franco, Godinho and Rodrigues (2021); Sulistyan et al. (2022)	Feedback is constant.
Dethine, Enjolras and Monticolo (2020)	There is coordination of change management activities.
Dethine, Enjolras and Monticolo (2020); Sulistyan et al. (2022)	The results of the change in organizational culture are measured.
Pahlawansah, Octiva and Muafiqie (2023); Dethine, Enjolras and Monticolo (2020)	The proposed goals for organizational change were satisfactorily met.
Dethine, Enjolras and Monticolo (2020)	Information and analysis of the change process is documented.
Dethine, Enjolras and Monticolo (2020); Thomas (2020); Sulistyan et al. (2022)	The team has access to all the information needed to make the change.

Source: Own elaboration.

3. Methodology

3.1. Sample

SMEs (less than 250 employees) located in the Guadalajara Metropolitan Area (AMG) that focus on local trade were included. In other words, internationalized firms were not included, nor were those embedded in global value chains. The study concentrated on those with an exclusively local presence and in the formal sector.

The INEGI databases do not differentiate between firms that only operate locally and those directly or indirectly internationalized. For the latter reason, we opted for a non-probabilistic sample and surveyed 78 informants who owned SMEs. It was verified that the entrepreneurs considered in the study were managing an organizational change involving ICTs.

3.2. Data collection

The study instrument, a Likert-scale questionnaire, was created based on the theoretical framework. Furthermore, Cronbach's Alpha was tested to corroborate the consistency and reliability of the research instrument used. In addition, Bartlett's test and the KMO sample adequacy measure were obtained to confirm that these variables were correlated and that it is possible to conduct a factor analysis.

The empirical study of this work, which aims to find out how ICTs intervene in the organizational change process, tested the significance level of the analysis of variance (ANOVA) by linking the ICT variables with the results that could be obtained in an organizational change and with specific issues that favor or hinder the culmination of

an organizational change.

It should be noted that the questionnaire used as a research instrument was developed based on the bibliographical references studied (Table 1) to determine which ICT factors influence organizational change in commercial companies in the AMG. For all these reasons, it was decided to develop a questionnaire with structured questions to determine these factors. Once the information was obtained, the research results were analyzed and classified. study instrument, a Likert-scale questionnaire, was created based on the theoretical framework. Furthermore, Cronbach's Alpha was tested to corroborate the consistency and reliability of the research instrument used. In addition, Bartlett's test and the KMO sample adequacy measure were obtained to confirm that these variables were correlated and that it is possible to a factor analysis.

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4. Data analysis and results

Cronbach's Alpha, Bartlett's Test, and KMO were calculated. According to the calculated reliability indices, Cronbach's Alpha was highly consistent (Table 2) because, at 0.800, it is close to the number 1. In addition, the survey variables were administered consistently so that multivariate analysis could express correlations and general trends in depth. The level of fit between groups should be understood through factor analysis, Bartlett's test, and KMO (Table 3).

Table 2. Cronbach's alpha of the ICT variables.

Cronbach's Alpha	Number of elements
.800	18

Source: Own elaboration.

Table 3. KMO and Bartlett's test.

Kaiser-Meyer-Olkin measure of sampling adequacy		.603
Bartlett's test of sphericity	Approximate Chi-square	523.754
	gl.	153
	Sig.	.000

Source: Own elaboration.

If Sig. (p-value) <0.005 is admitted H0 (null hypothesis) > it is feasible to use factor analysis.

If Sig. (p-value) > 0.005 H0 is rejected > no factor analysis is possible.

The result reveals a significance level of zero, which is representative because the closer it is to zero, the more satisfactory the test is.

The variables with the highest significance are 1) Intensity of technological backwardness, 2) Frequency of technological backwardness, and 3) Technological innovation was fundamental to the firm's decision to change.

Table 4. COMMUNITIES.

