

The Role of Social Media and Innovation in Mexican Industrial Entrepreneurship

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ABSTRACT: The main goal of this work is to provide insights on the combined influence of social media and innovation on industrial entrepreneurship in Mexico. To do this, we study the meaning of social networks and innovation in products and processes and their joint impact on industrial entrepreneurship by developing a structural equation model (sem) that shows the relationships between these three variables, using a hypothesis-based approach that demonstrates their close relationship in the creation of social value. The indices of goodness and fit were used to evaluate the sem, showing satisfactory results. One of the key findings of this study is the use of social networks, such as Facebook, WhatsApp, Instagram, and Twitter, among others, as digital marketing tools that allow increasing market share and achieving return on investment by diversifying products and services and signaling new business opportunities.

KEYWORDS: Social media, entrepreneurship, innovation, industrial sector, sustainable competitive advantage.

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Introduction

The present study seeks to analyze the existing relationship between social networks and innovation in the context of industrial entrepreneurship in Mexico. To do this, we will understand social media as the digital links that connect and interconnect with instant communication channels through which people express and share their thoughts collectively. In other words, social media is a collection of interactions comprised of a relational structure of actors and their interactions, covering a wide range of communication forms such as blogs, discussion forums, company-sponsored digital comment spaces, emails, websites (created by users and companies), news sites, information download sites, communities oriented to the trade of goods and services (e.g., eBay, Amazon.com), help sites (Wikipedia), social interaction sites (Facebook, My Space), business networks (LinkedIn), content-share media (You-Tube), photo-oriented sites (Instagram, Flickr), and microblogging (Twitter), among others (Nicolás *et al.*, 2018).

According to Nicolás *et al.* (2018), out of the 7.39 billion people living on Earth, 3.4 billion have access to the internet (with an annual growth rate of 10%), with 2.3 billion using social media on a regular basis (with a growth of more than 10% since January 2015). Furthermore, it is important to note that approximately 3.8 billion people use mobile phones (with an annual increase of 4 %) and nearly 2 billion use these devices to access social media (study “We are social,” 2016, cited by Nicolás *et al.*, 2018). This advancement of social media that most globalized countries are experiencing is greater in developed economies due to better communications infrastructure, such as internet servers, high financial budgets, and improved technical and human capacities, which allow individuals, organizations, and governments to communicate more effectively, as opposed to what occurs in developing countries, characterized by their scarce and inefficient infrastructure, which generates a negative impact on their socioeconomic progress (Madon, 2000; Zahoor *et al.*, 2021).

As one of the most important digital media available, social media has created an extremely important context in the business activities of entrepreneurs in order to generate new business initiatives (Ebrahimi *et al.*, 2021). Likewise, social media has recently gained relevance in the business sector as it allows established and entrepreneurial companies to offer and strengthen their value proposition to new and existing clients (Çiçek, 2018). In this way, social media is used as a strategy to promote innovation and, as a result, generate new markets into which entrepreneurs and companies can enter to generate commercial and business areas.

Social media is defined as technological means used to generate communications and transactions that allow the development of business activities to be used through the customer network and promote the creation of value (Andzulis *et al.*, 2012; Anwar & Zhiwei, 2020).

In the context of industrial sales, buyers use social media to make purchases, compare products, conduct market research, and interact with sellers. They can use social media in all stages of the sales process and project its potential continuation (Baum *et al.*, 2018; Itani *et al.*, 2017), ensuring increased future income for companies that manufacture and sell industrial goods.

Social media sites are extremely popular among online users, ranging from suppliers of productive inputs to potential customers of goods and services, in such a way that all members of the productive chain are linked to making sales and purchases of goods and services available to satisfy the needs and desires of the consuming population.

In summary, social media promote an important range of new products awaiting commercialization, the search for new consumers, market studies, and product marketing design combining the four Ps (Price, Place, Promotion, and Product), for what proves to be an extremely important business strategy that enhances the marketing and positioning of the product through the positioning promoted through social networks. The use of social media in companies is already an innovation in business communication and also a simple and low-cost way to search for information, promote products, and open new distribution channels for products and services (Secundo *et al.*, 2021), whose availability is broad so that companies can have effective and low-cost means of communication to achieve their business strategies and long-term competitiveness in the fields of economics, social sciences, and environment-related areas (Frank *et al.*, 2021; Kahar *et al.*, 2012; Papa *et al.*, 2018), which, in the case of developing economies, result in core information services that could strengthen the socioeconomic development of Latin American countries, for example, through digital technologies (Madon, 2000; Malecki, 2018), considering that the business fabric in this region is made up of a 95% share of micro, small, and medium-sized businesses that sustain approximately 75% of employment in the region (CEPAL, 2021).

New businesses should consider the benefits of social media, since, just to put an example, in Mexico there is a high rate of business failure during the first two years (López-Lemus *et al.*, 2021a), being poor marketing strategies the cause of 41% of business closure cases. With that in mind, marketing strategies are a key issue entrepreneurs must observe attentively so they can effectively market their products or services, with social media being a powerful tool within such strategies to promote marketing and opening new markets, thus meeting customers' needs identified through innovation processes.

