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The relation between digital marketing, internet skills, and business characteristics; A study of female entrepreneurs

Relación entre el marketing digital, las habilidades en internet y las características del negocio; un estudio en mujeres emprendedoras

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Abstract

Digital marketing and internet skills are current digital topics, therefore, the purpose of the study focuses on determining if there is a significant relationship between digital marketing and internet skills in female entrepreneurs, in addition, determining if there is a correlation with business characteristics. Women who reside in Puerto Rico, Venezuela, Argentina and Colombia participated. To analyze the data for hypothesis testing, an econometric model is used with the use of Gretel software. A statistically significant relationship was found between the digital marketing index and the internet skills index. The three components of digital marketing are positively related to the ability of internet self-learning. The strategic emphasis component towards digital marketing, with the highest score (74%), is negatively related to the age of the business. It is advisable to explore the influence of social and cultural factors.

JEL Code: M30, M31, Z33, C40
Keywords: women entrepreneurs; digital marketing; internet skills; strategic emphasis

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Resumen

El marketing digital y las habilidades en internet son temas de la actualidad digital, por ello, el propósito del estudio se centra en determinar si existe una relación significativa entre el marketing digital y las habilidades de internet en mujeres emprendedoras, además, determinar si correlacionan significativamente con las características del negocio. Participaron mujeres, que residen en Puerto Rico, Venezuela, Argentina y Colombia. Para analizar los datos se utiliza un modelo econométrico para la prueba de hipótesis con el uso del software Gretl. Se comprobó una relación estadísticamente significativa entre el índice de marketing digital y el índice de habilidades de internet; los tres componentes del marketing digital están relacionados de manera positiva con la habilidad del aprendizaje autónomo del internet. El componente énfasis estratégico hacia marketing digital, con la puntuación mayor (74%), está relacionado de manera negativa con la antigüedad del negocio. Es recomendable explorar la influencia de factores sociales y culturales.

Código JEL: M30, M31, Z33, C40
Palabras clave: emprendedoras; habilidades de internet; marketing digital; énfasis estratégico

Introduction

Social marketing orientation constitutes a philosophy in which companies establish their purpose, their reason for existing not only to meet the needs of their customers and for their own purposes of profitability or growth, but rather to visualize the common interest of individuals and society itself in the future (Lamb, Hair, & McDaniel, 2011). Alongside technological advances, social and digital media are rapidly transforming marketing (De Swaan, Van Den, & Weed, 2014). In turn, the Internet has become a primary resource for consumers who seek a variety of information before buying any product or service online, while for companies it is a tool that helps to boost their business through digital marketing strategies (Gulati, 2019). According to Yannoupoulos (2011), the Internet is impacting companies' marketing strategy, so this author recommends that marketing managers use digital marketing appropriately to avoid being at a disadvantage with those using it.

Digital marketing as a strategy requires the means to reach consumers with information about products or services, and the Internet is this conduit, where digital devices are the platforms to purchase the offers published by companies (Núñez et al., 2020). Companies have devoted themselves to the promotion of their brands through the Internet. This popularity has increased as people use more digital devices to make purchases (Del Olmo & Fondevila, 2014). Digital marketing has generated a paradigm shift in product searches and purchases by consumers. Consequently, digital marketing is the strategy through which entrepreneurs carry out actions to promote products or services supported by digital media (Gulati, 2019).

Although there is evidence that the use of digital marketing is relevant for companies, a lack of training on the use of office automation tools and digital networks by the owners or managers has been identified, which limits the use of digital marketing in small and medium-sized companies (Valdez et al., 2019). Research has identified that older businesses do not prioritize using computers in their digital processes.

Several types of research corroborate women's work as entrepreneurs and even in a higher percentage than men (Ojeda-López et al., 2019). Saavedra and Camarena (2015) conducted a study on women with the characteristics to become entrepreneurs. The result of the research indicates that there is a higher tendency for women than men to start a business out of necessity, albeit the size of the operation of such entrepreneurial businesses is smaller than the entrepreneurial projects led by men.