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Intensity of technological backwardness.	0.883					
Frequency of technological backwardness.	0.838					
Technological innovation was central to the company's decision to make the change.	0.814					
ICTs were decisive for the company's change process.		0.782				
Accepting calculated risks.		0.765				
The organization is increasingly aware of its knowledge base.		0.753				
The company operated based on quantifiable data only.		0.747				
The e-business was instrumental in bringing about organizational culture change.		0.711				
Frequency of adequate information available.			0.678			
Intensity of feedback.			0.674			
Intensity of coordination of activities.			0.661			
The results of organizational culture change are measured.			0.639			
Frequency of feedback.			0.633			
Intensity of adequate information available.			0.614			
Frequency of coordination of activities.				0.553		
The proposed organizational change goals were successfully met.				0.520		
Information and analysis of the change process are documented.					0.484	
The team can access all the information they need to carry out their change work.						0.342

Source: Own elaboration.

It implies that the greater the intensity and frequency of technological backwardness, the greater the importance of technological innovation for the entrepreneur's decision to change (Table 4). In other words, those SMEs that were more aware of technological backwardness were more capable of managing change because the sense of backwardness was more significant than the resistance to change. Because they are smaller enterprises operating locally and with few resources, innovation means acquiring technological innovations that result in substantial organizational changes.

Therefore, Table 4 shows that ICTs were decisive for the company's change process, not because they had ICTs but because they recognized the need to acquire them to adapt to the local reality. In addition, calculated risks were taken, the organization became increasingly aware of its knowledge base, and it was managed based on quantifiable figures only. E-business was decisive in changing organizational culture.

Thus, the need to respond to technological backwardness led to the acquisition and adoption of ICTs in a change process to adapt successfully to local demand. On the other hand, the dynamics are not unidirectional. Just as ICTs drove the decision to manage change, they also influenced the process, which leads to the following hypothesis.

H1: ICTs contribute to the consummation of organizational change in commercial companies in the AMG.

As part of this research examining organizational change, a set of questions was formulated to identify how ICTs influenced organizational change. Within the questionnaire used, specific questions and hypotheses that examine the impact of ICT on a change process were considered:

ICT favors the commercialization of goods and services, promoting change and innovation in managing SMEs. ICT supports the achievement of a business model that fosters entrepreneurial success.

Enterprise members must be trained in using ICTs to achieve organizational growth. Companies must adopt this system as a strategic tool to improve competitiveness and stay in the market. Therefore, knowledge management and innovation processes are required.

The impact of ICT use on innovation in SME management is essential (Yadete et al., 2023). Gálvez (2014) points out that using innovative ICT tools and practices has positively changed companies' leadership and management styles.

The influence on change can be direct and indirect in that intervening in one subsystem can influence others dynamically (Shuaib et al., 2024; Midgley, 2003; Skyttner, 2005; Amagoh, 2008). Thus, the intensity of organizational change through ICT results primarily from organizational rules, structure, and processes, and it could have negative organizational consequences (Avgerou, 2001; Khaw et al., 2023).

Organizational changes effected utilizing ICT have their dynamics and intensity, which is a function of the content of the information systems and the conditions under which the change occurs (Maghsoudi & Nezafati, 2023). Thus, change has its dynamic pluralities, and the organizational change process moves through structural and functional nodes of firms' internal and external subsystems (Skyttner, 2005).

Thus, the nature and intensity of organizational change by ICTs depend on the firms' characteristics (Alexeeva-Alexeev & Mazas-Perez-Oleaga, 2024; Avgerou, 2000; Orlikowski & Barley, 2001).

The relationship between ICT and e-business was instrumental in changing organizational culture, consumer expectations, anticipating the future and its changes, culture and society, and openness to trade worldwide. It indicates that these ICT-related factors are conducive to achieving organizational change. It shows that ICT can contribute to effecting change, as well as knowing the expectations of customers and the current and future trends in the market and society, favor the consummation of organizational change. Therefore, H1: ICTs contribute to the consummation of organizational change in commercial enterprises in the AMG and are accepted (see Table 5). Changes in an organization involve all the organization members; therefore, the second hypothesis is H2: The information available to employees favors implementing organizational change in commercial companies in the AMG.

Table 5. Influence of ICTs on an organizational change process.

