

Measurement of digital maturity in medium-sized companies in the municipality of Tecomán, Colima, Mexico

Medición de la madurez digital de las empresas medianas del municipio de Tecomán, Colima, México

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ABSTRACT

The present study aims to analyze the digital maturity of medium-sized companies in the municipality of Tecoman, Colima, Mexico, and the relation it as with the gender or level of study of the leader of the organization, by applying the Forrester four-dimension model. For this purpose, a mixed approach is used, selecting a sample of 40 economic units out of a total of 47 in the municipality, all medium-sized companies with between 51 and 250 employees. As a result, it was observed that the gender and level of education of the person in charge has no influence on the digital maturity of medium scale business.

Keywords: digital maturity; medium size companies; gender.

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Resumen

El presente estudio busca analizar la madurez digital de las empresas medianas del municipio de Tecomán, Colima, México y su relación con el género y grado de estudios de la persona responsable de la organización, haciendo uso del modelo Forrester de cuatro dimensiones. Para ello se emplea un enfoque mixto, seleccionando una muestra de 40 unidades económicas de un total de 47 que existen en la municipalidad, todas empresas medianas con entre 51 y 250 empleados. Se observa como resultado que el género y el nivel de estudios de la persona a cargo de la empresa, no tiene influencia directa en la madurez digital de esta.

Palabras clave: madurez digital; empresas medianas; género.

1. Introduction

The relentless march of technology and its transformative influence on business operations and market competition necessitates a comprehensive understanding and evaluation of corporate digital maturity levels. Despite this imperative, there is a conspicuous absence of studies focusing on the digital maturity of medium-sized companies in the municipality of Tecomán, Colima.

This oversight concerning the digital maturity levels of companies in the region could have detrimental repercussions for their competitive standing and the overall health of the local economy. As Silva et al. (2022) astutely observed, the strategic adoption and effective utilization of advanced digital technologies can endow companies with a competitive advantage, streamline operations, reduce costs, and elevate customer satisfaction. Conversely, failure to embrace and leverage these technologies can result in missed opportunities for growth and business expansion, and a subsequent erosion of market competitiveness.

Furthermore, the failure to gauge the digital maturity of companies in the municipality of Tecomán, Colima, could have wider ramifications for economic development. A study by the Economic Commission for Latin America and the Caribbean (ECLAC) posits that the adoption of digital technologies by companies can catalyze productivity and competitiveness on a national and regional scale (ECLAC, 2020).

Consequently, the crux of the problem lies in the neglect of measuring the digital maturity of medium-sized companies in the municipality of Tecomán, Colima, and its potential repercussions on competitiveness and local economic growth.

The Forrester model serves as a robust tool for measuring digital maturity and has been utilized extensively in diverse studies and research within the business domain. A comprehensive literature review conducted by Hein-Pensel et al. (2023) scrutinized various digital maturity models and concluded that the Forrester model is well-documented and aptly suited for application in the present study.

A study by Pinto et al. (2023) employed a five-dimension model focusing on strategy, market, operations, culture, and technology to gauge the digital maturity of the retail industry in an

emerging economy. The authors found that most of the companies evaluated demonstrated a low level of digital maturity. They posited that a company must cultivate capabilities across these five dimensions to attain digital maturity and, consequently, competitive advantages.

In another study, Yang et al. (2023) assessed the adoption of information and digital technologies for sustainable smart manufacturing systems in the context of Industry 4.0. The authors found that the adoption of advanced technologies and the bolstering of innovation capacity could significantly enhance the digital maturity of manufacturing companies.

The primary objective of this study is to analyze the digital maturity of medium-sized companies in Tecomán, Colima, and ascertain its correlation with variables such as the gender of the person in charge or manager, their level of education, and the nature of the business.

The Forrester model for measuring digital maturity is a potent tool that empowers companies to evaluate their readiness for digital transformation and their competitiveness in the digital era. The model is predicated on four principal dimensions: strategy, structure, culture, and technology. Each dimension comprises distinct elements that are used to assess a company's maturity level in that specific area.

As per an article by Forrester Research, the digital maturity model 4.0 emphasizes “the company's capacity to adapt to the challenges and opportunities of the digital economy, and generate value for customers, employees, and shareholders through the integration of technology, processes, and culture” (VanBoskirk and Gill, 2016).

