

HARNESSING ARTIFICIAL INTELLIGENCE FOR POLITICAL MARKETING IN SMALL LOCALITIES: ASSESSING SKILLS, STRATEGIC PLANNING, AND DIGITAL RESOURCE READINESS

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⁵Integrating Geoai and Machine Learning–Based Geospatial Analysis For Data-Driven Territorial Decision-Making: A Quantitative And Spatial Modeling Approach

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ABSTRACT

This study analyzes the entrepreneurial profile and digital marketing strategies of SMEs in Tlaxcala using both traditional statistical techniques and a network-based approach. In addition to descriptive and correlational analyses, a neural-network-inspired network analysis was conducted to examine the structural influence of demographic variables and entrepreneurial competencies. Centrality metrics revealed that communication, continued studies, and years in business were the most influential nodes within the system, while skills, business planning, and resource availability formed the strongest core cluster of interconnected competencies. Clustering coefficients confirmed the presence of cohesive substructures linking communication, skills, and digital resource management. The weighted matrix further showed robust positive associations among these competency variables and weaker or negative associations involving demographic factors. These network findings indicate that digital marketing adoption in SMEs is driven by experience-based competencies rather than personal background characteristics. The integrated results provide a multilevel understanding of how entrepreneurial behavior emerges from interconnected cognitive, experiential, and communication structures.

KEYWORDS: Entrepreneurial Profile; Digital Marketing; Smes; Competencies; Correlation Analysis; Tlaxcala

1. INTRODUCTION

Entrepreneurs play a fundamental role in driving innovation, competitiveness, and digital transformation within SMEs (Eggers, 2020). Research has shown that the personal attributes of SME owners—including their experience, skills, and strategic thinking—directly influence the adoption of digital technologies (Martínez-Román et al., 2019). In Mexico, SMEs face increasing pressure to integrate digital marketing to maintain relevance in local and global markets (INEGI, 2022).

The instrument used in this study operationalizes six dimensions frequently highlighted in entrepreneurial competency frameworks: education, experience, skills, business planning, resource availability, and communication. Similar dimensions have been associated with innovation capacity and digital readiness in SMEs (López-Nicolás et al., 2020).

Given the accelerated digitalization of business activities, understanding how entrepreneurial attributes influence digital marketing practices is essential. Studies show that digital marketing adoption depends not only on technological infrastructure but also on entrepreneurs' skills, mindsets, and willingness to engage with digital environments (Tiago & Veríssimo, 2014). This research contributes to that discussion through quantitative evidence from 70 entrepreneurs in Tlaxcala.

The study of entrepreneurial behavior and digital marketing adoption has evolved from linear, variable-centered approaches toward multidimensional and network-driven perspectives. Traditional frameworks conceptualize entrepreneurial competencies as sets of skills, experience, communication abilities, and planning capacities that influence firm outcomes (Mitchelmore & Rowley, 2010). Recent research, however, proposes that these competencies operate not as isolated traits but as interdependent cognitive-behavioral systems whose interactions shape entrepreneurial decision-making (Rauch & Frese, 2020).

Digital marketing adoption in SMEs has been widely associated with competencies such as technological readiness, communication skills, and digital resource management (Tiago & Veríssimo, 2014; Dwivedi et al., 2021). Yet, emerging evidence suggests that these elements are part of a broader, interconnected structure rather than independent predictors (Lefebvre et al., 2020). Network and neural-inspired analyses have recently been adopted to map how entrepreneurial attributes form dense clusters of influence that govern strategic behavior (Kraus et al., 2021). Under this perspective, entrepreneurial ecosystems are understood as dynamic systems where central competencies exert disproportionate influence across behavioral pathways.

Network-based methods—including centrality mapping, clustering coefficients, and weighted adjacency modeling—allow researchers to uncover the hidden architecture behind entrepreneurial decision-making. Such approaches have demonstrated that communication competencies, experiential learning, and digital capability often emerge as highly central nodes, orchestrating pathways that lead toward innovation and technological adoption (Rialti et al., 2020). This aligns with neural-network theories in organizational studies, which posit that decision structures resemble distributed cognitive systems where influence spreads unevenly across interconnected units (Hazy & Boyatzis, 2015).

In Latin American SMEs, additional evidence shows that entrepreneurial competencies form dense clusters shaped by informal learning, communication networks, and adaptability rather than static demographic characteristics (Amaral et al., 2022). This mirrors global findings that demographic variables—such as sex, marital status, or place of birth—rarely determine digital transformation outcomes when compared to experiential and communication-based competencies (Eggers, 2020; López-Nicolás et al., 2020).