Therefore, entrepreneurial activity is seen as an activity in which both men and women develop their ideas to carry them out in a reality immersed in technological changes, i.e., technology emerges in and permeates every activity carried out by human beings. An example of this is the study conducted by Olson and Bernhard (2020) on digitalization and the use of social networks by female entrepreneurs. In their study, they analyze how women operate their small companies, as well as their skills and adaptation to the changes in technologies that are occurring more and more rapidly. Furthermore, they identified important aspects that suggest that their learning is obtained informally. Even when they do not have the necessary experience or knowledge, they rely on digital natives to carry out the activities that are difficult for them and related to digital environments.

Continuous training in technological tools of those who lead the companies, whether small, medium, or large, is essential to remain competitive. Among other skills, it involves training in digital aspects, one of the most representative means for commercializing products and services in digital marketing (Núñez et al., 2020).

Regarding Internet skills, Jiménez et al. (2016) evaluate the previous Internet training of female students: in what type of institution they studied (school, university), if it was on their own initiative, if they were self-taught with books, CD-ROMs, web pages, tutorial blogs, YouTube, if they learned by practicing on a computer, or if they had the support of a colleague, relative, or friends. The authors identify five dimensions of Internet skills: E-Management, Content creation and posting on social networks, Autonomous learning, Privacy and security, and Information and communication. Additionally, Mahmutović (2021) conceptualized the digital marketing variable as comprising three dimensions: Strategic emphasis, Digital intelligence generation, and Resource planning and provisioning.

From the above arguments, this paper focuses on determining the relation between digital marketing, Internet skills, and business characteristics. The latter are related to the age, size, and sector to which the business belongs.

Review of the literature and the conceptual model of the study

A useful concept in digital marketing is that of Kotler and Keller (2012), who define marketing as an administrative and social process through which individuals and groups obtain what they need and want by generating, offering, and exchanging value products with their peers.

From this definition emerges what could conceptually be labeled as social marketing. Lamb, Hair, and McDaniel (2011) point out that social marketing is a philosophy of the company's reason for existing, not only to meet customer needs but also to conceive the common interests of individuals and society itself. Other approaches and definitions related to Digital Marketing refer to traditional marketing and add the digital part (Smith, 2010), considering it a practice in which products and services are promoted using digital distribution channels or online advertising to establish communication with consumers. More recently, it has been conceptualized as a dynamic concept with the necessary characteristics to design and implement successful marketing strategies (Nuseir & Aljumah, 2020).

In the nineties, digital marketing emerged, which, hand in hand with technological progress, strengthened and increased marketing strategies as more digital platforms emerged. Undoubtedly, companies have devoted themselves to promoting and positioning their brands with the support of the Internet and everything that can be used in digital platforms (Del Olmo & Fondevila, 2014).

The Internet is a fundamental part of human activities since it is used in practically every field: at home, socially, culturally, in sports, and in many other activities. Therefore, this technological tool has become indispensable in business. Such is the case of online entrepreneurship, which requires a certain level of knowledge: understanding the language used to advertise online (Ramli, Mahat, & Abd Razak, 2022).

The literature identifies studies that explore digital literacy with variables such as English proficiency in female entrepreneurs, whose findings showed that female entrepreneurs have moderate to high skills in the use of technology but not so in English language skills for marketing applications (Ramli, Mahat, & Abd Razak, 2022). The application of digital marketing is observed in every activity beyond entrepreneurship. One example is a study conducted in Hungary, where 5548 job contents related to digital marketing were analyzed (Kovacs & Vamosi, 2022). Of course, they highlight the requirements that must be covered, such as interpersonal skills and other hard skills, but they emphasize the skills in digital marketing.