The strategy dimension pertains to the company's strategic use of technology to realize its business objectives. The structure dimension focuses on the company's organization and management, and how these influence its capacity to innovate and adapt to technological shifts. The culture dimension relates to the company's values, attitudes, and behaviors towards technology and innovation. Finally, the technology dimension zeroes in on the infrastructure and technological tools the company deploys to achieve its objectives.

To implement the Forrester model, an evaluation is carried out in each dimension using specific questions, and a scale is used to measure the company's maturity level in that area. Based on the maturity level, areas that need enhancement can be pinpointed, and a strategic action plan can be formulated to foster greater digital maturity.

This study, therefore, aims to assess the digital maturity of medium-sized companies in Tecomán, Colima. It will provide valuable insights into the current state of digital maturity in the region and offer actionable recommendations for companies to improve their digital capabilities. This, in turn, could contribute to enhancing the competitiveness of these companies and stimulate local economic development.

2. Methodology

This study was designed to assess digital maturity in medium-sized businesses located in a city in Mexico. Out of the forty-seven medium-sized businesses operating in the city, forty were selected for the survey, ensuring a comprehensive representation of the business landscape. The data collected was complete, with no missing entries.

Digital maturity was evaluated across four key dimensions: Culture, Organization, Technology, and Insights. Each dimension was carefully examined to provide a holistic view of the businesses' digital maturity. Descriptive statistics were used to summarize and interpret the data.

Gender-based differences were scrutinized using an independent sample t-test, providing insights into the potential influence of gender on digital maturity. A One-Way ANOVA was employed to assess the impact of the education level of the business leader on digital maturity. All data analysis was performed using SPSS software version 26, ensuring rigorous and reliable results. Interpretations were made with a 95% confidence level, reinforcing the validity of the findings.

Considering the research problem and the specific objectives outlined, the following hypotheses were proposed for the study:

Hypothesis 1: Most medium-sized companies in the municipality of Tecomán, Colima, exhibit a low level of digital maturity in terms of the adoption of advanced technologies and innovation capacity.

This hypothesis draws on findings from previous studies that have measured digital maturity. These studies have frequently found a correlation between low digital maturity and a lack of regional economic digitalization policy (Tutak & Brodny, 2022).

Hypothesis 2: The level of digital maturity of medium-sized companies does not significantly differ based on the gender of the person in charge or manager.

This hypothesis is predicated on the notion that the gender of the business leader should not significantly impact the company's ability to adopt advanced technologies or enhance its innovation capacity. While gender differences exist in job roles and levels of business management participation, there is no evidence to suggest that these differences directly influence the digital maturity of companies (Hirpa Tufa et al., 2022).

Hypothesis 3: Medium-sized companies led by managers with a higher level of education will demonstrate a higher level of digital maturity compared to companies led by managers with a lower level of education.

This hypothesis assumes that managers with a higher level of education may possess a more comprehensive understanding of advanced technologies and a greater capacity for innovation. Prior studies have indicated that the education level of managers can influence their ability to adopt technologies and enhance company productivity (Skare et al., 2023).

The hypotheses formulated for this study provide a clear direction for the research and will guide the analysis of the data collected. The results of this study will contribute to a better understanding of the factors influencing digital maturity in medium-sized businesses in the municipality of Tecomán, Colima, and could inform strategies for enhancing digital maturity in this context.

3. Results

3.1 Demographics of the person in charge of the business

Table 1. Gender and Education level of the person in charge of the studied businesses

Parameter	N	%
Gender		
Male	19	47.5
Female	21	52.5
Level of Study		
Secondary Technical	5	12.5
Graduates	27	67.5
Bachelors	3	7.5
Masters	5	12.5

Source: Author's own

As depicted in Table 1, the sample was slightly skewed towards females, who constituted 52.5% of the individuals in charge of the businesses. This suggests a relatively balanced gender distribution among the leadership of the businesses studied, which is a positive indication of gender diversity in the business landscape of Tecomán, Colima.

