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Driving Digital Transformation in Lima's SMEs: Unveiling the Role of Digital Competencies and Organizational Culture in Business Success

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Abstract: This study examines the impact of digital competencies (DCs) and organizational culture (OC) on digital transformation (DT) in small and medium-sized enterprises (SMEs) in metropolitan Lima. Using a non-experimental and cross-sectional design, 307 business owners were surveyed using a previously validated questionnaire. Data were analyzed through partial least squares structural equation modeling (SEM-PLS). The results show that DCs have a direct and significant impact on DT, being the main driver of this process. Additionally, OC acts as a partial mediator between DCs and DT, although its influence is lesser, compared with DCs. The study highlights the importance of DCs in driving digitalization in SMEs, while OC facilitates, although does not solely determine, the success of the digital transformation process. Despite the limitations and the cross-sectional nature of the study, the findings provide valuable insights for SMEs in emerging economies and offer a basis for future research on the factors influencing digital transformation in similar contexts.

Keywords: digital competencies; organizational culture; digital transformation; SMEs; SEM; emerging economy; technological innovation; mediation

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1. Introduction

Digital transformation (DT) in small and medium-sized enterprises (SMEs) has emerged as a key process to enhance competitiveness and adaptability in today's businesses (Gupta & Jagtap, 2024; Malewska et al., 2024; Cheng et al., 2024a; Chiu et al., 2024; Fernando et al., 2024; Hu et al., 2023). This process, which goes beyond the adoption of technologies, involves changes in the operations, strategies, and business models of organizations (Mihu & Herciu, 2024; Merín-Rodrigáñez et al., 2024; M. R. I. Bhuiyan et al., 2024). Digital competencies (DCs) and organizational culture (OC) are presented as fundamental factors determining the success of DT. However, the interaction between these elements and their impact on the DT of SMEs, especially in emerging economies like Lima, Peru, has not yet been explored in depth.

DCs are essential for organizations not only to adopt technologies but also to use them effectively to generate value. According to Rupeika-Apoga et al. (Rupeika-Apoga et al.,

2022), these competencies include both technical and strategic skills, allowing companies to adapt to the digital environment and improve their business model. Aghazadeh et al. (Aghazadeh et al., 2024) highlighted the importance of digital resilience and the ability of SMEs to manage digital platforms, which drives innovation and growth. Meanwhile, Zhang et al. (Zhang et al., 2024) linked DCs with dynamic capability, suggesting that organizations must continuously adapt to technological changes to remain competitive.

OC, on the other hand, is the set of values, beliefs, and norms that guide behavior within the company and can either facilitate or hinder DT (Arabeche et al., 2022). According to Leso et al. (Leso et al., 2023), a favorable OC facilitates the adoption of digital technologies, whereas a culture that is resistant to change can impede the digitalization process. Isensee et al. (Isensee et al., 2023) reinforced the idea that OC can significantly influence a company's ability to successfully implement DT. Despite the growing literature on DCs and OC, knowledge gaps persist. In particular, few studies have empirically explored the interrelation between these factors and their joint impact on DT in the context of emerging economies, such as SMEs in Lima, Peru (Bradač Hojnik & Huđek, 2023; Espina-Romero et al., 2024a). Furthermore, the mediation of OC in the relationship between DCs and DT has scarcely been addressed, leaving significant room for new research.

This study aimed to bridge this gap in the literature by examining how DC directly impacts OC and DT in SMEs, and how OC acts as a mediator in this process. To address these aspects, this study used partial least squares structural equation modeling (SEM-PLS), a methodological approach that is suitable for analyzing complex relationships in non-experimental and cross-sectional studies, allowing for the assessment of both direct and indirect effects among variables. The research questions guiding this study were as follows.How do DCs impact OC in SMEs in Lima? What is the relationship between DCs and DT in this context? How does OC influence the success of DT? And finally, how do DCs have an indirect impact on DT through OC?

The central objective of this study was to explore and quantify the impact of DCs on the DT of SMEs in Lima, considering OC as a mediating factor. This approach aimed to provide a comprehensive view of the internal factors that may facilitate or inhibit the digitalization process, and to offer practical recommendations for optimizing DT in SMEs. The main contribution of this study lies in offering a deeper understanding of the organizational dynamics that influence DT, contributing both to the theoretical debate and to business practice. By focusing on the context of Lima, Peru, it contributes to the limited empirical literature on SMEs' digitalization in emerging economies, providing insights that may be applicable to other similar contexts.

Finally, the content of the document is structured as follows. After this introduction section, the second section presents the theoretical framework, where the key concepts of DC, OC, and DT are addressed, followed by development of the hypotheses. Then the methodology used is detailed, including the use of SEM-PLS to test the relationships proposed in the conceptual model. Subsequently, the results of the analysis are presented, which are discussed in comparison with the existing literature in the Discussion Section. The study concludes with an analysis of the practical implications, potential lines of future research, and the limitations.

2. Theoretical Framework

DT in SMEs is a complex process that depends on various factors, including DCs and OC. These two elements are intrinsically linked and play a crucial role in adapting and succeeding in an increasingly digitalized environment (Proksch et al., 2024).

2.1. Digital Competencies

DCs are defined as the capabilities and skills that an organization possesses to implement and use digital technologies effectively (Rupeika-Apoga et al., 2022; Zhang et al., 2024). These competencies include both technical and strategic skills that enable SMEs to adapt to changes in the digital environment. According to Rupeika-Apoga et al. (Rupeika-Apoga et al., 2022), these competencies encompass both digital orientation and the digital capacity of the organization, which directly influence DT and the adaptation of business models in SMEs. This approach was complemented by Aghazadeh et al. (Aghazadeh et al., 2024), who highlighted the importance of digital resilience in SMEs, allowing these companies to manage digital platforms and leverage resources such as big data and digital leadership to drive their transformation and international growth.

Espina-Romero et al. (Espina-Romero et al., 2024a, 2024b) highlighted, in both studies, that DCs not only influence the ability of SMEs to adopt technologies but also in human resource management and improving OC, creating a conducive environment for DT. These competencies are seen as a key factor that enables companies to enhance both their operational capacity and organizational sustainability. Zhang et al. (Zhang et al., 2024) expanded the concept by linking DCs with dynamic capabilities, which implies that organizations must be agile and continually adapt to technological changes. In this regard, DCs not only drive DT but also act as a catalyst for innovation and the responsiveness of SMEs in constantly evolving business environments. This framework is consistent with Proksch et al. (Proksch et al., 2024), who underscored that DCs enable emerging businesses, such as startups, to quickly scale by developing a strong digital culture.

2.2. Organizational Culture

OC refers to the set of values, beliefs, and norms that influence the behavior and performance of a company (Arabeche et al., 2022). In the context of digital transformation (DT), OC acts as a mediator that can either accelerate or hinder the adoption of technologies. According to Arabeche et al. (Arabeche et al., 2022), an OC aligned with entrepreneurial principles facilitates DT by enhancing innovation and the ability of SMEs to adapt to technological changes.