Other scholars on digital marketing have focused on the design of scales to evaluate digital marketing orientation, understanding the use of technology to develop marketing-related activities. An example of this is the work of Mahmutović (2021), who designed and validated the properties of a scale to measure digital marketing orientation (DMO) in the hospitality industry.

Companies interact with their audience to position their brand and achieve their objectives through digital tools, such as website design, e-mail, various mobile media, and social media platforms for online advertisements (Bala & Verma, 2018). This argument coincides with the definition of marketing by Kotler and Keller (2012), who conceive of it as a social process where individuals and groups converge to obtain what they want through the exchange of products and value with other individuals and groups of individuals; hence digital is added to this definition and digital marketing is obtained.

The most important elements in digital marketing are web design, web analysis, SEO positioning, SEM positioning, SMM positioning, online ads, content generation, and e-mail marketing. Currently, companies are using techniques such as Search Engine Optimization (SEO), Search Engine Marketing (SEM), and Social Media Marketing (SMM) in their digital marketing strategies. In this regard, Rogers and Sexton (2012) state that it is necessary to have clear goals and objectives—even when experimenting with new technology—to determine how to improve the return on investment of digital marketing.

Decades ago, a four-level structure was proposed to measure Internet skills: First, the operational level includes basic skills such as knowing how to navigate the Internet, backing up files on a hard disk, opening files in different formats, the use of search engines, and filling out forms, among others. The second level includes formal skills such as using hyperlinks and not getting disoriented when navigating between web pages using search engines. The third level suggests informational skills such as defining a problem that requires certain information, the ability to select a website or information search system, defining search options, or selecting and evaluating information. Finally, there are strategic Internet skills, such as seeking advantages through an orientation toward a particular goal, taking the right actions and decisions to achieve it, and obtaining benefits from it (Deursen & Van Dijk, 2010).

Nevertheless, it is important to understand the digital gap concept when discussing Internet skills. The definition proposed by Kularski (2012) refers to the digital gap in terms of skills and access to information technologies. This concept can be understood as digital competence, i.e., how the subject combines skills, knowledge, and attitudes related to how individuals perform in virtual environments (Jiménez et al., 2016).

The literature has documented in various research studies that the determinants of Internet skills are related to general digital skills and, in a very particular way to content. In the same line, substantial evidence suggests that sociodemographic and socioeconomic factors most frequently impact Internet skills, and not so social and cultural factors, which apparently have been little studied (Scheerder et al., 2017).

Different studies determine how Digital Marketing impacts companies' performance. In this regard, Bhagat and Sambargi (2019) measured the impact of female entrepreneurs' digital skills and levels

of innovation to adopt digital marketing. The result suggests that both variables strongly impact the intention to adopt digital marketing. Moreover, the applications favor effective communication with customers, hence the companies will be able to react more quickly to the needs of their customers and, above all, be prepared to face the competition in providing information to customers in a timely and effective manner (Nuseir & Aljumah, 2020).

Regarding female entrepreneurs, some studies have shown that social influence and expectation are important variables that influence the intention to use mobile applications. The importance of digital marketing lies in the use of this technology to obtain information about customers, to launch new products and offers in the consumer market, and, very importantly, to develop the brand and achieve greater reach (Sathye et al., 2014; Abed, 2021).

Based on these arguments, the route of the conceptual model for the empirical study is outlined, as well as the research questions, objectives, and hypotheses to be tested:

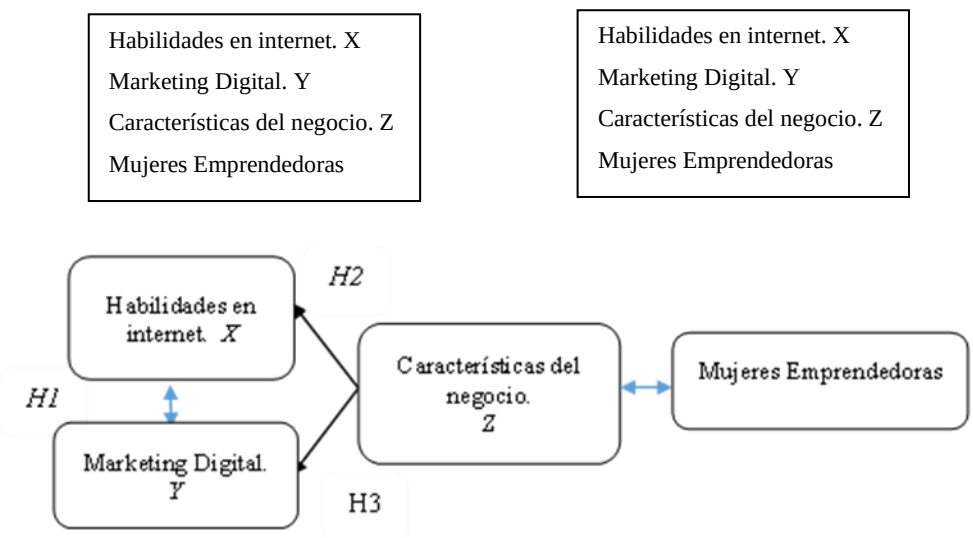

Figure 1. Conceptual model for the empirical study

Source: created by the authors

Research questions and objectives

The following questions arise based on the different types of Internet skills that Latin American digital female entrepreneurs exhibit: Is there a significant relation between digital marketing and the Internet skills that Latin American female entrepreneurs exhibit? Is there a significant relation between digital

marketing and business characteristics? Therefore, the following objectives are established: to determine if there is a significant relation between digital marketing and Internet skills in female entrepreneurs, and to determine if there is a relation between digital marketing and business characteristics (number of collaborators, age of the business, and business sector).

Hypotheses and their statistical form

Null hypothesis: H0: $\rho = 0$ Alternative hypothesis: Ha: $\rho \neq 0$

Where *H0* states that the correlation coefficient is not significantly different from zero. There is no significant linear relation between X and Y in the female entrepreneurs analyzed. In the opposite case, *Ha* shows that the correlation coefficient is significantly different from zero, which gives evidence of the existence of a linear relation between X and Y. Therefore, the purpose is to demonstrate whether:

H1. Digital marketing is significantly related to Internet skills in female entrepreneurs.

H2. The components of digital marketing are significantly related to different types of Internet skills.

H3. Digital marketing is related to business characteristics (number of collaborators, age of the business, and business sector).

Design and method

The population under study comprises female entrepreneurs, whose main characteristic is to have carried out some type of digital entrepreneurship. Non-probabilistic sampling by self-determination is used. Data collection is done through a questionnaire (online), applied during February 2023.

The questionnaire is made up of four sections. The first section has sociodemographic questions (age, marital status, educational level, place of residence, employment status, and monthly income from the business). The second has questions on the business characteristics (number of collaborators, age of the business, and business sector). The third includes questions about the means used to acquire Internet skills. The fourth is composed of two scales. The first scale measures Internet skills with 18 Likert-type items with response options: never, rarely, occasionally, frequently, and very frequently; responses are coded with a value from 1 to 5, respectively (Jiménez et al. (2016). The scale provides information on Internet skills in five categories: E-Management (5 items), content creation and posting on social networks (4 items), autonomous learning (4 items), privacy and security (3 items), and information and communication (2 items). The second scale, proposed by Mahmutović (2021), measures digital marketing through 16 items with responses ranging from total disagreement (1) to total agreement (5). The scale is

composed of three components of digital marketing: strategic emphasis on digital marketing (5 items), digital intelligence generation (5 items), and resource planning and provision (6 items).

Each individual's total Internet skills score is calculated as the sum of the scores of the 5 categories, which can take any value between 0 and 90. From this, an Internet skills index is constructed to provide a metric. The methodology used in constructing indexes from scales is followed (CNBV, 2022; Martins et al., 2021; OECD, 2022). For comparative purposes, the maximum value of 90 points is standardized to 100, multiplying by 100/90. The indicators of the five categories are calculated similarly.