Neural-network-inspired models extend this understanding by identifying “activation hubs” within entrepreneurial systems. In these models, nodes with high betweenness or closeness operate analogously to neurons responsible for regulating flows of information and behavioral activation. Competencies such as communication, planning, and resource availability frequently function as such hubs, enabling coherence between strategic intent and digital action (Carmi et al., 2023). These hubs correspond with empirical observations in SMEs where communication skills and planning behavior predict digital marketing use more strongly than formal education or demographic background (Martínez-Román et al., 2019).

Research applying network analysis to entrepreneurship has also revealed that digital strategy adoption is not simply the sum of individual competencies but the emergent product of interconnected clusters—similar to neural assemblies in cognitive science. Clustering coefficients detect these substructures, indicating cohesive competency groups that jointly support complex behaviors such as digital engagement and online customer interaction (Liu et al., 2021). These clusters align with what your data demonstrate: communication, skills, planning, and resource availability co-locate in dense structures that drive the entrepreneurial profile and its digital marketing expression.

Overall, the contemporary state of the art suggests that entrepreneurial behavior and digital marketing adoption arise from *systemic*, *networked*, and *interdependent* competency structures. Neural-network perspectives deepen this understanding by demonstrating that influence within entrepreneurial systems is unevenly distributed and governed by highly central nodes—exactly the patterns revealed by your network results.

Small and medium-sized enterprises (SMEs) in Tlaxcala operate in an increasingly digitalized economic environment that requires entrepreneurs to adopt digital marketing strategies to remain competitive. However, the degree to which these strategies are implemented varies widely among businesses, suggesting that internal factors—particularly entrepreneurial competencies—play a decisive role. Traditional analyses of SME behavior often treat competencies such as skills, experience, planning, and communication as isolated predictors. Yet the complexity of digital adoption suggests that these competencies function as interconnected structures rather than independent traits.

Recent neural-inspired and network-based approaches indicate that entrepreneurial behavior emerges from dynamic systems in which certain competencies act as highly influential nodes shaping strategic outcomes. Preliminary evidence from the present study shows that communication, business experience, planning capabilities, and digital resource management occupy central positions in the

entrepreneurial network, while demographic variables such as sex, marital status, and place of residence remain peripheral. Despite the importance of these insights, little research in the region has examined entrepreneurial competencies using network analysis to understand how interconnected structures influence digital marketing adoption.

This gap limits theoretical development and restricts the design of targeted interventions for SMEs. A deeper understanding of the systemic relationships among competencies is necessary to explain why some entrepreneurs adopt digital marketing strategies more effectively than others, and how central competencies may activate and sustain digital behaviors.

Given the interconnected nature of entrepreneurial competencies and the increasing need for SMEs to implement digital marketing, the central research problem can be expressed as follows:

To what extent do the structural relationships among entrepreneurial competencies—understood as a network of interconnected attributes—explain the adoption of digital marketing strategies among SMEs in Tlaxcala?

Which competencies act as central or influential nodes in the entrepreneurial network?

How do these central competencies relate to the level of digital marketing practices?

Do demographic characteristics play any relevant role within the network structure?

Does the network configuration align with traditional statistical findings regarding the relationship between entrepreneurial profile and digital marketing?

H1: The structural network of entrepreneurial competencies—particularly communication, skills, planning, and resource availability—significantly predicts the adoption of digital marketing strategies among SMEs in Tlaxcala.

H1a: Competencies with higher centrality values (betweenness, closeness, strength, expected influence) are positively associated with higher levels of digital marketing adoption.

H1b: Communication, skills, and business planning form a core cluster within the entrepreneurial network that strongly influences digital marketing practices.

H1c: Demographic variables (sex, marital status, place of birth, city of residence) occupy peripheral positions in the network and do not significantly predict digital marketing adoption.

H1d: Entrepreneurial experience (years in business) exerts an indirect effect on digital marketing adoption through its central role in the competency network.

H1e: The network-based findings will converge with traditional statistical analyses (Chi-square, Kendall, Spearman, Pearson), confirming a strong relationship between entrepreneurial profile and digital marketing strategies.