Furthermore, Leso et al. (Leso et al., 2023) noted that OC is a critical factor in the digital transition of SMEs. The values, beliefs, and practices within the organization influence its capacity to manage DT, especially in contexts where companies face resource limitations. This approach was complemented by Isensee et al. (Isensee et al., 2023), who argued that OC can act both as a driver and a barrier in the implementation of DT. This highlights the importance of an OC that supports innovation and change to maximize the benefits of digitalization. The relationship between OC and DT has been reinforced by authors like Malewska et al. (Malewska et al., 2024), who pointed out that a digital OC is fundamental to facilitating innovation in business models and technological adoption, particularly in competitive and evolving sectors. This perspective underscores the need for an OC that promotes flexibility and dynamism to manage the challenges of DT.

2.3. Digital Transformation

DT in SMEs is a process that goes beyond the mere adoption of technology; it involves a profound change in the way companies operate, interact with their customers, and manage their resources. This transformation is not limited to the incorporation of new technological tools; rather, it involves a structural reconfiguration of internal processes, organizational culture, and business strategy (Dąbrowska et al., 2022). According to Klein and Todesco (Klein & Todesco, 2021), DT is seen as a strategic response to overcome crises such as the COVID-19 pandemic, which forced SMEs to accelerate their digitization to close

technological and managerial gaps. This approach was complemented by Espina-Romero and Guerrero-Alcedo (Espina-Romero & Guerrero-Alcedo, 2022), who highlighted that DT involves a process of transferring physical elements to a digital environment, facilitating the management and organization of information.

A more comprehensive approach was proposed by Dąbrowska et al. (Dąbrowska et al., 2022), who view DT as a socioeconomic change that impacts individuals, organizations, and ecosystems. This framework emphasizes that DT is not just a technical issue but also a social phenomenon that affects multiple levels of the business environment. This perspective is particularly relevant for SMEs, which, in adopting digital technologies, must also consider external factors such as government regulations and customer expectations. Finally, Battistoni et al. (Battistoni et al., 2023) underlined that DT in SMEs involves the adoption of digital technologies that enhance companies' abilities to collect and process data, which boosts more informed decision-making. This process is essential for SMEs to manage their digital transition effectively, maximizing the benefits of emerging technologies like Industry 4.0 (Kagermann & Wahlster, 2022).

2.4. Relationships Among DCs, OC, and DT

The literature reveals a clear interrelationship among DCs, OC, and DT. Espina-Romero et al. (Espina-Romero et al., 2024a, 2024b) suggested, in their two studies, that DCs not only directly impact DT but also indirectly influence it through OC. This occurs because DCs strengthen SMEs' ability to manage talent and foster an OC that is receptive to technological changes, which is crucial in today's digital context. Additional studies, such as those by Rupeika-Apoga et al. (Rupeika-Apoga et al., 2022) and Aghazadeh et al. (Aghazadeh et al., 2024), reinforced this relationship by highlighting that DCs include both technical skills and a strategic orientation towards digital technologies, enabling companies to adapt to changes and digital business models, thus facilitating the DT process.

Furthermore, authors like Leso et al. (Leso et al., 2023) and Isensee et al. (Isensee et al., 2023) have shown that an OC fostering innovation and aligned with digitalization is crucial in facilitating DT. This OC not only promotes the adoption of technology but also acts as a mediator that can enhance or limit the success of transformation. According to Malewska et al. (Malewska et al., 2024), a digital OC is essential for fostering business model innovation and enhancing SMEs' ability to navigate constantly evolving business environments.

This theoretical framework supports the hypotheses that DCs have both a direct and indirect positive impact on DT through OC. The literature suggests that when DCs are aligned with a favorable OC towards digitalization, SMEs can more quickly adapt to the challenges and opportunities of the digital environment. Thus, developing DCs within an organizational culture that promotes innovation, and technological change maximizes the likelihood of success in the DT process, as also suggested by Zhang et al. (Zhang et al., 2024) and Proksch et al. (Proksch et al., 2024).

2.5. Gaps and Limitations in the Literature

Despite advancements in understanding DCs and OC in DT, there are still gaps in research. For example, specific studies in the contexts of emerging economies, such as SMEs in Lima, Peru, are limited. Additionally, there is scant empirical research exploring the indirect impact of DCs on DT through OC. This suggests a need for future research to delve deeper into the analysis of these interrelationships in different geographical and economic contexts. To facilitate the understanding of the relationships among DCs, OC, and DT, an infographic is presented below (Figure 1), which summarizes the key concepts and their interactions in the context of SMEs according to the theoretical framework.

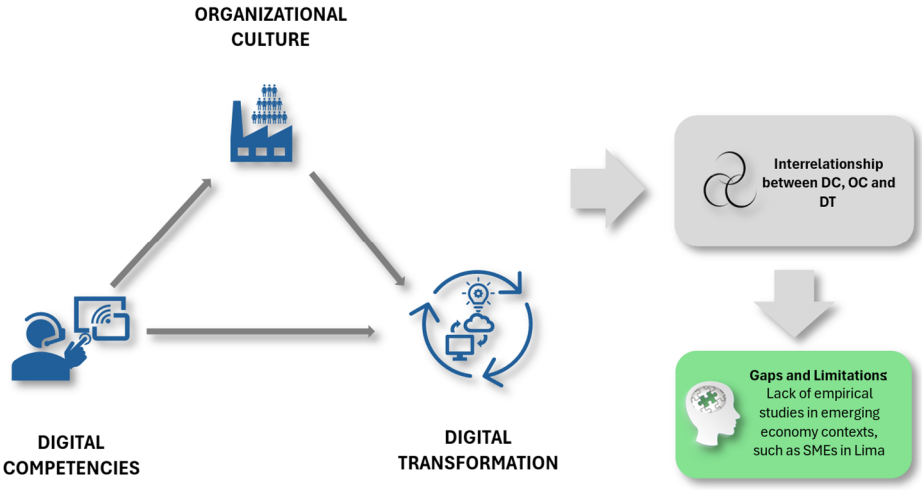

Figure 1. Interrelation among DCs, CO and TD in SMEs. Based on studies by Malewska et al. (Malewska et al., 2024), Espina-Romero and Guerrero-Alcedo (Espina-Romero & Guerrero-Alcedo, 2022), Dąbrowska et al. (Dąbrowska et al., 2022), Battistoni et al. (Battistoni et al., 2023), and Kagermann and Wahlster (Kagermann & Wahlster, 2022).

3. Hypothesis Development

The DT process in SMEs has gained importance in recent years, particularly in emerging economies like Lima, Peru. DCs and OC play a key role in how these organizations adopt and adapt to digital technologies. The following is the development of the hypotheses of this study, supported by previous studies.

3.1. DCs Have a Positive Impact on OC (H1)

DCs are a set of capabilities that enable organizations to use digital technologies effectively to enhance their performance and competitiveness. According to Rupeika-Apoga et al. (Rupeika-Apoga et al., 2022), DCs not only encompass technical skills but also a company's digital orientation, which includes the organization's willingness to use digital technologies. In the context of SMEs, these DCs can directly influence OC by fostering innovation and improving the management of knowledge and human resources.

Espina-Romero et al. (Espina-Romero et al., 2024a, 2024b) suggested, in both studies, that DCs allow companies to improve their human resources management, which positively influences OC. In other words, by effectively implementing digital technologies, SMEs can promote a more dynamic, innovative, and change-oriented OC. This is also supported by Aghazadeh et al. (Aghazadeh et al., 2024), who highlighted that DCs enable tech SMEs to better adapt to changes in the digital environment, thus strengthening cultural cohesion by promoting an environment of continuous learning and organizational resilience. Therefore, it is expected that DCs will positively impact the OC of SMEs.