The scores of the three indicators are added together to calculate the digital marketing index, which can take any value between 0 and 80 points. The methodology of Masrianto et al. (2022) is followed and standardized to 100, multiplying by 100/80. Also, the sub-indicator corresponding to each of the three components is calculated similarly.

173 cases were obtained in the application of the instrument, of which 24 were discarded as they did not correctly cover the test answers. The respondents reside in Puerto Rico, Venezuela, Argentina, and Colombia; when the survey was conducted, they indicated they had a digital business. Their ages ranged from 25 to 45 (66.44%), 46 or older (27.52%), and only 6.04% were between 18 and 24 years old.

The multiple linear regression model (Wooldridge, 2015) was used to analyze the relation between digital marketing, Internet skills, and business characteristics. Consequently, an econometric model is estimated to determine the relation between the digital marketing, Internet skills, and business characteristics indices.

The study was based on the following formula:

$$y = \alpha + \beta x + \gamma z + u$$

Where y: digital marketing index (components: y1: strategic emphasis, y2: digital intelligence generation, and y3: resource planning and provision); x: Internet skills (components: x1: E-Management, x2: content creation and posting on social networks, x3: autonomous learning, x4: privacy and security, and x5: information and communication); z: business characteristics (z1: number of collaborators, z2: age of the business, and z3: business sector); α and β are parameters to estimate; and u: error term.

For the variable "number of collaborators," two categories are proposed: 1 collaborator, and 2 to 5 collaborators. For the variable "age of the business," age ranges analogous to those proposed by Valdez et al. (2019) are designed: 0 to 2 years, 3 to 5 years, and 6 years or more. The variable "business sector" is defined by three categories: goods, services, and goods and services. For the statistical strategy, binary variables are designed for each category, in which 1 indicates the presence of the characteristic and 0 indicates the absence.

The Gretl software version updated in July 2023, available at https://gretl.sourceforge.net/, was used to estimate the models. The statistical method used was ordinary least squares. To identify the variables related to digital marketing, the contrast statistic $t = \frac{\beta_i' - \beta_i}{ee(\beta_i')}$ was used. If the null hypothesis $H_0: \beta_i = 0$ and $\alpha = 5\%$ (significance level of the test), the null hypothesis is rejected when $(p - value) \leq \alpha$.

Results

The results regarding the means used to acquire Internet skills by the Latin American female entrepreneurs in the sample show that 47.65% of them had no previous Internet training, 97.32% have developed digital Internet skills by practicing (learning by doing), 85.23% have developed Internet skills self-taught with books, CD-ROMs, web pages, blogs, tutorials, or YouTube, and 79.87% have developed Internet skills through informal help from colleagues, relatives, friends, or their children.

Table 1 presents Latin American female entrepreneurs' digital marketing and Internet skills index scores. The digital marketing index score is 68%. The component strategic emphasis on digital marketing presents the highest score (74%), which suggests that Latin American female entrepreneurs strongly agree that applying digital marketing is a strategic necessity in their businesses and is a way to transfer knowledge to other collaborators.

Table 1
Index score: digital marketing, Internet skills, and components

Indicators/components	Score (scale 0% -100%)
Y: Digital marketing index	68%
Components:	
Y1: Strategic emphasis	74%
Y2: Digital intelligence generation	65%
Y3: Resource planning and provision	66%
X: Internet skills index	79%
Components:	
X1: E-Management	82%
X2: Content creation and posting on social networks	74%
X3: Autonomous learning	76%
X4: Privacy and security	78%
X5: Information and communication	86%

Source: the results of the digital marketing index and the Internet skills index were obtained by applying the scales of Mahmutović (2021) and Jiménez et al. (2016), respectively.