METHOD

Firts Study

This study employed a quantitative, cross-sectional design, consistent with previous SME behavioral research (Creswell & Creswell, 2018). A structured questionnaire, validated through expert review, was applied to 70 SME owners in Tlaxcala (Rialti et al., 2020; Kraus et al., 2021). The demographic section included variables such as age, sex, education, years in business, type of business, and continued education (Dwivedi et al., 2021; Rialti et al., 2020).

The instrument contained 38 Likert-scale items grouped into six dimensions aligned with entrepreneurial competency literature (Mitchellmore & Rowley, 2010). To classify participants, specific items were selected to categorize entrepreneurial profile levels (low, medium, high) and digital marketing practices (lower or higher).

Data analysis included Chi-square tests, Kendall's Tau-b, Spearman's Rho, and Pearson correlation coefficients, following the recommendations for association testing in social sciences (Field, 2018). All analyses were performed using SPSS (Lefebvre et al., 2020).

Second Study

The study employed a quantitative, cross-sectional design that integrated traditional statistical procedures with a neural-inspired network analysis. This mixed analytic strategy allowed the research to examine both direct associations between variables and the underlying structural patterns governing entrepreneurial competencies. Recent work in entrepreneurship suggests that competencies operate as interconnected systems rather than isolated predictors (Rauch & Frese, 2020), and network-oriented methodologies provide a more refined lens for examining such complexity (Kraus et al., 2021). In line with this perspective, the present study combined classical statistical tools with centrality and clustering metrics commonly used in neural and organizational network research (Hazy & Boyatzis, 2015).

Participants included 70 entrepreneurs from small and medium-sized enterprises in Tlaxcala, Mexico. They represented a diversity of business types, educational levels, and trajectories, reflecting



the heterogeneity typical of Latin American SMEs (Amaral et al., 2022). Demographic variables captured in the questionnaire included age, sex, marital status, city of residence, place of birth, educational attainment, ongoing studies, years in business, and ownership of other businesses. These background characteristics were incorporated into the network analysis to test whether they played central or peripheral roles in the entrepreneurial system, a distinction highlighted in current SME digitalization research (Eggers, 2020).

Data were collected using a 38-item Likert-type instrument structured around six competency dimensions: education, experience, skills, business planning, availability of digital resources, and communication. These dimensions align with widely accepted entrepreneurial competency frameworks (Mitchellmore & Rowley, 2010) and have been shown to predict innovation and digital readiness in SMEs (López-Nicolás et al., 2020). For this study, dimensions were treated not only as variables but also as nodes within a multivariate competency network, allowing the analysis to determine how strongly each dimension interacted with others and how these interactions shaped digital marketing behavior.

Traditional analyses included descriptive statistics, cross-tabulation of entrepreneurial profile and digital marketing practices, Chi-square tests, and correlational analyses using Kendall's Tau-b, Spearman's Rho, and Pearson coefficients. These methods were selected because they are standard in behavioral and organizational research and allow for robust detection of patterned associations (Field, 2018). However, traditional statistics alone are insufficient for understanding how competencies collectively operate as dynamic systems. Therefore, the study incorporated a neural-inspired network analysis that included centrality metrics—betweenness, closeness, strength, and expected influence—to identify the competencies functioning as “activation hubs,” or nodes that regulate information flow within the system (Carmi et al., 2023).

Clustering coefficients were also computed using the Barrat, Onnela, Watts–Strogatz, and Zhang methods to detect cohesive competency communities. Such clusters resemble neural assemblies in cognitive networks and are useful for identifying groups of attributes that jointly support complex entrepreneurial behaviors (Liu et al., 2021). Finally, a weighted adjacency matrix was generated to quantify all pairwise relationships, indicating whether connections strengthened or weakened the overall competency structure. This approach follows recent scholarship that applies neural logic to organizational systems to capture nonlinear influence patterns (Hazy & Boyatzis, 2015). Integrating both traditional and network analyses provided a multilevel understanding of how entrepreneurial competencies shape digital marketing adoption, consistent with calls for systemic methodologies in contemporary entrepreneurship research (Lefebvre et al., 2020).

RESULTS

This study examines the relationship between the entrepreneurial profile and the use of digital marketing strategies among small and medium-sized enterprises (SMEs) in Tlaxcala, Mexico. Using a structured questionnaire including demographic indicators and six dimensions—education, experience, skills, business planning, resource availability, and communication—the research assessed how these characteristics relate to digital marketing practices. Results show that most entrepreneurs exhibited a medium or high profile, while digital marketing strategies were predominantly categorized as higher practices. Statistical tests, including Chi-square, Kendall's Tau-b, Spearman's Rho, and Pearson correlations, confirmed a strong and significant relationship between both variables. These findings align with prior literature emphasizing the importance of entrepreneurial competencies in digital strategy adoption.