3.2. DCs Have a Positive Impact on DT (H2)

DT is a multifaceted process that depends on the effective adoption of digital technologies to enhance business performance. DCs play a crucial role in this process by providing the necessary tools for SMEs to integrate digital technologies into their daily operations. According to Cheng et al. (Cheng et al., 2024b), DCs are essential for the successful implementation of digital technologies, enabling companies to collaborate more effectively in supply chains and generate sustainable innovations.

On the other hand, Zhang et al. (Zhang et al., 2024) highlighted that DCs are associated with the dynamic capabilities of organizations, which implies that companies must be agile and adapt quickly to technological changes. DCs not only improve operational capabilities

but also allow companies to effectively integrate digital resources, facilitating the DT process. Proksch et al. (Proksch et al., 2024) also pointed out that DT cannot be achieved without proper management of technological competencies, reinforcing the importance of these skills to ensure a high degree of digitalization in products, services, and processes. Therefore, it is proposed that DCs have a direct positive impact on the DT of SMEs, allowing them to effectively manage the adoption of new technologies.

3.3. OC Has a Positive Impact on the DT of the Company (H3)

The OC is a set of values, beliefs, and norms that influence the behavior and decisions of an organization. In the context of DT, OC can act as a key facilitator. According to Leso et al. (Leso et al., 2023), OC plays an essential role in facilitating the DT process, as companies with a culture oriented towards change and innovation are better positioned to adopt digital technologies. This relationship is reflected in the companies' ability to effectively manage their resources, structure, and leadership, elements that are fundamental during DT. Isensee et al. (Isensee et al., 2023) argued that OC can be both a driver and a barrier in DT, depending on how the values and beliefs within the company are managed. An OC that encourages employee empowerment and teamwork, as suggested by Alshammari et al. (Alshammari et al., 2024), can accelerate the digitalization process, while a more traditional culture may resist change. Consequently, a favorable OC, which supports innovation and change, is expected to have a positive impact on the DT of SMEs.

3.4. DCs Have an Indirect Impact on DT Through Their Influence on OC (H4)

The final hypothesis posits that DCs not only directly impact DT, but they also do so indirectly through their influence on OC. Espina-Romero et al. (Espina-Romero et al., 2024a, 2024b) asserted, in their two studies, that DCs enhance human resource management and create an OC that is more open to change, which, in turn, facilitates DT. This mediation process suggests that adopting DCs can generate a cultural environment that favors innovation and flexibility, allowing SMEs to adapt more easily to new technologies.

The idea that DCs indirectly influence DT through OC is supported by studies like those of Proksch et al. (Proksch et al., 2024), who argued that a strong digital culture is necessary to accelerate technological transformation. Additionally, Zhang et al. (Zhang et al., 2024) highlighted that when DCs are properly implemented, they promote an agile OC that supports ongoing change and adaptation to technological advances. In this regard, it is expected that DCs will indirectly impact DT through the creation of an OC that facilitates and promotes this process. In summary, the hypotheses developed in this study establish a clear and direct relationship among DCs, OC, and DT. The academic literature reviewed suggests that DCs not only directly impact the DT of SMEs but also influence it indirectly through OC, which acts as a key mediator in this process. Figure 2 shows the proposed conceptual model.

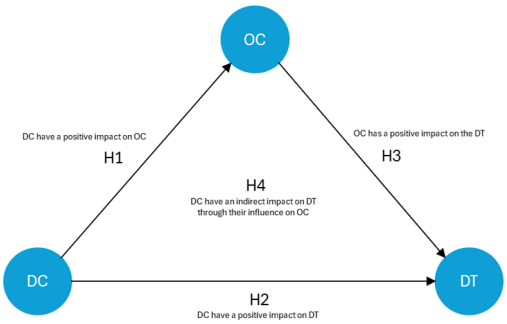

Figure 2. Conceptual model.

4. Materials and Methods

This study sought to analyze the impact of DCs and OC on the DT of SMEs in metropolitan Lima. The study design was non-experimental and cross-sectional (Hernández-Sampiere & Mendoza, 2018), meaning that data were collected at a single point in time, without manipulation of the variables. To achieve the objectives, quantitative methodologies based on structured surveys were employed, which were validated using SEM-PLS. The target population of the study consists of entrepreneurs operating in SMEs in Metropolitan Lima, a region that concentrates a high percentage of business activity in Peru. In total, 307 entrepreneurs were surveyed during the first quarter of 2024, all of whom are active entrepreneurs, excluding individuals who were inactive in business management. Although information on the academic degrees of the participants was collected, it was not used as an inclusion criterion but for descriptive purposes (Table 1). The sample selection was based on non-probabilistic sampling, using convenience and snowball sampling techniques.

Table 1. Demographic profile of 307 entrepreneurs.

Demographics	Frequency	Percentage
Gender		
Female	95	30.94%
Male	212	69.06%
Age		
24–40	103	33.55%
41–50	130	42.35%
51–71	74	24.10%
Academic degree		
Bachelor's degree	88	28.66%
Master's degree	101	32.90%
Licensed professional	58	18.90%
Technical degree	31	10.10%
PhD	17	5.54%
Specialist	12	3.90%

The instrument used for data collection was based on a questionnaire previously validated by Espina-Romero et al. (Espina-Romero et al., 2024a), originally designed to measure four variables: DCs, OC, digital human resource management (DHRM), and DT. However, in this study, only three of these variables were selected, namely DCs, OC, and DT, which are directly related to the study's objectives. The GDRH variable was excluded, as it was not directly relevant to the hypotheses proposed. Despite the exclusion of this variable, it was decided to maintain the original sample size of 307 surveys, since the data collected remained relevant for the three selected variables. Additionally, this sample size is considered adequate for structural equation modeling (SEM), according to the recommendations of Hair et al. (J. Hair et al., 2019). This approach ensuref the consistency and relevance of the statistical analyses performed, respecting the validity of the original instrument and ensuring comparability between studies.

The questionnaire included items measured using 5-point Likert scales (1 = strongly disagree, 5 = strongly agree), which captured the entrepreneurs' perceptions of the central topics of the study. The collected data were analyzed using SmartPLS4 software version

4.1.0.3 (Ringle et al., 2024; J. F. Hair et al., 2011) to apply the SEM-PLS method. This method was chosen for its ability to handle complex models with multiple latent variables and its effectiveness in studies with non-probabilistic samples. Additionally, SEM-PLS allows the estimation of both direct and indirect effects, which is essential for testing the study's hypotheses.

The data analysis was developed in several stages. First, the reliability and validity of the constructs were assessed using measures such as Cronbach's alpha, composite reliability, and reliability Rho (Cronbach, 1951; J. F. Hair et al., 2011). Convergent validity was also verified through the average variance extracted (AVE) and factor loadings, and discriminant validity was evaluated using the Fornell–Larcker criterion (Fornell & Larcker, 1981), cross-loadings, and the HTMT (heterotrait–monotrait ratio). Once the measurement model had been validated, the structural relationships among the constructs were evaluated. The hypotheses were tested by analyzing the direct effects among DCs, OC, and DT, as well as the mediating effect of OC. Additionally, the effect size (f^2) was calculated to quantify the magnitude of the associations among the constructs. Finally, the VAF (variance accounted for) was used to assess the degree of mediation of OC in the relationship between DCs and DT (Nitzl et al., 2016).