Grounded on the above, the main objective of this research is establishing how to analyze the degree of relationship and influence exerted by social media and innovation on industrial entrepreneurship in Mexico. The study was conducted in the state of Guanajuato because it represents one of the Mexican regions with the largest economic dynamics, specifically in the industrial sector.

Likewise, this state has consolidated in recent years as one of the main markets offering new opportunities to entrepreneurs in the industrial sector, as a result of profitable and sustained investments in the region (Guanajuato Puerto Interior, 2021). In this sense, Guanajuato is one of the Mexican states with the largest number of science, technology and innovation parks that contribute to the country's industrial and economic development (López-Lemus *et al.*, 2021b). In the same way, this work allows establishing a strategy through the conclusions reached and the limitations identified in the study, which allow proposing new lines of research that could contribute to the literature on the subject through the analysis of this approach to the phenomenon of entrepreneurship.

This research is conducted in the context of Mexico because, according to The Global Competitiveness Report 2019, this country is currently a solid economy ranked as the second largest economy in Latin America and the 48th worldwide (Schwab & Zahidi, 2020), whose growth has been based on efficiency (Schwab, 2019) through industrialization, which has become more dynamic in recent years. In this sense, Mexico represents one of the most attractive countries to promote entrepreneurship and attract investment (IMCO, 2021), and by means of this generate enterprises that contribute to economic growth and development through the use of social media as one of the main means for innovation. This approach is relevant because it contributes to the literature and theories based on entrepreneurship in emerging economies, demonstrating relevant and valuable results for the literature, theories, and strategies for the industrial business sector.

Theoretical framework

In a changing international business environment, innovation and social media are widely analyzed as a foundation for achieving sustainable entrepreneurship, defined as the creation, discovery, growth, evaluation, and exploitation of opportunities in the business opening process (López-Lemus *et al.* 2021a; Zahra, 1991). It should be noted that entrepreneurial dynamism is a critical factor in a nation's renewal and economic growth. Therefore, entrepreneurship implies capturing ideas and transforming them into products or services to later create a business, launching the product to the market, and combining innovation, talent, knowledge, and the skills of employees, as well as effective management that takes advantage of the generation of increasing economies of scale produced by a particular combination of production factors (Nicolás *et al.*, 2018). According to Heinonen and Poikkijoki (2006), some of the characteristics associated with entrepreneurial activity include a high availability to change, self-confidence, creativity, and the ability to solve business problems in an innovative manner.

Cooper (2001) defines innovation as the process of developing new products or services offered by businesses or the implementation of improvements to existing ones. The motivation of an organization when developing innovations is to create value for both internal and external stakeholders, with innovation serving as a catalyst for entrepreneurship. This process begins with the conceptualization of an idea and ends with the market promotion of the created (or improved) product

or service (Sandoval *et al.*, 2012) through the use of social networks that allow “sharing” information and “collaborating” in order to generate round deals. It is important to note that while innovation is not an assurance of success, it does increase the chances of a business becoming more profitable, thus obtaining satisfactory results and achieving success.

Freeman and Soete (1997) and Gordon and McCann (2005), on the other hand, define innovation as the development of innovative ideas in processes, products, and services, being one of the most important factors for the growth of business entrepreneurs (Rodríguez-Pose & Crescenzi, 2008). Product, process, administration, technology, quality, and customer satisfaction innovation, among other elements, can be the focus of innovation (Murat & Baki, 2011; Santos-Vijande & Álvarez-González, 2007; Rasheed *et al.*, 2021). For this study, two types of innovation approaches were selected: i) product innovation and ii) process innovation.

Product innovation is defined as the process of developing and launching new products or services (Löfsten, 2014; Zahoor *et al.*, 2021), as well as development motivated by a desire to improve the characteristics or the properties of finished products. The goal of product innovation is to maximize customer utility by developing new products, processes, and improving them in terms of properties, quality, and presentation, among other features, (Bergfors & Larsson, 2009; Lager, 2002) to maximize their utility for customers (Fagerlin & Wang, 2021). On the other hand, product innovation requires the improvement of both methods and processes (Rasheed *et al.*, 2021), implying that when a company generates innovation in the products it offers, it must also improve the manufacturing process. In this sense, it is necessary to develop an innovation in the process, which also merits activities such as technical design, research, and development of commercial activities, such as new product marketing. Process innovation is defined as development driven by internal production objectives; thus, the primary goal of this type of innovation is to reduce costs, increase production performance, improve productivity levels, and preserve the environment (Bergfors *et al.*, 2009; Lager, 2002; Macchion & Fornasiero, 2021).

In such a setting, social media enable countless interactions between producers and consumers, facilitating order management, supplier management, product and service advertising, sourcing of ideas for improving products and services, and so on, while lowering the cost of their use (Anwar & Zhiwei, 2020). Furthermore, social media could increase consumers’ confidence in making safe purchasing decisions thanks to positive experiences of consumers who speak favorably about the attributes of a product they consumed and their recommendation to other consumers (Baum *et al.*, 2018; Tuten & Perotti, 2019). Although social media helps entrepreneurs avoid the insecurity caused by criminal acts and allows for cost efficiency, their use can also result in cyber theft of both information and personal data or the electronic theft of money, acts that are less severe (given the advanced digital protection options) (Rathore *et al.*, 2017) than those caused by organized crime (e.g., armed robbery, vandalism, kidnapping).