In terms of education level, the majority (67.5%) of the individuals in charge of the businesses were graduates, indicating a high level of educational attainment among business leaders in the region. This could potentially influence the businesses' approach to digital transformation and their ability to adapt to technological changes.

A significant proportion (12.5%) of the individuals in charge had a master's degree, suggesting a presence of advanced academic qualifications among the business leaders. This could potentially correlate with a higher level of digital maturity, as individuals with advanced degrees might have a better understanding of advanced technologies and a greater capacity for innovation.

On the other hand, 12.5% of the individuals had secondary technical level education, and only 7.5% had bachelor's degrees. This indicates a certain level of diversity in educational backgrounds among the business leaders, which could influence the businesses' digital maturity in various ways. The diversity in both gender and educational attainment among the individuals in charge of the businesses provides a rich context for analyzing the digital maturity of medium-sized companies in Tecomán, Colima. It allows for a nuanced understanding of how different demographic factors might interact with digital maturity and provides a foundation for further analysis and interpretation of the data.

3.2 Descriptive Statistics

The study utilized a questionnaire composed of 27 questions, divided into four major themes. The table below presents the descriptive statistics of the responses for each question.

Table 2. Descriptive statistics of the questions used in the study.

Question	Mean	SD	Interpretations
Culture			
We believe our competitive strategy depends on the digital aspect.	2.02	0.7	Agree
The highest-ranking individuals in the company support our digital strategy.	2.17	0.75	Agree
We have the right leaders to execute our digital strategy on a daily basis.	2.03	0.77	Agree
We invest in education and digital training focused on all levels of our organization.	1.85	0.83	Agree
We clearly communicate our digital vision both internally and externally. We take measured risks to allow for innovation.	1.98	0.89	Agree
We prioritize the overall customer experience over the performance of any individual channel.	2.13	0.72	Agree
Organization			
Our organizational structure prioritizes customer journeys over functional silos.	1.82	0.75	Agree
We allocate the appropriate resources to digital strategy, governance, and execution.	1.9	0.9	Agree
The staff supporting our critical digital functions are best in class.	1.85	0.8	Agree
We have digital skills integrated throughout our organization.	2	0.88	Agree
Our organizational model fosters cross-functional collaboration.	2.2	0.65	Agree
We have developed repeatable processes for managing digital programs.	1.82	0.71	Agree
Our supplier partners offer value that enhances our digital competencies.	1.88	0.82	Agree
Technology			
Our technology budget is flexible to allow for changing priorities.	1.9	0.9	Agree
Our marketing and technology resources work together to co-create our digital technology roadmap.	1.87	0.99	Agree
We have a flexible, iterative, and collaborative approach to technology development.	1.9	0.84	Agree
We leverage modern architectures (APIs, cloud, etc.) to promote speed and flexibility.	1.82	0.96	Agree
We measure our technology teams by business outcomes, not just system uptime.	1.83	0.84	Agree
We use customer experience assets, such as personas and journey maps, to guide our technology design.	1.58	0.78	Disagree
We use digital tools to promote innovation, collaboration, and employee mobility.	2	0.75	Agree
Insights			
We have clear and quantifiable goals to measure the success of our digital strategy.	1.98	0.77	Agree
All employees understand how their performance relates to corporate digital objectives.	2	0.75	Agree
We use customer-centric metrics such as Net Promoter Score or lifetime value to measure success.	1.23	0.97	Disagree
We measure how channels work together to achieve a desired outcome.	1.73	0.91	Disagree
Customer insights actively drive our digital strategy.	1.42	0.84	Disagree
Customer insights inform digital design and development.	1.57	0.84	Disagree
We feed lessons learned from digital programs into our strategy.	1.75	0.78	Agree

Source: Author's own

As illustrated in Table 2, respondents generally agreed with most of the statements. However, they disagreed with five questions, namely: “We use customer-centric metrics such as Net Promoter Score or lifetime value to measure success.”, “Customer insights actively drive our digital strategy.”, “We use customer experience assets, such as personas and journey maps, to guide our technology design.”, “We measure how channels work together to achieve a desired outcome.”, and “Customer insights inform digital design and development.” It’s also noteworthy that there were no questions that respondents strongly agreed or disagreed with.