Regarding ethical considerations, all participants were informed about the objectives of the study and gave their consent to participate voluntarily. Furthermore, the confidentiality of the collected data was ensured, as the data were used exclusively for research purposes. Figure 3 shows the steps outlined in this Materials and Methods Section.

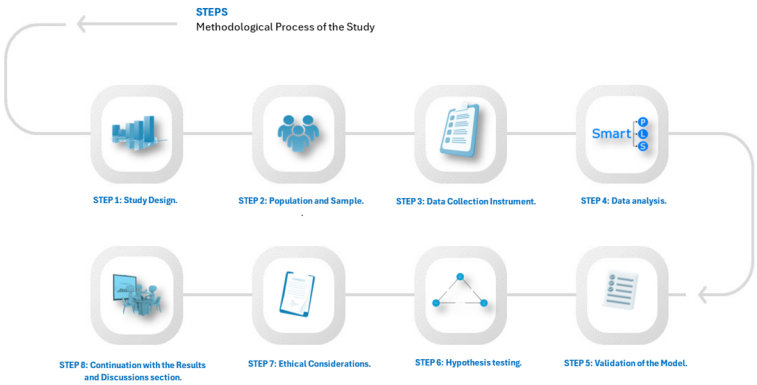

Figure 3. Methodological process of the study.

Statement of Generative AI and AI-Assisted Technologies in the Writing Process

We have used various programs and tools, currently including AI, to enhance our research. These include Microsoft Word for grammar and style suggestions, Microsoft Excel for data analysis, DeepL for accurate translations, ChatGPT for comparing translations, and Google Search for efficient information retrieval. It is important to emphasize that these resources do not replace our interpretation of the data or the extraction of scientific conclusions.

5. Results and Discussion

5.1. Cross-Loadings

The analysis of cross-loadings is crucial for assessing discriminant validity in structural equation models (SEM-PLS). This process verifies whether the items measuring a construct are more strongly related to their own construct than to others, ensuring that each item is adequately associated with the concept it intends to measure (Henseler et al., 2015; J. F. Hair et al., 2011). Table 2 presents the cross-loadings corresponding to the three key constructs: DCs, OC, and DT.

Table 2. Cross-loadings.

	DC	OC	DT
DC1	0.946	0.410	0.643
DC2	0.949	0.417	0.633
DC3	0.953	0.408	0.634
DC4	0.914	0.432	0.636
OC1	0.409	0.706	0.403
OC2	0.258	0.819	0.249
OC3	0.340	0.806	0.302
OC4	0.320	0.816	0.305
OC5	0.262	0.774	0.234
OC6	0.401	0.816	0.359
OC7	0.367	0.758	0.341
DT1	0.495	0.463	0.724
DT2	0.545	0.262	0.825
DT3	0.432	0.348	0.740
DT4	0.556	0.248	0.806
DT5	0.631	0.327	0.861

In analyzing the DCs, it is observed that items DC1 to DC4 have very high loadings on their own construct, with values ranging from 0.914 to 0.953. These loadings are significantly higher than the correlations with OC and DT, which are much lower, at 0.410 and 0.643, respectively. This pattern is consistent across the other items of the construct, demonstrating clear differentiation and, therefore, good discriminant validity for DCs, as the items are more strongly related to their own construct than to the other two.

In the case of OC, items OC1 to OC7 also show a high association with their own construct, with loadings ranging from 0.706 to 0.819. These loadings are higher in OC than in the other two constructs. For example, OC2 has a loading of 0.819 on its own construct, while its correlations with DCs and DT are much lower (0.258 and 0.249, respectively). However, some items, such as OC1 and OC6, present moderate correlations with DCs, with values of 0.409 and 0.401, suggesting a potential relationship between both constructs. Although these correlations do not exceed the loadings on their own construct, it could be useful to further explore the interaction between OC and DCs, especially in the context of the study on DT.

On the other hand, items associated with DT (DT1 to DT5) also show a greater relationship with their own construct than with the other two. The loadings of DT range from 0.724 to 0.861, exceeding the correlations of these items with DCs and OC. For example, DT5 has a loading of 0.861 in DT, while the correlations with DCs and OC are 0.631 and 0.327, respectively. Although this construct shows good discriminant validity, it is important to note that some items, like DT1 and DT4, present moderate correlations with DCs (0.495 and 0.556, respectively). This may indicate that DCs have some influence on DT, which is consistent with the hypotheses proposed in the study, where it is suggested that DCs directly affect DT.

In summary, the analysis of cross-loadings reveals that the items have higher loadings on their own constructs than on the others, indicating good discriminant validity in the model. The items associated with DCs, OC, and DT show a greater relationship with their

respective constructs, supporting differentiation among them. However, the moderate correlations between DCs and DT suggest an important interrelation that should be explored further, especially considering the relevance of DCs in the DT of SMEs, as postulated in the study hypotheses.

5.2. Heterotrait–Monotrait Ratio

The HTMT is a method used to assess discriminant validity in SEM-PLS (Henseler et al., 2015). Unlike the Fornell–Larcker criterion (Fornell & Larcker, 1981), which compares the extracted variances, the HTMT focuses on correlations between constructs, setting a threshold that, if exceeded, would indicate that the constructs are not sufficiently different from each other. Generally, an HTMT value below 0.85 is considered a good indicator of discriminant validity, although some studies allow a value of up to 0.90 in specific cases. Table 3 presents the HTMT values among the constructs DCs, OC, and DT, along with the confidence intervals of these values.

Table 3. Heterotrait–monotrait ratio criteria.

	DC	OC	DT
DC			
OC	0.462 [0.354–0.565]		
DT	0.744 [0.660–0.820]	0.460 [0.332–0.586]	

The HTMT value between DCs and OC is 0.462, with a confidence interval of [0.354–0.565]. This value is below the recommended threshold of 0.85, indicating that these two constructs are adequately differentiated. The confidence interval confirms that there is no excessively high correlation between DCs and OC, suggesting that both constructs are conceptually distinct. The moderate relationship between these constructs supports the idea that while DCs can influence OC, they are not so closely linked as to question their conceptual independence in the model.

On the other hand, the HTMT value between DCs and DT is 0.744, with a confidence interval of [0.660–0.820]. Although this value is higher than that observed between DCs and OC, it is still below the threshold of 0.85, indicating that DCs and DT also meet the criteria for discriminant validity. However, the closer relationship between these two constructs is consistent with the hypotheses of the study, which suggest that DCs are a key factor in the DT of SMEs. The confidence interval, although close to the upper limit of 0.85, does not exceed it, reinforcing the idea that the constructs are related but not to the point of being indistinguishable.

Finally, the HTMT value between OC and DT is 0.460, with a confidence interval of [0.332–0.586]. This value is like that observed between DCs and OC and is also below the threshold of 0.85. This suggests that although there is a relationship between OC and DT, both constructs are distinct enough to be considered independent in the model. The confidence interval also supports this conclusion, as the minimum and maximum values are distant from the critical threshold, reinforcing the discriminant validity between these two constructs.

Overall, the analysis of the HTMT values confirms that the three constructs (DCs, OC, and DT) meet the criteria for discriminant validity. None of the HTMT values exceed the threshold of 0.85, suggesting that the constructs are adequately differentiated and do not present conceptual overlap issues. The higher correlations observed between DCs and DT

are consistent with the study hypotheses but remain within acceptable limits to maintain the discriminant validity of the model.