		Sum of squares	gl	Root mean square	F	Sig.
The e-business was instrumental in bringing about organizational culture change.	Between groups	26.383	3	8.794	15.021	.000
	Within groups	33.956	58	.585		
	Total	60.339	61			
Consumer expectations.	Between groups	13.487	3	4.496	5.270	.003
	Within groups	49.481	58	.853		
	Total	62.968	61			
Anticipating the future and its changes.	Between groups	11.503	3	3.834	6.668	.001
	Within groups	33.352	58	.575		
	Total	44.855	61			
Culture and society.	Between groups	13.013	3	4.338	5.606	.002
	Within groups	44.874	58	.774		
	Total	57.887	61			
Trade openness.	Between groups	16.235	3	5.412	5.938	.001
	Within groups	52.862	58	.911		
	Total	69.097	61			

Source: Own elaboration.

Changes are occurring rapidly, leading companies to rely increasingly on ICT to remain competitive, improve profitability, and achieve their goals (Stanimirovic, 2015). In adaptation to these changes, it is paramount to incorporate ICT in companies to inform and train teams, have adequate training and information, invest in the required infrastructure, and have the right tools to optimize work so that the company is adequately prepared for change and can achieve business goals (Manal et al., 2018). It helps teams share a common vision and thus create innovative business opportunities that generate competitive advantages in the sector (Kato, 2019).

Innovation and communication foster productivity and support the development of a system that drives business development (Audretsch et al., 2014). ICT has changed communication and information procedures in SMEs (Horváth, 2023), contributing to the development of social skills and the generation of technological knowledge, which has developed a constant cycle of innovation and has led to the adoption of this system as a strategy for the effective exchange of information, thus improving the productivity and organizational development of the company (Janssen et al., 2014). Hence, employees must have all the information required for the organizational change process (Islam, 2023).

According to the results derived from this work, it was found that there is a significant relationship between

access for employees to all the information they need to carry out their work within the organizational change process with adequate information available, shared vision, the organization is becoming more aware of its knowledge base, the organization was prepared for change and management involvement (Huu, 2023). It shows that to effect organizational change, it is required that the employers are involved in the change process and have the organization and its members well informed so that there is a shared vision and that the employee knows what is going to happen, and thus the company and its employees are prepared for the change process and what role they play within the new organizational set-up. Therefore, the second hypothesis is accepted (see table 6).

H2: The information available to employees favors implementing organizational change in commercial companies in the AMG.

Table 6. The team has access to all the information it needs to carry out its work within the organizational change process.

		Sum of squares	gl	Root mean square	F	Sig.
Adequate information available.	Between groups	14.931	3	4.977	7.801	,000
	Within groups	37.005	58	.638		
	Total	51.935	61			
The organization is increasingly aware of its knowledge base.	Between groups	3.597	3	1.199	4.873	.004
	Within groups	14.274	58	.246		
	Total	17.871	61			
The organization was prepared for the change.	Between groups	9.183	3	3.061	4.772	.005
	Within groups	37.204	58	.641		
	Total	46.387	61			
Management involvement.	Between groups	14.165	3	4.722	8.830	.000
	Within groups	31.013	58	.535		
	Total	45.177	61			
Shared vision.	Between groups	10.317	3	3.439	6.106	.001
	Within groups	32.667	58	.563		
	Total	42.984	61			

Source: Own elaboration.

When analyzing the effects of technological backwardness, it was found that it is significantly related to specific issues such as resistance to change and scarcity of resources to finance the change program. These results reflect that these factors are closely related to technological backwardness, so it is necessary to have sufficient capital and resources to implement the change program in the company successfully. When sufficient resources are available to carry out the change process through ICT, valuable innovations can be carried out for SMEs.

Wanous et al. (1997) point out that when employees have a cynical and negative perception of organizational

change, it can lead to failure. If workers believe these tools lack influence, this is likely to be reflected in organizational change.

As an integral part of learning that ICT can significantly enhance, cooperation can be understood as employees having the same business goals. It helps the company overcome physical constraints imposed by departments, functions, and hierarchical levels (Pesce & Neirotti, 2023). Providing affordable and cost-effective ICT to handle a wealth of explicit and implicit knowledge has been highly influential in organizational change.