3.3 Reliability of the constructs

The reliability of the constructed questions under each subsection was analyzed. Table 3 below presents the results.

Table 3. Reliability of the questionnaire constructs used in the study.

Subcategory	Number of items	Cronbach's alpha
Culture	6	.874
Organization	7	.892
Technology	7	.916
Insights	7	.906

Source: Author's own

As indicated in Table 3, all four constructs have Cronbach's alpha values exceeding .70, suggesting high internal consistency within each construct. This high level of reliability allows for further analysis of the data with confidence in its consistency and reliability.

Table 4: Descriptive statistics of the sub sections. Average response was taken for each of the subsection. Following shows the results.

Subcategory	Mean	SD
Culture	2.03	0.61
Organization	1.93	0.62
Technology	1.84	0.71
Insights	1.67	0.67
Overall response	1.86	0.60

Source: Author's own

As shown in Table 4, the mean scores for the Culture, Organization, Technology, and overall response lie between 1.75 and 2.25, indicating an agreed level of digital maturity. However, the mean score for Insights shows some level of disagreement.

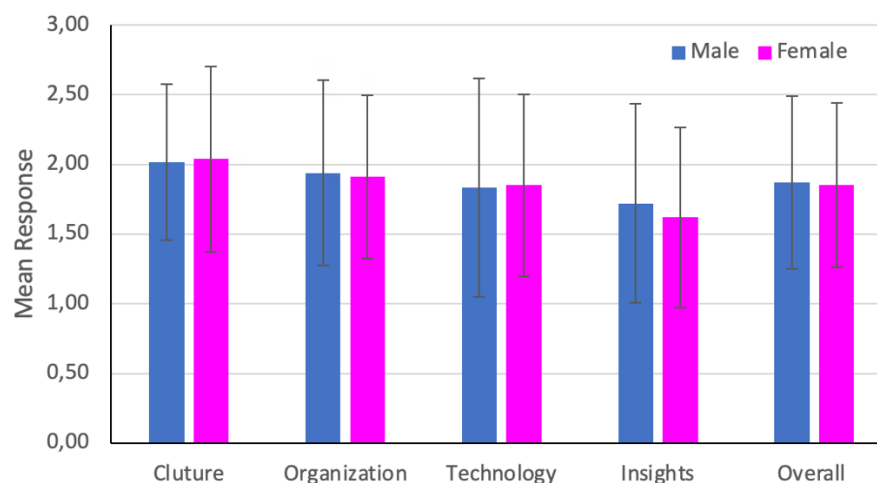
These findings suggest that while businesses generally agree on the importance of culture, organization, and technology in digital maturity, there is some disagreement or uncertainty regarding the role of insights. This could indicate a potential gap in understanding the importance of data-driven insights in digital transformation, which could be an area for further exploration and education.

Furthermore, the high reliability of the constructs suggests that the questionnaire is a reliable tool for assessing digital maturity. This adds credibility to the findings and provides a solid foundation for further analysis and interpretation of the data.

3.4 Impact of Gender on Digital maturity

An independent sample t-test was conducted to evaluate the gender-based differences in the digital maturity of the studied organizations.

Figure 1: Mean Response of the male and female business in charge persons on the digital maturity



Source: Author's own

As depicted in Figure 1, females ($M = 2.04$, $SD = .67$) had a slightly higher mean score on culture than males ($M = 2.02$, $SD = .56$). However, the results of the independent sample t-test indicated that this difference was not statistically significant, $t(38) = .11$, $p = .911$. This suggests that both males and females recognize the importance of culture in digital maturity to a similar extent.

Males ($M = 1.94$, $SD = .66$) had a slightly higher mean score on organization than females ($M = 1.91$, $SD = .59$). Again, the independent sample t-test showed that this difference was not statistically significant, $t(38) = .14$, $p = .887$. This indicates that both genders perceive the role of organization in digital maturity similarly.

Females ($M = 1.85$, $SD = .66$) had a slightly higher mean score on technology than males ($M = 1.83$, $SD = .78$). However, the independent sample t-test revealed that this difference was not statistically significant, $t(38) = .06$, $p = .945$. This suggests that both males and females value the role of technology in digital maturity to a similar degree.