5.3. Fornell–Larcker Criterion

The Fornell–Larcker criterion (Fornell & Larcker, 1981) is a technique used in structural equation modeling to assess the discriminant validity of constructs. This criterion suggests that the square root of the AVE (average variance extracted) for each construct should be greater than the correlations of that construct with others in the model. This ensures that the constructs measure distinct concepts and that there is no excessive overlap between them. Table 4 presents the results of the Fornell–Larcker criterion for the three constructs analyzed: DCs, OC, and DT.

Table 4. Fornell–Larcker criterion.

	DC	OC	DT
DC	0.940		
OC	0.443	0.786	
DT	0.677	0.413	0.793

Firstly, the diagonal of Table 4, which contains the square root of the AVE for each construct, shows that the corresponding figures are adequately higher than the correlations off the diagonal. For DCs, the square root of the AVE is 0.940, indicating that this construct has a strong ability to explain the variance of its own items. The correlations of DCs with OC and DT are 0.443 and 0.677, respectively. This suggests that DCs are sufficiently differentiated from the other two constructs, as the square root of the AVE is higher than these correlations. Although the correlation between DCs and DT is relatively high (0.677), the discriminant validity remains acceptable, given that the square root of the AVE for DCs is clearly higher.

For OC, the square root of the AVE is 0.786, which also indicates that this construct adequately explains the variance of its own items. The correlations of OC with DCs (0.443) and DT (0.413) are lower than the square root of the AVE, confirming that OC is well differentiated from the other constructs. Although there is a moderate correlation between OC and the other constructs, particularly with DCs, this difference between the correlations and the square root of the AVE is sufficient to affirm that OC has good discriminant validity in the model. Finally, for DT, the square root of the AVE is 0.793. The correlations of DT with DCs and OC are 0.677 and 0.413, respectively. As in the other cases, the square root of the AVE for DT is greater than the correlations with the other constructs, ensuring discriminant validity. However, like the case of DCs, the relatively high correlation between DT and DCs (0.677) could suggest a conceptually close relationship between both constructs, which is consistent with the hypotheses posed in the study, asserting that DCs influence DT.

In summary, this analysis confirms that the three constructs, DCs, OC, and DT, have good discriminant validity. The square roots of the AVE for each construct are higher than the correlations among the constructs, indicating that each measures a distinct concept and there is no significant overlap between them. Although the correlation between DCs and DT is higher than that in other cases, it remains within the acceptable limits, reinforcing the idea of an important interrelation between these constructs, as suggested by the hypotheses of the study.

5.4. Reliability and Validity Analysis of the Measurement Model

An analysis of reliability and validity of the measurement model is crucial in studies using SEM-PLS. In this context, Table 5 presents the reliability and validity results of the

three main constructs: DCs, OC, and DT. Following Table 5, a detailed analysis of these constructs is provided, based on the indicators used.

Table 5. Reliability and validity of the measurement model.

Construct	Loadings	Cronbach's Alpha	Rho	Composite Reliability	AVE
Digital competencies					
DC1	0.946	0.956	0.956	0.968	0.884
DC2	0.949				
DC3	0.953				
DC4	0.914				
Organizational culture					
OC1	0.706	0.897	0.902	0.919	0.618
OC2	0.819				
OC3	0.806				
OC4	0.816				
OC5	0.774				
OC6	0.816				
OC7	0.758				
Digital transformation					
DT1	0.724	0.851	0.859	0.894	0.629
DT2	0.825				
DT3	0.740				
DT4	0.806				
DT5	0.861				

The reliability of the constructs was evaluated using Cronbach's Alpha, Rho, and composite reliability (Sijtsma, 2009; Cronbach, 1951). Cronbach's Alpha measures the internal consistency of items associated with a construct, with values above 0.7 being acceptable. For DCs, the Cronbach's Alpha is 0.956, indicating excellent internal reliability, like Rho and composite reliability, both valued at 0.968. These results reflect a very high internal consistency among the items that make up this construct. In the case of OC, Cronbach's Alpha is 0.897, which is also a high value that denotes solid reliability, with a Rho of 0.902 and composite reliability of 0.919, reaffirming the internal consistency of the items.

For the DT construct, the reliability values are also acceptable, with a Cronbach's Alpha of 0.851, a Rho of 0.859, and composite reliability of 0.894, suggesting that the items related to this construct consistently measure what they should. On the other hand, the constructs' validity was assessed through convergent validity and discriminant validity. Convergent validity is measured via the average variance extracted (AVE) and factor loadings. For DCs, all factor loadings are above 0.9, indicating an excellent relationship between the items and the construct. Additionally, the AVE is 0.884, well above the threshold of 0.5, confirming high convergent validity. In OC, the factor loadings range from 0.706 to 0.819, reflecting adequate convergence between the items and the construct. The AVE for this construct is 0.618, meaning that the construct explains more than half of the variance of its items, thus showing acceptable convergent validity. For DT, the factor loadings range from 0.724 to 0.861, and the AVE is 0.629, also indicating adequate convergent validity for this construct.

Overall, the results indicate that all the analyzed constructs exhibit high internal reliability, as reflected in the high values of Cronbach's Alpha, Rho, and composite reliability. Regarding convergent validity, the constructs meet the necessary criteria, as the AVE values exceed the minimum threshold of 0.5, and the factor loadings are appropriate.

5.5. Test of Direct and Indirect Effects

The analysis in Table 6 presents the results of the direct and indirect effects, allowing an evaluation of the proposed hypotheses in this study on the impact of DCs and OC, and their influence on DT in SMEs of Lima. Each of the effects is analyzed below, along with the beta values (β), t-values, confidence intervals, *p*-values, and coefficient of determination (R^2).

Table 6. Summary of direct and indirect effect tests.

	β	t-Value	95% Confidence Interval	*p*-Value	R^2
Direct effect					
H1: DCs → OC	0.443	9.831	[0.361–0.535]	0.000	19.6%
H2: DCs → DT	0.615	14.245	[0.528–0.698]	0.000	47.4%
H3: OC → DT	0.141	2.642	[0.036–0.242]	0.008	
Mediator effect					VAF
H4: DCs → OC → DT	0.062	2.390	[0.015–0.118]	0.017	65.89%

Regarding the direct effect of DCs on OC (H1: DCs → OC), the β value is 0.443, indicating that DCs have a moderate positive impact on OC. This result is significant, as evidenced by the t-value of 9.831 and the *p*-value of 0.000, which is well below the typical threshold of 0.05, indicating high statistical reliability. The 95% confidence interval [0.361–0.535] reinforces this finding, as it does not include zero, confirming the positive impact. Additionally, the R^2 of 19.6% suggests that DCs explain approximately 19.6% of the variance in OC, meaning that while the effect is significant, there are other factors that also influence this construct.

The direct effect of DCs on DT (H2: DCs → DT) is also notably positive and strong, with a β of 0.615, indicating that as DCs improve, there is a significant increase in the capacity of SMEs to carry out a DT. This effect is highly significant, with a t-value of 14.245 and a *p*-value of 0.000, implying a robust relationship between DCs and DT. The 95% confidence interval [0.528–0.698] is completely above zero, confirming the positivity of the effect. The R^2 value of 47.4% suggests that nearly half of the variability in DT is explained by DCs, highlighting the importance of this factor in the digitalization process of businesses.