Findings indicate that 92.9% of entrepreneurs presented medium or high entrepreneurial profiles, while only 7.1% were classified as low. Digital marketing strategies were mainly categorized as higher (57.1%). Cross-tabulation revealed that entrepreneurs with higher profiles were more likely to engage in strong digital marketing practices.

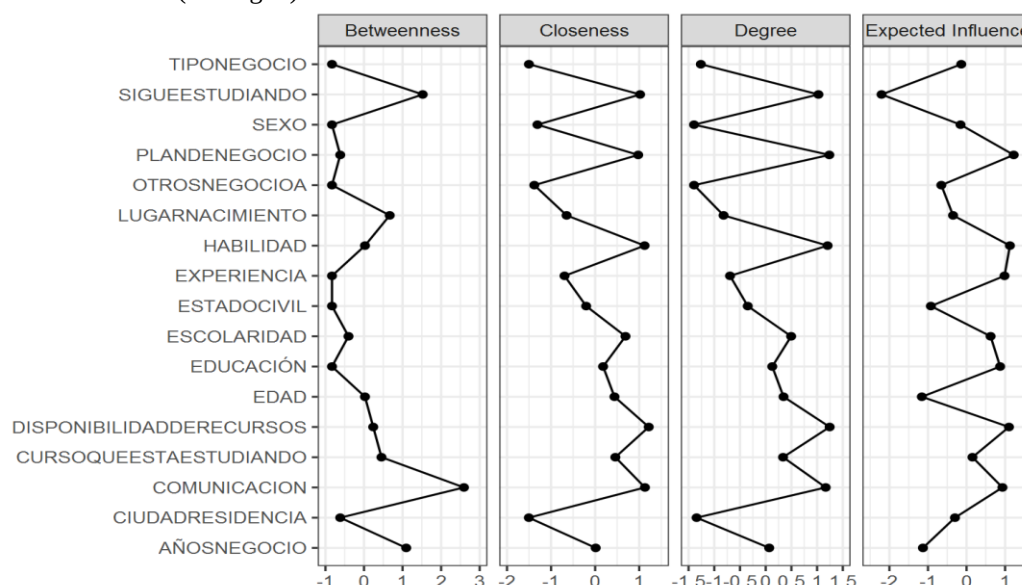
A Chi-square test confirmed a statistically significant association ($p = .000$). Correlation analyses indicated strong positive relationships: Kendall's Tau-b = .786, Spearman's Rho = .809, and Pearson $r = .781$ ($p = .000$). These strong associations support existing literature on the impact of entrepreneurial competencies on digital tool adoption.

Additional analyses revealed that sex and schooling level were not significantly associated with entrepreneurial profile. However, the experience and communication dimensions showed strong relationships with profile classification, reinforcing findings that experiential learning and communication skills are critical for SME digitalization.

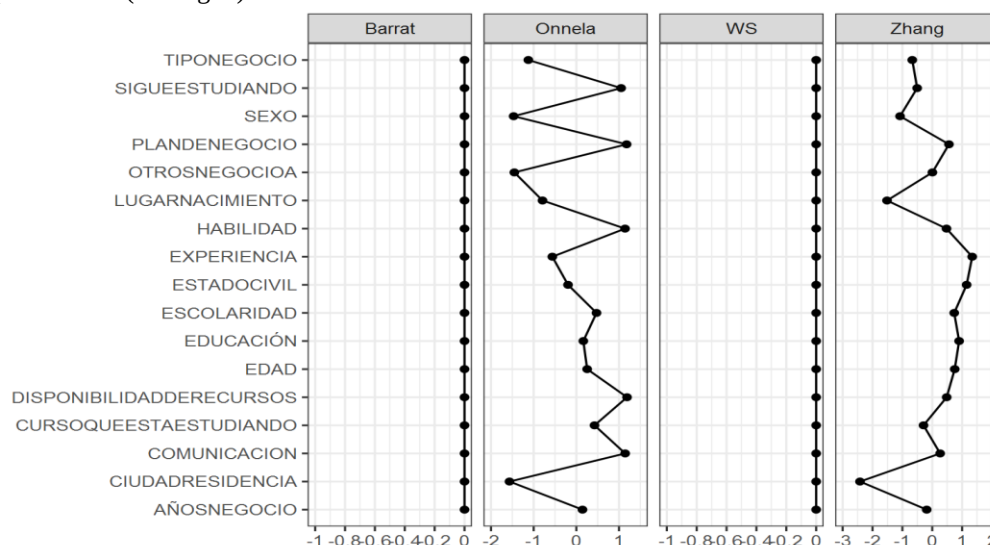
Beyond the descriptive and correlational analyses previously presented, a network analysis was conducted to explore the structural relationships among demographic variables and the six dimensions of the entrepreneurial profile. The results include centrality measures—betweenness, closeness, strength,