Thus, the technological backwardness, together with the lack of resources to carry out the change process, leads to a series of obstacles, such as resistance to change (Maia & Frogeri, 2023), which obstructs the implementation of organizational change; hence, the importance of entrepreneurs getting involved in the change process and informing team adequately so that they are aware of what is going to happen and thus get ready for the change and the new model of operating the company, and in this way, decrease resistance to change. Therefore, H3: Technological backwardness hinders organizational change achievement in commercial enterprises in the AMG (see Table 7).

Table 7. Technological backwardness.

		Sum of squares	gl	Root mean square	F	Sig.
Shortage of resources to finance the change program.	Between groups	15.053	3	5.018	6.941	.000
	Within groups	41.931	58	.723		
	Total	56.984	61			
Resistance to change.	Between groups	12.480	3	4.160	5.627	.002
	Within groups	42.875	58	.739		
	Total	55.355	61			

Source: Own elaboration.

5. Discussion, Conclusion, and Implications

Markets are part of the change. Thanks to ICT, social networks, and mobile applications, consumers have multiple alternatives to satisfy their needs. The customer has become increasingly demanding regarding the accessibility and variety offered by the Internet of Things (Singh, 2023). It forces local and smaller companies to meet these expectations earlier and better than others.

The results of this study serve to verify, based on the smaller companies marketing in a specific locality, the established objectives: To determine which factors related to Information Technologies intervened in an organizational change: e-business, consumer expectations, anticipating the future and its changes, culture, and society, and commercial openness (Objective 1). To find out what effects the information available to employees has on organizational change: when the company is aware of its knowledge base, the team, therefore, has adequate information, which leads to the team sharing the same vision and greater involvement by management, which in turn makes the organization more prepared for change (Objective 2). Technological backwardness was identified as an obstacle to organizational change (Objective 3).

This paper examined the influence of ICT in an organizational change process. The results indicate that ICT significantly relates to e-business, consumer expectations, anticipating the future and its changes, culture, society, and trade openness within an organizational change process. It is, therefore, of utmost importance for companies to know their customers well and to be aware of the prevailing trends in markets and society so that they can anticipate these changes before they occur, as this will help organizational change to take place.

On the other hand, it was found that one of the factors hindering the change process in companies is technological backwardness because the lack of recognition of backwardness leads to resistance to change. It is easier to imagine an employee with a smartphone, social media accounts, and mobile applications for procedures and services. Therefore, the task is to link these personal activities to business activities. In this way, the employee will recognize the backlog in the company and support the changes that need to be made.

Similarly, employees must be fully informed about the backlog and the benefits of adopting ICT in the company's activities to reduce resistance to change among the team.

Backwardness can be advantageous in specific economic contexts, mainly when the service is oriented towards a part of the population with less experience in the use of technologies or the company is in a country where ICT consumption does not get the most out of ICTs because they have exceeded the needs and expectations of the population.

Although it is impossible to guess what will happen in the future, it is possible to prepare for what lies ahead. Adequate preparation helps businesses to meet the challenges of the future successfully. Businesses, large and small, must be able to adapt to such changes. Small businesses are more vulnerable to change (Aharoni, 2024). From the above, it can be deduced that organizational change is a strategy companies use to maintain their operations and presence in today's changing markets.

It is important to note that while this project has yielded valuable results, it was subject to certain limitations that could inform future studies. Specifically, the information used in this study was based solely on the statements made by the respondents involved in the change process at the examined businesses. Additionally, the results of this study cannot be generalized to the entire population due to the judgmental sampling method used. Therefore, it is recommended that further research be conducted on organizations in other sectors and SMEs in different regions.

Finally, new directions in research can be taken. These are expressed in the following questions.

What specific issues can promote or hinder the implementation of organizational change in SMEs that have not yet internationalized? How does the intensity and frequency of ICT delay influence change management in SMEs? How can SMEs cope with the organizational changes brought about by adopting ICT, or how can ICT help SMEs cope with these changes?

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Author contributions

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