The direct effect of OC on DT (H3: OC → DT) is weaker compared with the previous ones, with a β of 0.141, but it is still positive and significant, as indicated by the t-value of 2.642 and the *p*-value of 0.008, which is below the threshold of 0.05. The 95% confidence interval [0.036–0.242] does not include zero, confirming that there is a positive relationship between OC and DT, albeit more limited compared with the direct effect of DCs. This result suggests that although OC influences DT, its impact is less relevant than that of DCs.

Finally, the analysis of the indirect or mediating effect (H4: DCs → OC → DT) shows how DCs influence DT through OC. The β value is 0.062, indicating a small but significant mediating effect, as evidenced by the t-value of 2.390 and the *p*-value of 0.017, which is below the significance level of 0.05. The 95% confidence interval [0.015–0.118] confirms that this indirect effect is positive. The percentage of variance explained (VAF) is 65.89%, indicating that a considerable proportion of the total effect of DCs on DT is mediated by OC. This result reinforces the hypothesis that DCs have not only a direct impact on DT,

but also an indirect impact through their influence on OC. The VAF is calculated using Equation (1), which is shown below (Nitzl et al., 2016).

$$\text{VAF} = \frac{0.443 \times 0.615}{0.443 \times 0.615 + (0.141)} = 0.6589 \cong 65.89\% \quad (1)$$

In summary, the analysis confirms that all proposed hypotheses are significant. DCs have a strong impact, both direct and indirect, on DT, partially mediated by OC. Although the effect of OC on DT is smaller compared with that of DCs, its mediating role is important and should be considered when designing strategies to improve DT in SMEs. Next, Figure 4 displays the structural model.



Figure 4. Structural model.

5.6. Effect Size Test

The analysis of Table 7 presents the results for the effect size (f^2), which assesses the magnitude of the impact that an independent variable has on a dependent variable in a structural model. This analysis is important because, in addition to identifying the statistical significance of the relationships (through *p*-values and t-values), the effect size measures the practical magnitude of these relationships, providing deeper context regarding the relevance of each predictor in the model. Generally, f^2 values are interpreted as follows: 0.02 indicates a small effect, 0.15 a medium effect, and 0.35 or higher indicates a large effect (Cohen, 2013; J. F. Hair et al., 2017).

Table 7. Summary of the effect size test.

Variable Path	f^2	t-Value	95% Confidence Interval	*p*-Value
DCs → OC	0.244	3.751	[0.150–0.402]	0.000
DCs → DT	0.578	4.350	[0.364–0.885]	0.000
OC → DT	0.030	1.208	[0.002–0.095]	0.227

Firstly, the effect size of DCs on OC (DCs → OC) has a value of $f^2 = 0.244$, indicating a medium effect. The t-value of 3.751 reinforces the significance of this relationship, as it exceeds the typical threshold of 1.96 for statistical significance at the 5% level. The 95% confidence interval [0.150–0.402] confirms that this effect size is relevant, since it does not include the value zero, reinforcing the idea that DCs have a considerable impact on OC. This suggests that, from a practical perspective, improving DCs in SMEs has a significant impact on creating an OC oriented towards innovation and transformation.

The effect size of DCs on DT (DCs → DT) is even more notable, with $f^2 = 0.578$, indicating a large effect. This value suggests that DCs have a very strong impact on the DT of SMEs. The t-value of 4.350, which is considerably higher than the significance threshold, along with the 95% confidence interval [0.364–0.885], reinforces that this effect is statistically significant and robust. This implies that DCs play a central role in the DT process, being the

main driver of change and technological adoption in these companies. The results suggest that investing in the development of DCs can have a transformative impact on the ability of SMEs to adapt and compete in a digital environment.

On the other hand, the effect size of OC on DT (OC → DT) is much smaller, with an f^2 = 0.030, indicating a very small effect. The t-value of 1.208 does not reach the significance threshold, and the *p*-value of 0.227 confirms that this relationship is not significant from a statistical standpoint. Additionally, the 95% confidence interval [0.002–0.095] includes the value of zero, reinforcing the lack of significance of this effect. This result suggests that while OC may have some impact on DT, its influence is limited compared with the direct impact of DCs. Practically speaking, this means that OC does not have a considerable weight in the ability of SMEs to implement DT, at least not to the same extent as DCs.

In summary, this analysis shows that DCs have a much stronger and more significant impact on both the OC and DT of SMEs, compared with the effect of OC on DT. This finding highlights the importance of prioritizing the development of DCs within SMEs as a key strategy to promote DT. Although OC may play a role, its influence is secondary in this context. Figure 5 shows the results of testing the hypotheses.

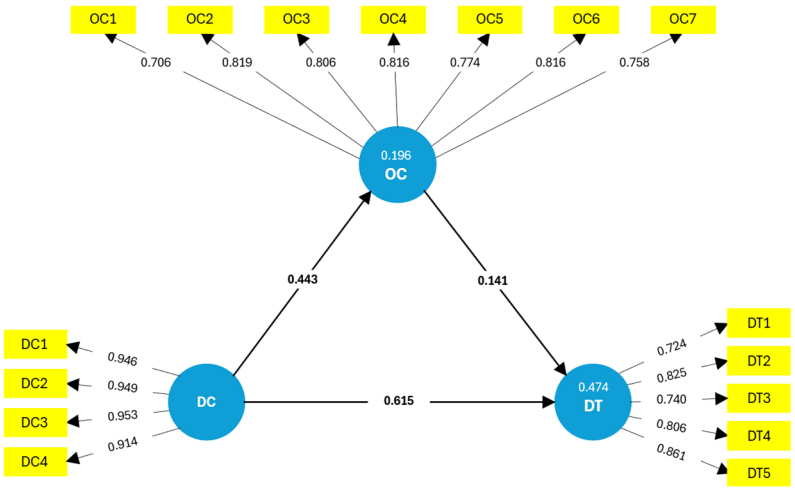

Figure 5. Results of the PLS-SEM.

5.7. Discussion

The results of this study provide empirical evidence supporting the hypotheses posed regarding the relationship among DCs, OC, and DT in SMEs in Lima. The analysis of the direct effects reveals that DCs have a significant positive impact on OC (H1), with an effect size (f^2) of 0.244, indicating a considerable influence. This finding is consistent with previous studies, such as that of Rupeika-Apoga et al. (Rupeika-Apoga et al., 2022), who argued that DCs enable organizations to improve digital orientation and readiness to implement technologies, thereby reinforcing a more dynamic and adaptive OC. Espina-Romero et al. (Espina-Romero et al., 2024a) also emphasized that DCs are key to enhancing human resource management and, therefore, positively influence OC by promoting a more innovative and technologically advanced work environment. The results of this study confirm that DCs not only enhance the technological capabilities of SMEs but also transform the way these companies manage their internal culture, fostering an organizational environment more oriented towards change and innovation.

Regarding DT, the results show that DCs have a strong and significant direct impact (H2), with a β of 0.615 and an effect size of 0.578, making it the main driving factor of DT in SMEs in Lima. This is consistent with the study by Aghazadeh et al. (Aghazadeh et al., 2024), who argued that DCs are crucial for managing technology platforms and for

developing digital resilience, enabling SMEs to adopt new technologies and digital business models more effectively. Zhang et al. (Zhang et al., 2024) also highlighted that DCs allow organizations to enhance their operational capabilities and adapt to technological changes, which are essential for successful DT. These results reinforce the importance of investing in DCs as a key element to drive the digitalization process in SMEs, a finding that aligns with studies that emphasize the direct relationship between technological competencies and the adoption of digital technologies.