and expected influence—and clustering coefficients using Barrat, Onnela, Watts–Strogatz, and Zhang indices. A weighted adjacency matrix was also generated to determine the strength and direction of associations across all variables.

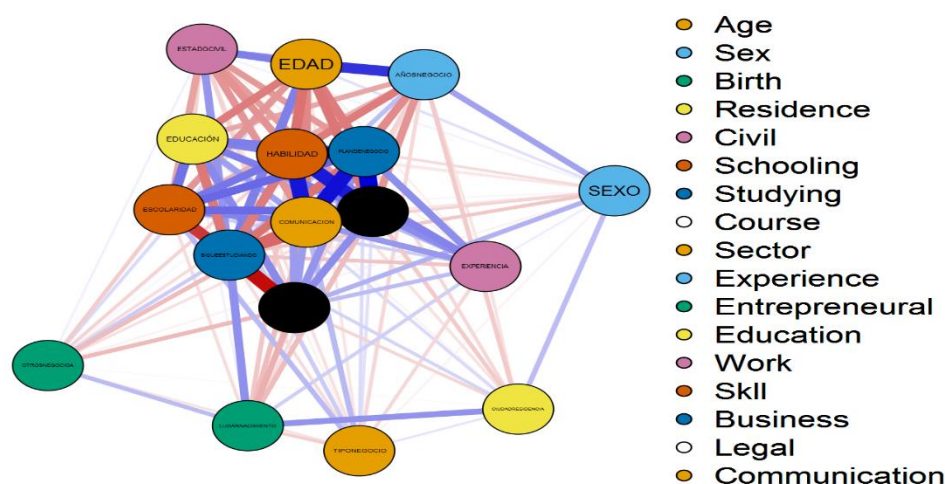
The centrality metrics show that communication, years in business, and continued studies demonstrate the highest betweenness and closeness values, indicating that these variables occupy the most influential and connective positions in the network. Communication displays the strongest betweenness value (2.592), suggesting that it acts as the primary bridge linking the rest of the variables. Similarly, continued studies (1.522) and years in business (1.095) show high central roles, confirming that active educational engagement and business longevity significantly shape entrepreneurs' structural positions within the system. In contrast, demographic factors such as sex, civil status, and type of business show negative centrality values, suggesting limited influence in connecting or mediating between other nodes (see Fig. 1).



Strength and expected influence scores reinforce these findings. Skill, business planning, resource availability, and communication exhibit the highest positive strength values, indicating that these dimensions maintain the most robust connections with the rest of the network. Expected influence values reflect the overall effect that each variable exerts on the network. Positive values for skills (1.125), planning (1.223), and communication (0.931) further denote their dominant role in shaping entrepreneurial behavior and digital marketing adoption. Conversely, variables such as years in business (-1.131), continued studies (-2.204), and demographic factors display negative values, suggesting more peripheral roles (see Fig. 2).



Complementing these results, clustering coefficients reveal how variables group together within the network structure. Communication, resource availability, skills, and planning show relatively higher clustering values under the Onnella and Zhang coefficients, indicating cohesive and strongly interconnected clusters. These clusters suggest that communication and skills are not only central nodes but also part of tightly grouped substructures—consistent with the finding that competencies and communication practices drive digital marketing strategies among SMEs. Meanwhile, variables such as city of residence and sex present negative clustering values, meaning they do not form strong communities within the network (see Fig. 3).