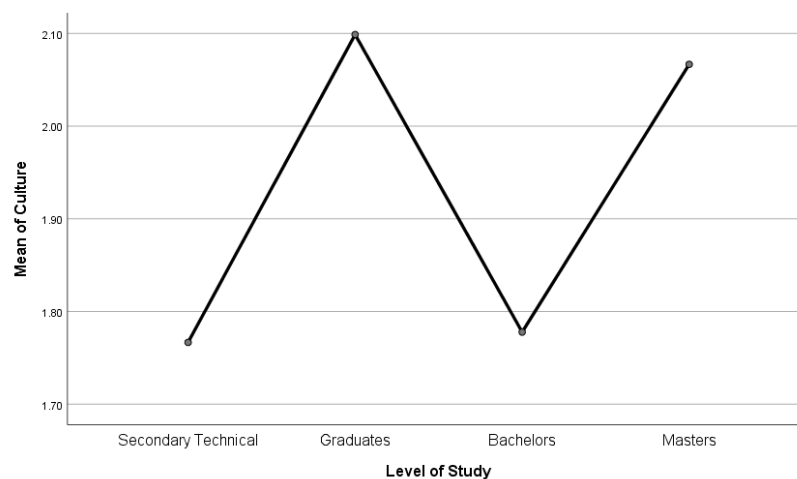
Males ($M = 1.72$, $SD = .71$) had a slightly higher mean score on insights than females ($M = 1.62$, $SD = .65$). Yet, the independent sample t-test showed that this difference was not statistically significant, $t(38) = .48$, $p = .636$. This indicates that both genders understand the importance of insights in digital maturity similarly.

Overall, males ($M = 1.87$, $SD = .62$) had a slightly higher mean score than females ($M = 1.85$, $SD = .59$) for all questions. However, the independent sample t-test indicated that this difference was not statistically significant, $t(38) = .14$, $p = .892$.

These findings suggest that the gender of the person in charge does not significantly impact the perceived digital maturity of the businesses. Both males and females appear to have a similar understanding and valuation of the different aspects of digital maturity, including culture, organization, technology, and insights. This reinforces the idea that digital maturity is not gender-dependent but rather influenced by a variety of other factors such as education, experience, and organizational culture.

3.5 Impact of level of Education on the Digital Maturity

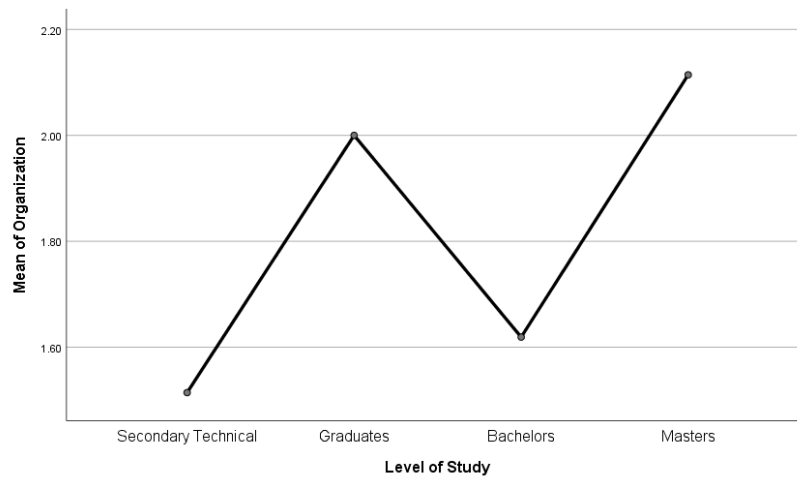
Figure 2: Variation of mean response for culture against level of education



Source: Author's own

As shown by the figure 2, the highest mean culture score was reported for Graduates ($M = 2.10$, $SD = .66$) and the lowest was for Secondary technical level ($M = 1.77$, $SD = .45$). An one way analysis of variance showed that the effect of education level on culture was not significant, $F(3,36) = .58$, $p = .631$.