The direct impact of OC on DT (H3) proved to be significant but much weaker compared with that of DCs, with a β of 0.141 and an f^2 of 0.030, indicating a small effect. This finding is partly consistent with the literature. For instance, Leso et al. (Leso et al., 2023) emphasized that OC facilitates DT, although this effect heavily depends on other factors such as leadership and organizational structure. In the context of SMEs, where resources may be limited, OC might not have such a strong impact on DT by itself, which aligns with the results obtained here. Isensee et al. (Isensee et al., 2023) pointed out that OC can be both a facilitator and a barrier to DT, which might explain why, in some cases, its influence is not as significant as that of other factors, like DCs. In this study, although OC plays a role in DT, its impact is more moderate, suggesting that SMEs need more than just a favorable culture to drive technological change.

The analysis of the mediating effect (H4) shows that DCs also have an indirect impact on DT through OC, although this effect is relatively small, with a β of 0.062 and a VAF of 65.89%, indicating partial mediation. This finding reinforces the idea that OC acts as a mechanism through which DCs influence DT, but its influence is limited. Espina-Romero et al. (Espina-Romero et al., 2024a) highlighted that a favorable OC can enhance the impact of DCs on transformation, especially when human resource management is aligned with the technological objectives. However, the results suggest that although OC can moderate the relationship between DCs and DT, its role is not as predominant as that of DCs themselves. This is consistent with the views presented by Zhang et al. (Zhang et al., 2024), who noted that organizations need not only a receptive culture but also strong technical competencies to meet the challenges of digitalization.

When comparing these results with the reviewed literature, DCs are the most relevant factor in driving DT in SMEs. The reviewed studies, such as those by Aghazadeh et al. (Aghazadeh et al., 2024) and Proksch et al. (Proksch et al., 2024), emphasized the central role that DCs play in the adoption of technologies, which is fully supported by the findings of this study. While OC also plays a role in this process, its impact is more limited, as suggested by studies like that of Isensee et al. (Isensee et al., 2023), which is also reflected in the results obtained. The mediation of OC in the relationship between DCs and DT is significant but moderate, suggesting that although it is important to cultivate a receptive OC, developing DCs remains the key strategy for SMEs to achieve successful DT. In conclusion, the results confirm and expand the findings of the existing literature, highlighting the importance of DCs as the main driver of DT, while OC acts as a moderator that can facilitate this process, albeit with a more limited impact.

6. Conclusions

This study has empirically demonstrated that digital competencies are a critical and essential factor in the process of digital transformation in small and medium-sized enterprises (SMEs). DCs, with a significant direct impact (β = 0.615; f^2 = 0.578), stand out as the main driver of DT by facilitating the integration of digital technologies and the organizational adaptation to constantly evolving environments. Additionally, this study reveals that DCs also exert an indirect influence on DT through organizational culture, which acts as a partial mediator by creating an environment that is receptive to technological change.

Building on these findings, the theoretical contributions, practical implications, and other key reflections of this study are outlined below.

From a theoretical perspective, this work significantly enhances the understanding of the role of DCs and OC in the DT of SMEs in emerging economies, such as Lima, Peru. The empirical results validate the fact that DCs are a key and direct determinant of DT, providing robust evidence that supports previous theories on the importance of technological capabilities in adopting digital models. Moreover, the study highlights the partial mediation of OC, which, while having a lesser impact compared with DCs, serves as a relevant moderator to facilitate the transformation process. This finding offers a new perspective on the existing literature by emphasizing that the success of DT does not depend solely on technological capabilities but also on how these are integrated into a favorable and receptive OC. This theoretical contribution is particularly valuable for advancing the academic discussion on DT in SMEs, especially in the context of emerging economies.

The results of this study hold not only theoretical implications but also significant practical value. For SMEs in Lima, Peru, the analysis identifies DCs as the main driver of DT, suggesting that companies should prioritize the development of technological skills among their employees and invest in advanced digital platforms and technological infrastructure. Furthermore, the research highlights that OC, although not the main factor, acts as a facilitator that amplifies the success of DT. Therefore, business leaders should foster a culture that promotes innovation, flexibility, and readiness for technological change. Aligning DCs with a receptive OC allows companies to better adapt to the demands of the digital environment while enhancing their competitiveness and sustainability.

Additionally, the findings offer practical applications from both an engineering and managerial perspective. From an engineering standpoint, the study highlights the importance of integrating digital technologies into SMEs' operational and strategic processes, including tools such as digital management systems, data analysis, and process automation. These implementations not only optimize DT but also enable more efficient data-driven decision-making. On the other hand, from a managerial perspective, the study emphasizes the need for business leaders to prioritize training in DCs and foster an adaptive OC. As demonstrated in this study, DT does not solely rely on technological infrastructure but also on how managers lead this change by aligning technological strategies with organizational goals.

Although the study focuses on SMEs in Lima, its findings have the potential to be generalized to other emerging economies facing similar challenges in technological adoption and DT. DCs are confirmed as a key factor in transforming companies, a finding that can be applied to SMEs across various geographic contexts and sectors. However, the influence of OC may vary depending on specific cultural and organizational factors, which suggests that the implementation of these findings should be tailored to the local particularities of each region. Despite these variations, the results provide a solid foundation to guide SMEs in their DT process, especially in regions with resource limitations and technological challenges like those in Lima.

Finally, this study opens several avenues for future research. It would be valuable to explore how other factors, such as digital leadership or open innovation, might meditate or moderate the impact of DCs on DT. Additionally, expanding this analysis to other geographical contexts or industrial sectors could evaluate the applicability of the findings in emerging economies or specific industries, such as manufacturing or services. Future research could also examine how external factors, such as governmental support or public policies, influence the speed and success of DT. Moreover, incorporating the study of emerging technologies like artificial intelligence or the Internet of Things would be key to understanding the constantly evolving technological landscape.

Despite its contributions, this study has several limitations. The non-experimental and cross-sectional design prevents the establishment of causal relationships among the variables analyzed, as the data were collected at a single point in time. Furthermore, the use of non-probabilistic sampling limits the representativeness of the sample, and although 307 entrepreneurs were included, the results cannot be fully generalized to all SMEs in the region. Additionally, the data relied on the entrepreneurs' perceptions of their DCs, OC, and DT, which could introduce subjective biases, as objective measures such as investments in digitalization or digital performance metrics were not included. Finally, the focus on Lima restricts the applicability of the findings to other contexts, suggesting the need for extending this analysis to other regions or countries to evaluate the generalizability of the results.