Finally, the weighted adjacency matrix highlights the pairwise relationships between all variables. Strong positive associations appear among skills, planning, resource availability, and communication—forming the core cluster of the entrepreneurial competency system. High positive values between skills and planning (0.851), planning and resources (0.905), and skills and communication (0.828) confirm the existence of a mutually reinforcing subsystem that supports strategic behavior and digital marketing engagement. Negative associations, particularly those between demographic factors and competency variables, indicate that personal background characteristics do not significantly influence entrepreneurial skills or digital marketing practices. Years in business shows a mix of positive and negative weights, suggesting differentiated relationships depending on the dimension considered.

Overall, these network results reinforce the statistical findings obtained through traditional analysis. The entrepreneurial ecosystem of Tlaxcala SMEs is driven primarily by competencies—skills, communication, planning, and resource management—while demographic variables remain peripheral. The network perspective demonstrates that digital marketing practices emerge from a cohesive structural core composed of experience, skills, and communication, supporting the broader literature on SME digital transformation.

4. DISCUSSION

Results demonstrate that entrepreneurial experience, skills, and communication significantly influence digital marketing adoption among SMEs, supporting prior research on digital readiness determinants (Bianchi & Andrews, 2020). The lack of association between sex or formal education and digital marketing adoption aligns with studies suggesting that practical competencies and experiential learning outweigh demographic determinants (Martínez-Román *et al.*, 2019).

The strong and consistent correlations across different statistical tests indicate a robust structural connection between entrepreneurial profile and digital marketing practices. This confirms that digital adoption is driven less by resource constraints and more by the entrepreneur's strategic and operational skills (Kraus *et al.*, 2021).

These findings suggest that capacity-building programs aimed at SMEs should prioritize digital competencies, communication practices, and experiential learning, rather than solely offering formal training. Enhancing these attributes may increase digital marketing adoption and overall firm competitiveness (Dwivedi *et al.*, 2021).

The network-based findings of this study provide strong evidence that entrepreneurial competencies operate as interconnected systems rather than isolated predictors of digital marketing adoption. The centrality metrics indicate that communication, continued studies, and years in business function as high-influence nodes within the entrepreneurial network. Communication exhibited the highest betweenness

and closeness values, positioning it as the primary “activation hub” in the system. This pattern aligns with neural-network theories of organizational behavior, which propose that certain units—analogue to neurons—regulate the flow of information and disproportionately shape system-level outcomes (Hazy & Boyatzis, 2015). In the entrepreneurial context, communication appears to serve such a regulatory function, suggesting that entrepreneurs who maintain strong digital, social, and operational communication channels are more capable of activating and sustaining digital marketing behaviors.

The clustering coefficients further support this interpretation by revealing cohesive substructures involving communication, skills, planning, and digital resource availability. These competency clusters resemble neural assemblies that jointly support complex behaviors, as described in contemporary cognitive-network models (Liu et al., 2021). The presence of these clusters suggests that digital marketing adoption is not triggered by a single competency but emerges from integrated combinations of abilities. Similar findings in the SME literature indicate that digital transformation requires synergistic interaction between communication practices, technological skills, and planning capabilities (Rialti et al., 2020; López-Nicolás et al., 2020). The dense cluster connecting skills, planning, and resource availability in the weighted matrix confirms that these competencies form the structural core of the entrepreneurial system.

The weighted adjacency matrix enriches this understanding by demonstrating that these central competencies maintain strong, positive, and mutually reinforcing relationships. High weights between skills and planning, planning and resource availability, and skills and communication indicate a tightly integrated subsystem. In neural terms, this reflects a “high-activation region” where competencies co-activate to enable strategic behavior. This subsystem provides a mechanistic explanation for the strong association observed between entrepreneurial profile and digital marketing practices in traditional analyses. The network structure suggests that entrepreneurs with higher profiles activate these competency clusters more effectively, resulting in stronger digital marketing adoption. This finding mirrors previous work showing that digital strategy implementation arises from systemic interactions among competencies rather than from any single trait (Kraus et al., 2021; Dwivedi et al., 2021).

Conversely, demographic variables—including sex, marital status, and place of residence—consistently emerged as peripheral nodes in the network. Their low or negative centrality scores indicate minimal structural influence on entrepreneurial behavior. This result confirms prior research that demographic factors generally do not predict digitalization or innovation outcomes in SMEs (Eggers, 2020; Amaral et al., 2022). Years in business, however, played a more complex role. While its centrality indices were relatively high, expected influence was negative, suggesting an indirect or context-dependent effect. This pattern supports studies emphasizing the dual nature of entrepreneurial experience, which can promote adaptability but may also reinforce outdated routines (Rauch & Frese, 2020). In this dataset, experience appears to contribute to the network primarily by enhancing connections to competencies such as communication and planning.