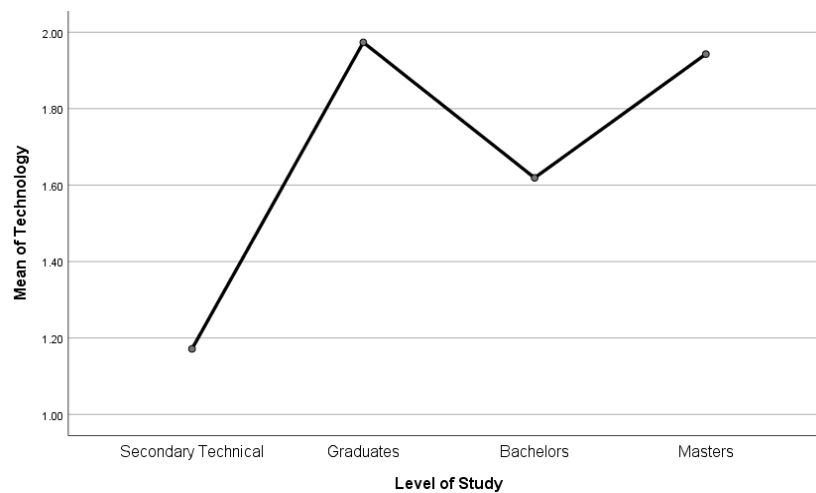
Figure 3: Variation of mean response for organization against level of education



Source: Author's own

As shown by the figure 3, the highest mean culture score was reported for masters ($M = 2.11$, $SD = .53$) and the lowest was for Secondary technical level ($M = 1.51$, $SD = .39$). A one-way analysis of variance showed that the effect of education level on organization was not significant, $F(3,36) = 1.31$, $p = .287$.

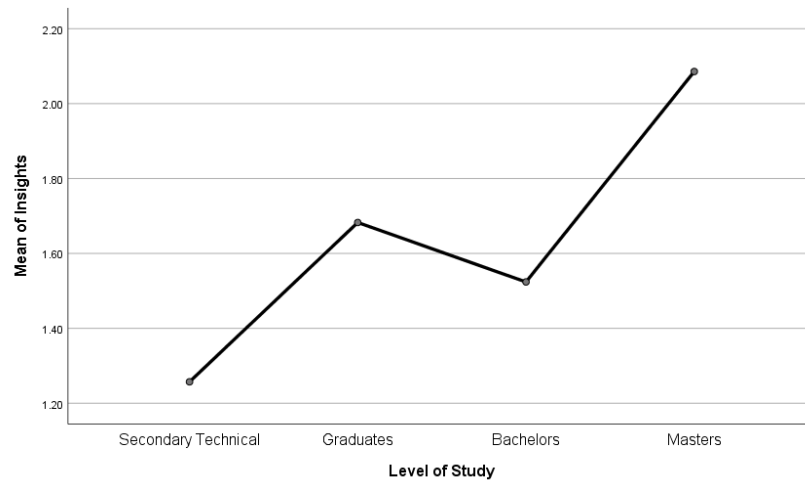
Figure 4: Variation of mean response for technology against level of education



Source: Author's own

As shown by the figure 4, the highest mean culture score was reported for Graduates ($M = 1.97$, $SD = .73$) and the lowest was for Secondary technical level ($M = 1.17$, $SD = .60$). A one-way analysis of variance showed that the effect of education level on technology was not significant, $F(3,36) = 2.09$, $p = .118$.

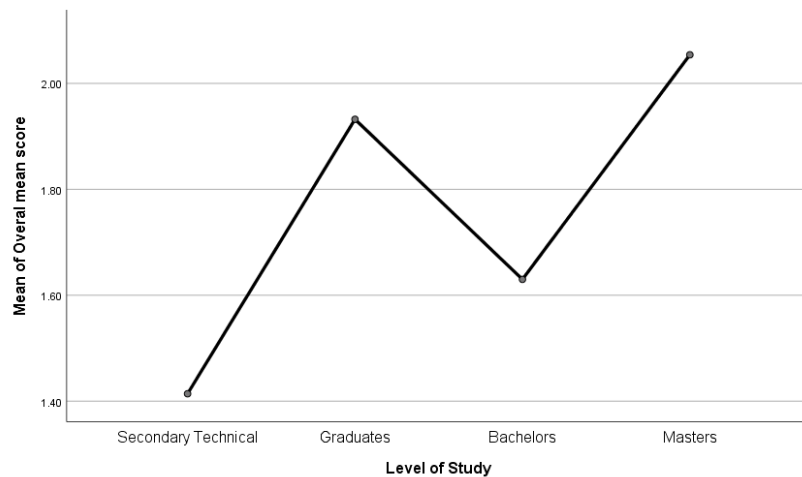
Figure 5: Variation of mean response for insights against level of education