It is important to note that social media emphasizes means that include social networks such as Facebook, WhatsApp, Instagram, and Snapchat, among others (Hassani & Mosconi, 2022). Digital media refers to the distinct types of formats on the internet that can be created, modified, and shared in real-time through digital electronic devices, regardless of users' geographical location.

According to Papa *et al.* (2018), the ability of companies to innovate and the existence of social media contribute to explaining industrial entrepreneurship, creating new business models and strategies based on new digital communication instruments (Hassani *et al.*, 2021) that bring information that allows the development of business intelligence to better decision-making regarding the composition of the production chain: efficient suppliers in the delivery of orders for productive inputs (raw materials and sophisticated technologies), workers with higher qualifications, and an increase in potential consumers through the development of new product lines based on greater accuracy of market research results (Baum *et al.*, 2018; Luomaranta & Martinsuo, 2020). Based on the above, the following hypothesis is established:

H₁. The use of social media has a positive and significant effect on innovation.

However, in such a dynamics the most complex and expensive process is industrial product innovation (Hassani *et al.*, 2021; Singh-Panesar & Markeset, 2008), that is also a source of growth and future income for manufacturing firms. The ability of an industrial firm to generate a consistent quantity of product innovations can significantly improve the entrepreneurship of its businesses by increasing levels of competition and decreasing product life cycles, resulting in the introduction of a variety of newly manufactured products. This complicates industrial product management in terms of the development of product and process innovation while maintaining a close link between product innovation and business performance in industrial firms (Löfsten, 2014; Powers *et al.*, 2020).

Product innovation processes differ from related work processes at later stages of a product's life cycle, such as manufactured products (Powers *et al.*, 2020). First, high variation in product innovation processes indicates that the rate and level of products manufactured by a given factory are difficult to predict. Second, product innovation processes are also characterized by their diversity, resulting in a wide range of products manufactured by factories that generate significant multifactor productivity. As a result, industrial product innovation processes are complex, require flexibility, and represent high unit costs.

Product innovation processes considered through social media are also strategically important for entrepreneurship in industrial firms, since the design of a new product is not an isolated activity but requires the collaboration of several departments, such as research, development, production, marketing, distribution, and logistic units, among others (Hinson *et al.*, 2017). That is, in addition to the design of the product based on consumer needs, the plans in the manufacturing process, the planning

of the inputs required for the manufacturing of the products, their distribution to market segments, and the sales process are all intricately linked to serve the various markets. This helps ensuring higher sales income and better market positioning, resulting in increased market participation (Baum *et al.*, 2018).

In the case of industrial firms' entrepreneurship, the use of social media and new product innovation enable high economic performance, as companies produce a wide range of highly differentiated goods that are acquired in various markets, so their performance is always improved when industrial firms accompany the undertaking of many and varied products with innovation. In this sense, social networks play an essential role in entrepreneurship (Secundo *et al.*, 2021) as they allow identifying new needs and market niches, as well as new markets that could offer advantages to potentiate entrepreneurship by generating new products or services designed to satisfy identified needs among consumers and turn this into an area of business opportunity. Based on the above, the following hypothesis is established:

H₂. The use of social media has a positive and significant effect on industrial entrepreneurship.

All the processes are supported by social networks, which have an incredibly low cost and potentially reduce production-related expenses. Furthermore, industrial companies primarily use social media to facilitate communication with customers and suppliers, promote the company, form alliances, look for new useful information to innovate their products, and keep track of competitors. The impact of social media on innovation allows industrial firms to detect existing needs and meet market niches for the design of new products, processes, packaging, and improve quality, among other things. As a result, social media become a really useful tool for identifying areas of opportunity in the market and generating strategies to address them, with Facebook, Twitter, Instagram, and WhatsApp being the most popular platforms among businesses, according to an online study conducted by the Center for the Support of Small and Medium Enterprises of the Autonomous University of the State of Mexico among microentrepreneurs in the state of Mexico, in which 100% of them claimed they knew and used digital social media for decision making. Additionally, 59% of these interviewed entrepreneurs generate new knowledge from the information obtained in social networks, which is why it is applicable to their work to a significant extent, while only 29% say it is applied very little, and 11% that is not applied at all. This means that information obtained through social media is a key factor in decision-making, daily work, and the ability to maintain interaction with suppliers, clients, and other entrepreneurs (Sandoval *et al.*, 2012).

Companies in the industrial sector use social networks to share information with people who are interested in their products or services, developing business intelligence with real-time information and suggestions or comments on the products they offer, building relationships with clients, partners and

influential people, and promoting innovation in the process. As a result, entrepreneurship promotes innovation, both in products and services and in the processes that lead to their development.