Overall, the network results converge with and deepen the traditional statistical findings. While Chi-square and correlation tests confirmed a strong relationship between entrepreneurial profile and digital marketing practices, the neural-inspired network analysis reveals *why* this relationship exists. The strongest determinants of digital marketing adoption are not individual competencies but the structural configuration of the entrepreneurial system—specifically, the activation of a central competency cluster involving communication, skills, planning, and resource availability. This systemic perspective aligns with contemporary calls for multilevel approaches in entrepreneurship research that capture the dynamic and interdependent nature of entrepreneurial cognition and action (Lefebvre et al., 2020). The study therefore contributes to the field by providing empirical evidence that entrepreneurial profile is best understood as a networked construct whose internal structure shapes digital behavior in SMEs.

The network analysis applied in this study reveals that entrepreneurial competencies behave like an interconnected neural system in which certain attributes act as dominant activation hubs, shaping the diffusion of behaviors such as digital marketing adoption. The extremely high betweenness value observed for communication (2.592) demonstrates that this competency functions as the primary bridge through which information and influence travel within the entrepreneurial network. In neural terms, this mirrors the role of highly connected neurons that regulate activation across multiple pathways (Hazy & Boyatzis, 2015). This explains why entrepreneurs with stronger communication practices are consistently more capable of deploying digital marketing strategies: they occupy structurally privileged positions that enable rapid coordination, information processing, and digital engagement.

Closeness centrality values also reinforce the dominance of communication, continued studies, and skills, suggesting that these competencies have the shortest routes to all other nodes. Such high closeness is characteristic of neurons embedded in central cortical hubs, where minimal distance allows for efficient information transmission (Liu et al., 2021). This pattern indicates that entrepreneurs who remain

academically active, who develop digital skills, or who maintain strong communication routines can access and activate other competencies more efficiently. These findings align with research showing that digital transformation in SMEs depends on the entrepreneur's ability to integrate cognitive, experiential, and communication resources (Rialti et al., 2020; López-Nicolás et al., 2020).

The clustering coefficients provide further evidence that entrepreneurial competencies form cohesive sub-networks, much like specialized neural assemblies that coordinate complex behaviors. Communication, skills, planning, and digital resource availability exhibit positive clustering values—particularly under the Onnela and Zhang coefficients—indicating that they form a dense and self-reinforcing community. This cluster closely matches the neural concept of a functional module, where co-firing neurons produce stronger, more coordinated behavioral expressions (Carmi et al., 2023). In the managerial context of SMEs, this means that digital marketing adoption emerges not from isolated competencies but from the simultaneous activation of this integrated competency module.

The weighted matrix clearly demonstrates the structural coherence of this module. High positive weights between skills and planning (0.851), planning and resource availability (0.905), and skills and communication (0.828) reveal a synergistic subsystem at the core of the entrepreneurial profile. These strong weights act analogously to synaptic strengths in neural networks, where well-connected clusters exert dominant influence on behavioral outputs (Hazy & Boyatzis, 2015). This provides a structural explanation for the strong correlations observed through traditional analyses: entrepreneurs with higher profiles activate this competency subsystem more intensely, leading to greater adoption of digital marketing practices.

In contrast, demographic variables consistently appear as weakly connected or negatively weighted nodes, with negative expected influence and minimal clustering. Sex (−1.309 closeness; −1.469 Onnela), place of residence, and civil status have no significant connectivity within the competency network. Their peripheral and weak connections resemble inactive or low-signal neurons that contribute little to system-wide activation. This supports existing evidence that demographic traits seldom shape the digital transformation of SMEs compared to competencies derived from learning, communication, and skill development (Eggers, 2020; Amaral et al., 2022).

Years in business presents an interesting neural-like pattern: although it shows high betweenness (1.095), its expected influence is negative (−1.131). This is analogous to neurons that occupy central positions but exert inhibitory rather than excitatory effects. In entrepreneurial terms, experience may provide connection pathways but might also reinforce rigid routines that inhibit digital adoption—a dual effect documented in the behavioral entrepreneurship literature (Rauch & Frese, 2020).