Source: Author's own

As shown by the figure 5, the highest mean culture score was reported for masters ($M = 2.08$, $SD = .28$) and the lowest was for Secondary technical level ($M = 1.26$, $SD = .49$). An one way analysis of variance showed that the effect of education level on insights was not significant, $F(3,36) = 1.35$, $p = .274$.

Figure 6: Variation of mean response for all questions against level of education



Source: Author's own

As shown by the figure 6, the highest mean culture score was reported for masters ($M = 2.05$, $SD = .34$) and the lowest was for Secondary technical level ($M = 1.41$, $SD = .37$). A one-way analysis of variance showed that the effect of education level on overall score was not significant, $F(3,36) = 1.44$, $p = .247$.

4. Discussion

The purpose of this study was to analyze the digital maturity of medium-sized companies in the municipality of Tecomán, Colima, Mexico, and explore its relationship with the gender and level of education of the person in charge. The results provide valuable insights into the current state of digital maturity among these businesses and highlight areas for further exploration and improvement.

The results showed that the gender of the person in charge does not significantly impact the perceived digital maturity of the businesses. This finding is consistent with the hypothesis and aligns with previous research suggesting that digital maturity is not gender dependent (Hirpa Tufa et al., 2022). This reinforces the idea that digital maturity is influenced by a variety of factors such as education, experience, and organizational culture, rather than gender alone.

Similarly, the level of education of the person in charge does not significantly impact the perceived digital maturity of the businesses. This finding contradicts the hypothesis and diverges from previous studies suggesting that managers with a higher level of education may have a better understanding of advanced technologies and a greater ability to innovate (Skare et al., 2023). This discrepancy could be due to differences in the sample or context of the study, and further research is needed to explore this relationship in more detail.

The results also revealed areas where improvement is needed in terms of digital maturity. Particularly, the role of customer insights in driving digital strategy and informing digital design and development seems to be undervalued. This could indicate a potential gap in understanding the importance of customer-centric approaches in digital transformation, which is a key aspect of digital maturity (Pinto et al., 2023).

Furthermore, the disagreement with the statement about using customer-centric metrics to measure success suggests that businesses may be relying on traditional metrics, which may not fully capture the impact of digital strategies. This could potentially limit their ability to effectively evaluate and optimize their digital transformation efforts.

The disagreement with the statement about measuring how channels work together to achieve a desired outcome could indicate a lack of integrated multi-channel strategies. This could potentially hinder businesses' ability to provide a seamless customer experience across different channels, which is a key aspect of digital maturity (Yang et al., 2023).

These findings contribute to the understanding of digital maturity in medium-sized companies in Tecomán, Colima, and provide a basis for further research and action. However, they should be interpreted with caution due to the limitations of the study. The sample size was relatively small and limited to one municipality, which may limit the generalizability of the findings. Further research with larger and more diverse samples is needed to confirm these findings and explore other potential factors influencing digital maturity.

5. Conclusion

Responses were highly reliable as internal consistency was high. Gender has no significant impact on the four sub sections scores as well as on overall score for digital maturity. Similarly, it was found that no significant influence of level of education on the four sub sections scores and overall score for digital maturity. It is concluded that the gender and level of education of the person in charge has no influence on the digital maturity of medium scale business in the City of Tecoman, Colima, Mexico.

In conclusion, this study provides valuable insights into the digital maturity of medium-sized companies in Tecomán, Colima, and highlights the importance of customer-centric approaches and integrated multi-channel strategies in digital transformation. The findings suggest that digital maturity is not significantly influenced by the gender or level of education of the person in charge, but rather by a variety of other factors such as education, experience, and organizational culture. These findings provide a foundation for further research and action to enhance digital capabilities and competitiveness among businesses in the region.

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STATEMENT

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