Consequently, innovation and entrepreneurship are crucial factors that contribute to improving economic conditions in regional development (Malecki, 2018), as they promote new areas of opportunity identified by entrepreneurs. Similarly, information obtained from social media generates new knowledge for industrial companies, influencing the generation of new ideas and fostering experimentation, exploration, and research and development, while considering innovation in the production, management, and administration processes in order to keep the company competitive in the industrial sector (Frank *et al.*, 2021) and in the market in which it operates, in response to a globalized economy. Following the literature, several studies have argued that innovation is positively related to entrepreneurship. Therefore, this work seeks to know and analyze the mediating effect of innovation between social media and industrial entrepreneurship. Based on the foregoing, the following hypothesis is established:

H₃. Innovation has a mediating effect between social media and industrial entrepreneurship.

As a result of the foregoing, the companies that emerge from industrial entrepreneurship are recognized by their innovation capacity, which is why entrepreneurship and innovation, as well as the use of social media for the continuous improvement of products and services, contribute to the economic growth of firms and the creation of jobs, in turn exerting influence on the economic development of cities (Ghura *et al.*, 2017) where entrepreneurs develop their activities.

Entrepreneurs are influenced by social network activities, particularly because they allow them to influence their ability to acquire and use information or resources that help them establish and manage a new business. When a business reaches maturity, entrepreneurs have developed their skills in resource management, strategic planning, and the deployment of long-term competitive advantages, allowing them to successfully position themselves in the national or international markets (Zahoor *et al.*, 2021). Given the importance of entrepreneurship as the base of an economy's wealth, it is critical to examine the impact of social media and innovation on industrial entrepreneurship in Guanajuato, Mexico.

Methodology

The methodological framework used in this research follows a quantitative and explanatory approach due to the specific characteristics of the studied variables that are used to provide a general perspective of a certain reality (López-Lemus, 2021), in this case, the use of social networks, innovation and entrepreneurship by industrial companies located in the state of Guanajuato, Mexico. This research was also observational, in the sense that it was intended to describe the phenomenon without intervening or manipulating the variables that determined the research process. The type of study was

cross-sectional, due to the period and sequence of the study, thus applying instruments to the study subjects on a single occasion. In addition, a cut in time was made to collect the information through the quantitative instruments to analyze the data and measure the effects of the latent and observable variables (López-Lemus, 2021).

Sample

The type of sampling was intentional and non-probabilistic, and the sample included young entrepreneurs from industrial companies within the state of Guanajuato, Mexico. An internet page was designed to upload the instruments that were later completed by participants, which allowed obtaining quantitative information to measure the studied variables (López-Lemus, 2021; Nguyen, *et al.* 2021). The sample was made up of 158 participants, of which 60.8% (n = 96) were women, while 39.2% (n = 62) were men. Regarding participants' age profile, 14.6% of them (n = 23) were under 20, 67.7% (n = 107) between 21 and 30 years, 10.1% (n = 16) between 31 and 40, 5.7% (n = 9) between 41 and 50, and 1.9% (n = 3) were above 51 years. Regarding the educational attainment of participating young entrepreneurs, 93.1% (n = 147) have a bachelor's level, 4.4% (n = 7) a master's degree, and 2.5% (n = 4) have reached education at a doctorate level.

According to the official journal of the federal government of Mexico (DOF, 2009), which establishes the stratification of small and medium-sized companies based on their number of employees, 48.1% (n = 76) of participating firms can be classified as micro-enterprises, 24.7% (n = 39) as small-sized, 10.1% (n = 16) as medium-sized, and 17.1% (n = 27) as large companies.

To verify the hypotheses established in this research, a structural equation model (SEM) was designed using Amos v.21 and SPSS v.21 for statistical analysis. Likewise, a correlation between the latent variables was made. As a result, we identified a positive and significant relationship (Bonett & Wright, 2000; Pearson, 1929, 1931) between the variables use of social networks, innovation, and entrepreneurship, measured through the coefficient of Pearson's correlation, as shown in table 1.

Table 1.

Descriptive statistics: Means, standard deviation, variance, and correlation of studied variables.

Variables	Mean	SD	Variance	1	2	3
Social media	4.00	0.934	0.872	1.000		
Innovation	3.71	0.964	0.931	0.260**	1.000	
Entrepreneurship	4.97	1.428	2.04	0.475**	0.536**	1.000

**p < 0.001. Source: authors.

Results and analysis

Reliability and validity of the instruments

Social media

A social media usage scale of 8 items was applied to measure this construct based on Chow and Chan (2008) and Harrigan *et al.* (2011). The items have a Likert-type format with 5 response points, where 1 represents “Not used” and 5 “Highly used.” Cronbach’s Alpha (α) was used to assess the instrument’s reliability for the construct of social media ($\alpha = 0.914$), which rendered a satisfactory result (Cronbach, 1951; Hair *et al.*, 2017).