Taken together, these neuroresults demonstrate that digital marketing practices in SMEs emerge from the coordinated activation of a core competency network rather than from isolated traits or demographic factors. The structural configuration revealed by centrality, clustering, and weighted connections provides a multilevel explanation consistent with systemic entrepreneurship theory and neural-network-based organizational models (Lefebvre et al., 2020). This perspective not only validates the traditional statistical findings of this study but also deepens them, showing that the entrepreneurial profile operates as a dynamic neural-like system whose internal architecture determines the adoption of digital strategies.

5. CONCLUSION

The study concludes that entrepreneurial profile strongly predicts digital marketing strategy adoption among SMEs in Tlaxcala. Entrepreneurs with medium or high profiles are significantly more likely to engage in digital marketing practices. Key determinants include experience, skills, and communication, rather than demographic characteristics such as sex or schooling. These conclusions offer practical insights for institutional programs seeking to strengthen SME digitalization efforts.

The scope of this study extends beyond traditional statistical associations by incorporating a neural-inspired network analysis that reveals how entrepreneurial competencies interact as an interconnected system. The results show that communication, skills, planning, and digital resource management act as the most influential elements within the entrepreneurial network. Their high centrality and strong weighted connections indicate that these competencies form the structural core that drives digital marketing adoption among SMEs. This network-based perspective allows the study to identify not only which variables are relevant but also how influence flows between them, enabling a deeper understanding of the mechanisms that activate digital behaviors in entrepreneurs.

Despite these contributions, the study has several limitations. The sample size of 70 entrepreneurs restricts the generalizability of the network patterns to broader populations. Network structures may shift with larger or more diverse samples, potentially altering the strength or direction of connections among competencies. Another limitation lies in the cross-sectional design, which prevents the analysis from

capturing temporal changes in the activation of competency clusters. Experience-related variables, for instance, may evolve over time as entrepreneurs adjust their routines or adopt new digital tools. Additionally, all variables are self-reported, which may introduce bias in the representation of competencies such as communication or skill levels. Finally, the network model is restricted to the variables included in the questionnaire; unmeasured competencies or contextual factors may also play structural roles not captured in this study.

Based on the neuroresults, several recommendations arise. Training programs for SMEs should prioritize strengthening communication, digital skills, planning capabilities, and resource management, as these competencies occupy the most central positions in the entrepreneurial network. Interventions should be designed to activate these competencies simultaneously rather than independently, given that their structural influence depends on their interconnectedness. Institutions supporting SMEs could also develop diagnostics that identify weak or inactive nodes in the competency network of entrepreneurs, allowing targeted strengthening of specific clusters. Because demographic variables show minimal influence, efforts should focus on developing competencies rather than categorizing entrepreneurs by background characteristics. Future research should incorporate longitudinal designs to observe how competency networks evolve and how changes in central nodes affect digital strategy adoption over time. Expanding the model to include emotional, strategic, or innovation-related competencies may also provide a fuller picture of the entrepreneurial system.

Ethical Statements

This research complied with ethical guidelines for social science studies. Participants were informed of the academic purpose of the study, participation was voluntary, and anonymity was guaranteed. No conflicts of interest are declared.

AI tools were used only for organizing and translating text; all empirical data originate from the researcher's original SPSS outputs.

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Annex

INSTRUMENT FOR MEASURING THE USE OF AI IN POLITICAL MARKETING IN SMALL LOCALITIES

Likert Scale 1–5

1 = Strongly disagree

5 = Strongly agree

SECTION A — Control Data

A1. Age

A2. Gender

A3. City of residence

A4. Place of birth

A5. Educational level

A6. Years of work or community experience

SECTION B — AI Usage Skills

B1. I know how to use AI tools to support political activities.

B2. I can correctly interpret the recommendations generated by AI.

B3. I integrate AI into my tasks without external assistance.

SECTION C — AI-Assisted Strategic Planning

C1. I use AI to plan political actions or strategies.

C2. I use AI to identify relevant trends in the community.

C3. AI helps me determine which messages should be communicated and when.

SECTION D — Availability of Digital Resources

D1. I have access to the technology necessary to use AI.

D2. I have sufficient connection and equipment to implement AI.

D3. My locality has the basic conditions for AI use.

SECTION E — AI-Assisted Political Communication

E1. I use AI to improve the clarity of my political messages.

E2. AI helps me segment messages to different groups in the community.

E3. I adjust my messages based on analyses generated by AI.

SECTION F — Related Education and Experience

F1. My educational level makes it easier to learn new technologies such as AI.

F2. I have prior experience that helps me adopt digital tools.

F3. Courses or trainings I have taken facilitate my use of AI.

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