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References

Aghazadeh, H., Zandi, F., Mahdiraji, H. A., & Sadraei, R. (2024). Digital transformation and SME internationalisation: Unravelling the moderated-mediation role of digital capabilities, digital resilience and digital maturity. *Journal of Enterprise Information Management*, *37*, 1499–1526. [CrossRef]

Alshammari, K. H., Alshallaqi, M., & Al-Mamary, Y. H. (2024). Digital transformation dilemma in the era of changing dynamics: How organizational culture influence the success of digital transformation. *Human Systems Management*, *43*, 455–472. [CrossRef]

Arabeche, Z., Soudani, A., Brahmi, M., Aldieri, L., Vinci, C. P., & El Amine Abdelli, M. (2022). Entrepreneurial orientation, organizational culture and business performance in SMEs: Evidence from emerging economy. *Sustainability*, *14*, 5160. [CrossRef]

Battistoni, E., Gitto, S., Murgia, G., & Campisi, D. (2023). Adoption paths of digital transformation in manufacturing SME. *International Journal of Production Economics*, *255*, 108675. [CrossRef]

Bhuiyan, M. R. I., Faraji, M. R., Rashid, M., Bhuyan, M. K., Hossain, R., & Ghose, P. (2024). Digital transformation in SMEs emerging technological tools and technologies for enhancing the SME's strategies and outcomes. *Journal of Ecohumanism*, *3*, 211–224. [CrossRef]

Bradač Hojnik, B., & Huđek, I. (2023). Small and medium-sized enterprises in the digital age: Understanding characteristics and essential demands. *Information*, *14*, 606. [CrossRef]

Cheng, S., Fan, Q., & Dagestani, A. A. (2024a). Opening the Black box between strategic vision on digitalization and SMEs digital transformation: The mediating role of resource orchestration. *Kybernetes*, *53*, 580–599. [CrossRef]

Cheng, W., Li, Q., Wu, Q., Ye, F., & Jiang, Y. (2024b). Digital capability and green innovation: The perspective of green supply chain collaboration and top management's environmental awareness. *Heliyon*, *10*, e32290. [CrossRef]

Chiu, M.-C., Huang, Y.-J., & Wei, C.-J. (2024). Enhancing SMEs digital transformation through machine learning: A framework for adaptive quality prediction. *Journal of Industrial Information Integration*, *41*, 100666. [CrossRef]

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge. [CrossRef]

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297–334. [CrossRef]

Dąbrowska, J., Almpanopoulou, A., Brem, A., Chesbrough, H., Cucino, V., Di Minin, A., Giones, F., Hakala, H., Marullo, C., Mention, A.-L., Mortara, L., Nørskov, S., Nylund, P. A., Oddo, C. M., Radziwon, A., & Ritala, P. (2022). Digital transformation, for better or worse: A critical multi-level research agenda. *R&D Management*, *52*, 930–954. [CrossRef]

Espina-Romero, L., & Guerrero-Alcedo, J. (2022). Fields touched by digitalization: Analysis of scientific activity in scopus. *Sustainability*, *14*, 14425. [CrossRef]

Espina-Romero, L., Parra, D. R., Hurtado, H. G., Rodriguez, E. P., Arias-Montoya, F., Noroño-Sánchez, J. G., Talavera-Aguirre, R., Corzo, J. R., & Pirela, R. A. V. (2024a). The role of digital transformation and digital competencies in organizational sustainability: A study of SMEs in Lima, Peru. *Sustainability*, *16*, 6993. [CrossRef]

Espina-Romero, L., Parra, D. R., Noroño-Sánchez, J. G., Rojas-Cangahuala, G., Cajo, L. E. C., & Velásquez-Tapullima, P. A. (2024b). Navigating digital transformation: Current trends in digital competencies for open innovation in organizations. *Sustainability*, *16*, 2119. [CrossRef]

Fernando, W., Madushan, H., Niles Perera, R. M., Ratnayake, C., & Thibbotuwawa, A. (2024). Assessing the digital transformation maturity of SMEs: A systematic literature review. In *2024 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT & NCON)* (pp. 427–432). IEEE. [CrossRef]

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39–50. [CrossRef]

Gupta, S., & Jagtap, S. (2024). Unlocking digital growth: Overcoming barriers to digital transformation for indian food SMEs. *Discover Food*, *4*, 55. [CrossRef]

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: A comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science*, *45*, 616–632. [CrossRef]

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*, 139–152. [CrossRef]

Hair, J., Risher, J., Sarstedt, M., & Ringle, C. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*, 2–24. [CrossRef]

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*, 115–135. [CrossRef]

Hernández-Sampiere, R., & Mendoza, C. P. (2018). *Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta* (vol. 10). Mc Graw Hill Educatión.

Hu, H. A., Tseng, H. T., Mou, J., & Kim, J. (2023, October 19–23). *From adoption to adaptation: Bridging digital transformation and AI integration in contemporary SMEs*. 23rd International Conference on Electronic Business, ICEB 2023 (Vol. 23, pp. 291–302), Chiayi, Taiwan. Available online: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85181403784&partnerID=40&md5=c8429b0750ab2aec0304395ea6481eae (accessed on 15 September 2024).

Isensee, C., Teuteberg, F., & Griese, K.-M. (2023). How can corporate culture contribute to emission reduction in the construction sector? An SME case study on beliefs, actions, and outcomes. *Corporate Social Responsibility and Environmental Management*, *30*, 1005–1022. [CrossRef]

Kagermann, H., & Wahlster, W. (2022). Ten years of industrie 4.0. *Sci*, *4*, 26. [CrossRef]

Klein, V. B., & Todesco, J. L. (2021). COVID-19 Crisis and SMEs responses: The role of digital transformation. *Knowledge and Process Management*, *28*, 117–133. [CrossRef]

Leso, B. H., Cortimiglia, M. N., & Ghezzi, A. (2023). The contribution of organizational culture, structure, and leadership factors in the digital transformation of SMEs: A mixed-methods approach. *Cognition, Technology & Work*, *25*, 151–179. [CrossRef]

Malewska, K., Cyfert, S., Chwiłkowska-Kubala, A., Mierzejewska, K., & Szumowski, W. (2024). The missing link between digital transformation and business model innovation in energy SMEs: The role of digital organisational culture. *Energy Policy*, *192*, 114254. [CrossRef]

Merín-Rodrigáñez, J., Dasí, À., & Alegre, J. (2024). Digital transformation and firm performance in innovative SMEs: The mediating role of business model innovation. *Technovation*, *134*, 103027. [CrossRef]

Mihu, C., & Herciu, M. (2024). Digital transformation: A quantitative analysis of romanian SMEs. *Studies in Business and Economics*, *19*, 137–166. [CrossRef]

Nitzl, Christian, J. L. R., & Cepeda, G. (2016). Mediation analysis in partial least squares path modeling. *Industrial Management & Data Systems*, *116*, 1849–1864. [CrossRef]

Proksch, D., Rosin, A. F., Stubner, S., & Pinkwart, A. (2024). The Influence of a digital strategy on the digitalization of new ventures: The mediating effect of digital capabilities and a digital culture. *Journal of Small Business Management*, *62*, 1–29. [CrossRef]

Ringle, C. M., Wende, S., & Becker, J.-M. (2024). SmartPLS 4. Available online: https://www.smartpls.com (accessed on 15 September 2024).

Rupeika-Apoga, R., Petrovska, K., & Bule, L. (2022). The effect of digital orientation and digital capability on digital transformation of SMEs during the COVID-19 pandemic. *Journal of Theoretical and Applied Electronic Commerce Research*, *17*, 669–685. [CrossRef]

Sijtsma, K. (2009). On the use, the misuse, & the very limited usefulness of cronbach's alpha. *Psychometrika*, *74*, 107–120. [CrossRef] [PubMed]

Zhang, M., Chen, X., Xie, H., Esposito, L., Parziale, A., Taneja, S., & Siraj, A. (2024). Top of tide: Nexus between organization agility, digital capability and top management support in SME digital transformation. *Heliyon*, *10*, e31579. [CrossRef] [PubMed]

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