A confirmatory factor analysis (CFA) was performed to assess the scale’s validity through the SEM, based on Chow and Chan (2008) and Harrigan *et al.* (2011). For validation, we considered Chi-square test ($\chi^2 = 33,850 / df = 15; p < 0.01$), goodness of fit index (GFI = 0.95), adjusted goodness of fit index (AGFI = 0.90), normalized adjustment index (NFI = 0.96), incremental adjustment index (IFI = 0.98), comparative fit index (CFI = 0.98), the Tucker-Lewis index (TLI = 0.96), index of the approximation of the root mean square error (RMSEA = 0.08), and standardized root mean square residual (SRMR = 0.03) (López-Lemus, 2021; Ramos-Estrada *et al.* 2021). Based on the results obtained, the goodness and fit indices of the model were found to be satisfactory (Asparouhov *et al.*, 2018; Jöreskog & Sörbom, 1981; Rigdon, 1996, 2016), as described in table 2.

Table 2.

Validity and reliability of the use of social media.

Latent variable: Social media	
Variable	Factorial load
SM1. Your clients use social networks (Facebook, WhatsApp, etc.) to learn about and purchase your products or services	0.593
SM2. Do you consider that social networks generate trust in customers to purchase products and services?	0.752
SM3. Do you consider that the use of social networks increases sales revenue?	0.937
SM4. The use of social networks has helped you reduce insecurity problems	0.675
SM5. Do you consider that the use of social networks is a means to increase your market share?	0.860
SM6. Do you consider that social networks are part of a new business model?	0.720
SM7. Do you consider that social networks are a means to establish a relationship between products and services with the client?	0.770
SM8. As an entrepreneur, you use social networks (Facebook, WhatsApp, etc.) as a means of marketing and advertising your products	0.805

$\chi^2 = 33,850 / df = 15$; CFI = 0.98; TLI = 0.96; GFI = 0.95; AGFI = 0.90; NFI = 0.96; IFI = 0.98; RMSEA = 0.08; SRMR = 0.03 $\alpha = 0.914$

Source: model based on Chow and Chan (2008) and Harrigan *et al.* (2011).

Innovation

The dimensions of innovation in the product and process of the innovation scale developed by Weerawardena (2003) were used to measure this construct among entrepreneurs. This scale consists of two parts. The items are presented in a Likert-type format, with 5 response points, where 1 represents “Very limited” and 5 represents “Very extensive.” To evaluate the reliability of this instrument, Cronbach’s Alpha (α) was used for the construct use of social media ($\alpha = 0.889$), which was satisfactory (Cronbach, 1951; Hair *et al.*, 2017).

Regarding the validity of the scale, a confirmatory factor analysis (CFA) was developed based on Weerawardena (2003), using a structural equation model (SEM). For SEM validation, the Chi-square test ($\chi^2 = 4.243 / df = 2$; $p < 0.01$) was employed. Likewise, the goodness and fit indices of the SEM model were validated (GFI = 0.94; AGFI = 0.90; NFI = 0.96; IFI = 0.98; CFI = 0.99; TLI = 0.98; RMSEA = 0.08; SRMR = 0.03) (López-Lemus, 2021; Ramos-Estrada *et al.* 2021), so that the goodness and fit indices of the model were found to be satisfactory (Asparouhov *et al.*, 2018; Jöreskog & Sörbom, 1981; Rigdon, 1996, 2016), as observed in table 3.

Table 3.

Validity and reliability of innovation.

Latent variable: Innovation	
Variable	Factorial load
INPD1. Product innovation has been introduced in our company in the last five years	0.631
INPD2. Product improvements have been in the last five years	0.866
INPC1. Process innovation has been introduced in our company in the last five years	0.927
INPC2. Innovation in processes has been in the last five years	0.856
$\chi^2 = 4.243 / df = 2$; CFI = 0.99; TLI = 0.98; GFI = 0.94; AGFI = 0.90; NFI = 0.96; IFI = 0.99; RMSEA = 0.08; SRMR = 0.03 $\alpha = 0.889$	

INPD: product innovation; **INPC:** process innovation. Source: based on Weerawardena (2003).

Industrial entrepreneurship

To measure this entrepreneur construct, a social media use scale based on Zahra (1991) was developed. This scale consists of nine items presented in a Likert-type format, with 7 response points, where 1 represents “less emphasis” and 7 “greater emphasis.” To evaluate the reliability of this

instrument, Cronbach's Alpha (α) was used for the construct use of social media ($\alpha = 0.935$), which was satisfactory (Cronbach, 1951; Hair *et al.*, 2017).

Regarding the validity of the scale, a confirmatory factor analysis (CFA) based on Zahra (1991) was developed through a SEM. For SEM validation, the Chi-square test ($\chi^2 = 35.264 / df = 20; p < 0.01$) was performed. In the same way, the goodness and fit indices of the model were considered (GFI = 0.95; AGFI = 0.90; NFI = 0.97; IFI = 0.99; CFI = 0.98; TLI = 0.97; RMSEA = 0.07; SRMR = 0.03) (López-Lemus, 2021; Ramos-Estrada *et al.* 2021), and the model's goodness and fit indices were found to be satisfactory (Asparouhov *et al.*, 2018; Jöreskog & Sörbom, 1981; Rigdon, 1996, 2016), as shown in table 4.

Table 4.

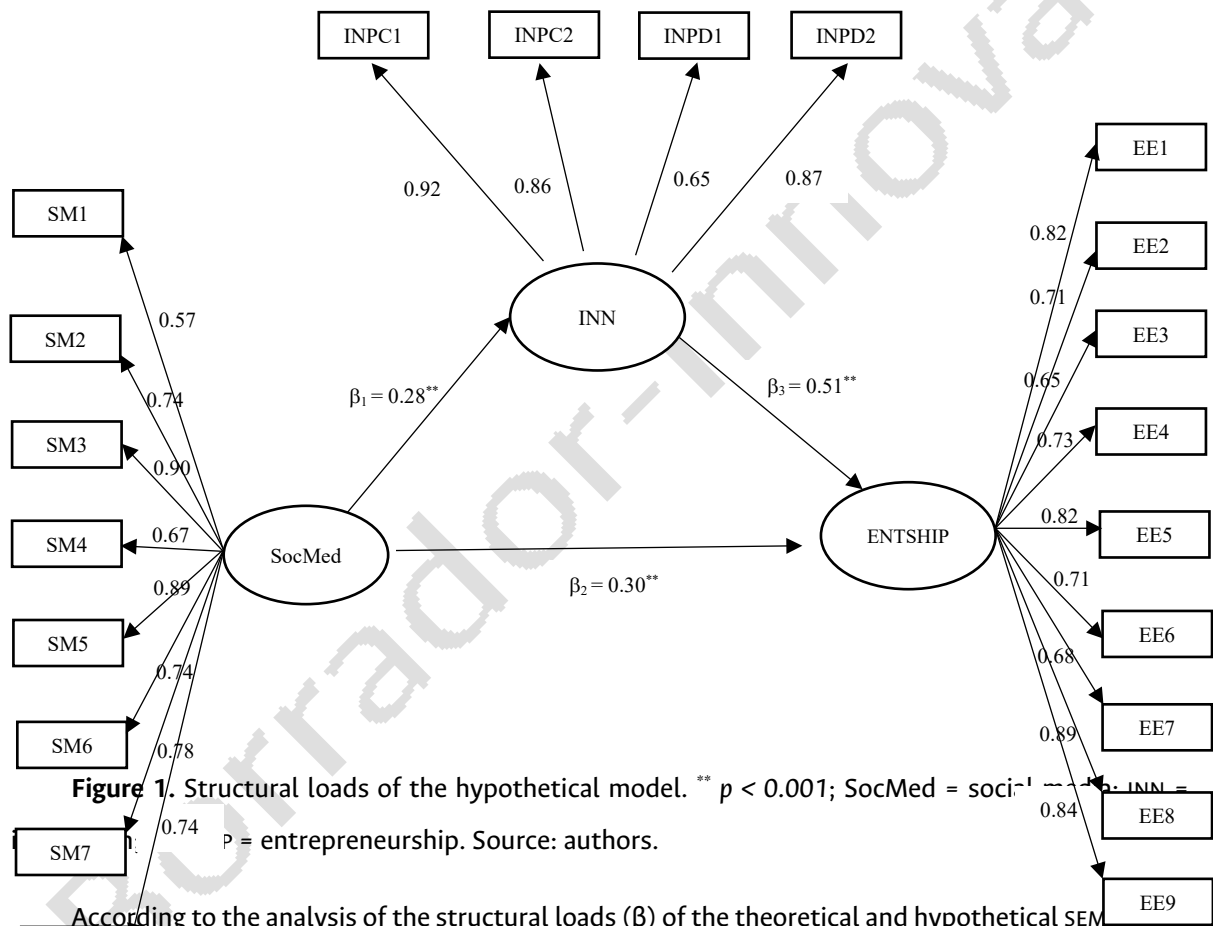
Validity and reliability of entrepreneurship.

Latent variable: Entrepreneurship	
Variable	Factorial load
EE1. Implement new programs to improve innovation throughout the company in the last three years	0.871
EE2. Encourage creativity and innovation of employees	0.716
EE3. Request ideas from employees for new products and processes	0.671
EE4. Reward employees for creativity and innovation	0.723
EE5. Establish a unit or department responsible for innovation and corporate development	0.830
EE6. Looking for business opportunities developed outside your company	0.630
EE7. Train supervisors and managers in creativity and innovation techniques	0.868
EE8. Appoint managers as leaders of new ideas or innovations	0.848
EE9. Emphasis on innovation in your company compared to your competitors	0.799
$\chi^2 = 35.264 / df = 20$; CFI = 0.98; TLI = 0.97; GFI = 0.95; AGFI = 0.90; NFI = 0.97; IFI = 0.99; RMSEA = 0.07; SRMR = 0.03	
$\alpha = 0.935$	

Source: model based on Zahra (1991).

Discussion

The goodness and fit indices listed below were used to evaluate the hypothetical SEM proposed. Chi-square was ($\chi^2 = 337,822$; $df = 176$), so that the Chi-square test ($\chi^2 / df = 1.91$; $p < 0.05$) was found to be satisfactory. Likewise, the following goodness and fit indices were considered (CFI = 0.93; TLI = 0.92; GFI = 0.92; AGFI = 0.90; NFI = 0.95; IFI = 0.93; RMSEA = 0.07; SRMR = 0.03). Therefore, the model turned out to be desirable and acceptable (Asparouhov *et al.*, 2018; Fornell & Larcker, 1981; Jöreskog & Sörbom, 1981; Muthén & Muthén, 1998, 2007; Rigdon, 1996), as observed in figure 1.



According to the analysis of the structural loads (β) of the theoretical and hypothetical SEM, the hypotheses of this research were evaluated. In this sense, to evaluate H_1 , the structural load corresponding to the path was analyzed via SocMed \rightarrow INN (β_1). According to the structural load analyzed, there is enough statistical evidence to confirm that the use of social media has a positive and significant effect ($\beta_1 = 0.28$; $p < 0.001$) on innovation. In this sense, H_1 is accepted.

To evaluate H_2 , the structural load corresponding to the SocMed \rightarrow ENTSHIP (β_2) path was considered and analyzed. Based on the structural load indicated, it is found that social media has a

positive and significant effect ($\beta_2 = 0.30$; $p < 0.001$) on industrial entrepreneurship. Consequently, H_2 is accepted.

Finally, to evaluate H_3 , the mediating effect between SocMed \rightarrow INN \rightarrow ENTSHIP latent variables was analyzed through structural loads (β_2 and β_3). For this purpose, the mediating effect (Sobel, 1987) of the indicated loads was calculated ($\beta_2 \times \beta_3$; $0.28_{(\beta_2)} \times 0.51_{(\beta_3)} = 0.14$; $p < 0.001$). According to the mediating statistical analysis, there is enough statistical evidence (López-Lemus, 2021) to affirm that innovation is a mediating factor that has a positive and significant influence between social media and industrial entrepreneurship. Based on the above, hypothesis H_3 is verified.

Given this statistical evidence, it is determined that social media is a digital mechanism resulting of the new technological revolution that most economies are experiencing because of globalization processes. In particular, for the state of Guanajuato, social media is an example of innovation as it represents a new mechanism for linking the industry with its customers that gathers core information from suppliers and customers for the design of new products and production processes, in which the complexity that innovation entails allows the production of a wide range of new products, generating high returns in industrial profits, given the low cost of using social media to provide key information; this promotes value co-creation for industrial entrepreneurship that involves the entire production chain.

According to Sandoval *et al.* (2012), the innovation component demonstrates that social media is widely used as it is associated with new ways of doing things, creating new products, or introducing changes. In this context, innovation means recreating or modifying the process of creating products or providing services by utilizing new equipment, new inputs, new technological solutions, or new software for the protection of digital operations that provide confidence to entrepreneurs and their customers in their electronic transactions, thus reducing the risks derived from organized crime.

As a result of industrial innovation, a wide range of new products are marketed through social media, which allows connecting the goods produced with a diverse range of customers, who expose the successful experiences of consuming these products, implying a recommendation for other consumers. In this regard, the close relationship between social media and industrial entrepreneurs is reassured, since consumers interact in cyberspace delineated by Facebook, Twitter, and WhatsApp, among other means, to achieve variety, quality, and better prices for products, as well as services that can meet market needs. Furthermore, social media allows for the improvement of logistics for the distribution of products to various customers, such as optimizing routes and achieving efficiency in the distribution of products from digital demands.

The ability of companies to innovate and the existence of social media help in explaining industrial entrepreneurship, an approach that creates a new strategy for the business model driven by digital technology and brings together the required information that allows the development of business intelligence to make better decisions regarding the composition of the production chain, thus allowing companies to develop a sustainable and competitive business model in the long term, and ensuring a higher market share, higher sales income, and higher profitability, all of which benefit internal and external stakeholders.

One of the main benefits of entrepreneurship through social media lies in the ability to use the information that will help identify and manage a business model or an economic entity that may emerge in a certain market. When a business matures, it is because entrepreneurs have developed their capacities for resource management, strategic planning, and the deployment of long-term competitive advantages that allow them to successfully position within a market.

Conclusions

Theoretical contributions

It is necessary to consider that the use of technology through social media represents a means by which entrepreneurs are used to increase income from sales (Itani *et al.*, 2017), as well as one of the means to increase market share (Szolnoki *et al.*, 2018). As a result, social media platforms, such as Facebook, WhatsApp, Instagram, and Twitter, and others, are among the digital marketing media used to increase market share and achieve a return on investment (Demek *et al.*, 2018; Edmiston, 2015; Powers *et al.*, 2020).

One of the main findings of this research is that social networks influence innovation, being the goal of increasing sales and market share among the main reasons for entrepreneurs to use social networks. Likewise, social networks represent a strategic means to establish a relationship between the products and services that the entrepreneur offers to their clients. Social networks have been used to establish strategies to improve and market the product and service, considering that one of the main factors that need to be observed and established within a market strategy lies in generating trust among customers regarding the use of social networks to purchase products or services. Therefore, it is necessary to promote a culture based on technology, where the use of social networks is a means to know and purchase products. This finding is particularly important since new opportunities to generate and do business emerge from business initiatives based on social networks. Even though this phenomenon has been studied in the literature, it has not yet been possible to potentiate social networks as a means of commercialization in industrial entrepreneurship.

Another relevant finding is that entrepreneurs use social networks to introduce innovation in entrepreneurial activities, to generate new products and services that have been identified through current trends and customer tastes, and, with this, promote innovation in the processes of administration, design, production, and commercialization of products and services. This finding is really important because entrepreneurs continually seek to enter the market little by little, and one of the virtues generated when using social networks is to increase a company's sales and market share through product innovation. Therefore, this approach creates a greater chance of success in the operating market.

Another of the findings of this research lies in the idea that the success of a new business is based on the generation of ideas or innovations in both products and services, using innovation as one of the main strategies to be competitive. For this reason, it is essential to establish plans and actions through a unit in the entrepreneurial initiative that is responsible for development and innovation, considering and motivating the work team to promote creativity and innovation in order to identify new business initiatives that can be exploited. Hence, it is extremely important to promote creativity and innovation techniques so that the work team in an entrepreneurial project engages in promoting innovative ideas for new products or services. Faced with this, social networks play a vital role both in innovation and entrepreneurship.

Managerial implications

It is necessary to consider that social networks represent one of the main strategies that can be implemented to ensure the success of an entrepreneurial project by generating new ideas and innovations of products and services and, consequently, be more competitive in the market. Therefore, to secure the venture's success, new projects should be influenced by innovation in the processes and products that will be marketed. Likewise, process and product innovation are strategies that regulate the increase in sales and market share generated by social networks and the venture's success. In other words, the success of a new business lies in increasing sales and market share through the use of social networks and, with this, promote product and service innovation through the identification of needs or new trends that allow identifying market segments that can be exploited through a business idea.

Similarly, the use of social media has increased customer trust in purchasing products and services (Kahar *et al.*, 2012; Luomaranta & Martinsuo, 2020) and is part of a new industrial business model strategy in Guanajuato (Nicolás *et al.*, 2018) that promotes reducing insecurity problems (Baum *et al.*, 2018; Demek *et al.*, 2018) through customer loyalty, given that customers use social media to learn about new products or services before they are introduced to the market (Baum *et al.*, 2018).

Entrepreneurship and innovation are widely considered as the foundation for achieving a long-term competitive advantage in an international business environment characterized by change and

uncertainty (Fagerlin & Wang, 2021; Maritz & Donovan, 2013). Furthermore, they are considered critical factors that drive economic growth and constitute the fundamental value in wealth creation, as well as the pillars for resolving the world's ongoing financial-economic crisis (Ghura *et al.*, 2017; Kiyosaki & Kiyosaki, 2013). Entrepreneurship is defined as the discovery, evaluation, and exploitation of opportunities in the process of establishing new businesses, as well as their growth and development. Finally, entrepreneurial dynamism is critical to reviving economic growth and development (Maritz & Donovan, 2013; Papa *et al.*, 2018).

Social media are indeed technological means for accelerating both innovation and entrepreneurship and facilitating the creation of social value by allowing the formation of companies that produce novel goods and productive processes, whose source of ideas, knowledge, and information is obtained through social media, which tends to minimize production costs and help to market a diverse range of industrial products and services in a variety of market segments.

Our findings are relevant and valuable since they provide a unique perspective on what social media has to offer. However, based on the results of other studies in the field (Clark *et al.*, 2018; Ebrahimi *et al.*, 2021; Emami & Khajeheian, 2019; Ferrer *et al.*, 2013) it has been determined that social media play an important role in enhancing entrepreneurship through innovation. It is critical to emphasize that social media is a digital medium that allows for new ways of doing business, providing anyone and the business sector with strategic opportunities to position a business model with minimal investment, infrastructure, and, most importantly, associated risks (Çiçek, 2018; Garcia-Morales *et al.*, 2018).

Finally, the contributions of this study are significant as some aspects of the entrepreneurship phenomenon are analyzed from a different perspective, thereby supporting theories regarding approaches available in the literature about social media entrepreneurship models, which, as suggested, are one object of study in the academic field that could signal new lines of research for this type of projects.

Limitations of the study

One of the main limitations identified in this study lies in the technological gap of entrepreneurs regarding the use of social networks, as well as innovation practices as one of the main factors that will influence industrial entrepreneurship.

It should be noted that one of the disadvantages that still exists in some regions is specifically customers' trust at the time of acquiring products and services through digital platforms. In addition to this, it is important to determine the characteristics of the products and services that are intended to be positioned in the market, since the use of social networks implies big data management, which, if

used properly, can provide useful information to generate innovation strategies and anticipate trends in a market segment. However, the lack of analysis or awareness around the available techniques to manage large amounts of information from social networks would turn out to be a factor of failure for entrepreneurs. Therefore, the scenario would turn out to be complex and the entrepreneur will end up opting for other strategies that will not necessarily contribute to ensure business success.

The present study is relevant since the analysis that is offered in this line is carried out from a perspective of the phenomenon that has not yet been studied through the literature. In other words, the phenomenon has been analyzed from the lens of a new perspective that allows to propose strategies that could help entrepreneurs to enhance their business activities and ensure the success of their businesses.

Disclosures

Authors declare no institutional or personal conflicts of interest.

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