The digital intelligence generation component score was 65%. This result indicates that female digital entrepreneurs recognize the importance of metrics for calculating the performance of the digital

business and obtaining data from the different customer-related processes. The score for the component of resource planning and provision was 66%. This result shows how important it is for female entrepreneurs to have a strategic approach to their businesses, based on a strategy and a digital marketing plan to respond to the needs and requirements of customers.

The Internet skills index score was 79%. Table 1 presents the score for each component: E-Management (82%), content creation and posting on social networks (74%), autonomous learning (76%), privacy and security (78%), and information and communication (86%). Table 2 shows the frequency of use for each component of the Internet skills by Latin American female entrepreneurs.

Table 2
Frequencies of use of Internet skills (in percentages)

Types of skills	Frequency scale				
	Never	Rarely	Occasionally	Frequently	Very frequently
X1: E-Management					
	1			1	6
I manage and monitor my bank account.	1	5	5	9	0
I purchase products and services online (travel, hotels, clothing, books, theater,	1			2	5
movies).	1	5	7	2	5
	1			2	5
I carry out administrative procedures through the Internet (education, health, etc.).	3	5	6	3	2
				1	6
I communicate online to inquire about products and services.	9	3	7	8	2
	1			1	5
I bookmark websites and services that I find useful.	1	5	9	8	6
X2: Content creation and posting on social networks					
	1		1	2	4
I post my own original content on the Internet.	0	7	0	6	8
				2	5
I create and share photos and/or videos over the Internet.	9	3	5	9	4
I create and manage my own websites, blogs, and/or YouTube channels on topics	3	1	1	1	2
of interest to me.	0	2	3	7	8
	1	1	1	2	3
I participate in forums and social networks to communicate and be informed.	4	0	3	4	8
X3: Autonomous learning					
			1	2	5
I learn how to solve tasks using Internet tutorials.	7	2	1	1	8
			2	2	4
I use other people's comments on the Internet to solve doubts.	4	6	1	2	7

	1		1	2	3
I use technical support services to solve problems.	1	6	8	7	8
	2	1	1	2	2
I perform periodic data backups to external devices.	0	2	9	1	7
X4: Privacy and security					
			1	2	5
I configure privacy settings to protect my personal data.	7	6	5	0	2
	1		1	1	4
I download and install software from secure websites.	0	8	9	9	4
	1		1	1	5
I share content on the Internet in compliance with intellectual property rights.	1	6	1	9	4
X5: Information and communication					
			1	2	5
I use Google (or another search engine) to find the information I need.	7	6	5	0	2
	1		1	1	4
I use e-mail, video calls, and instant messaging to communicate online.	0	8	9	9	4

Source: Results obtained from the application of the Jimenez scale (2016)

Regarding E-Management skills, 62% of Latin American female entrepreneurs use the Internet very frequently as a means of communication to inquire about products and services, 60% to manage and monitor their bank account, 55% to purchase products and services online, and 52% to carry out administrative tasks. Regarding content creation and posting on social networks, 54% of female entrepreneurs create and share photos or videos online, 48% post their own original content on the Internet very frequently, and 30% never create and manage Web pages or YouTube channels interesting to them.

Regarding autonomous learning, 58% of Latin American female entrepreneurs very frequently learn how to solve tasks using Internet tutorials, 47% use other people's comments on the Internet to solve doubts, 38% use technical support services to solve problems, and less frequently, they make periodic data backups.

Regarding Internet skills for privacy and security, a high percentage of Latin American female entrepreneurs (73%) frequently and very frequently share content on the Internet while complying with intellectual property rights; 72% configure privacy settings to protect personal data. A smaller proportion download and install software.

Regarding Internet skills for information and communication, 52% of the female entrepreneurs use Google very frequently to find information, while 52% use instant messaging tools (e-mail, video calls) to communicate online.

Table 3 presents the results of the estimation of the econometric model relating the digital marketing index to the Internet skills index and the digital marketing components to the different types of Internet skills. Model 1 presents the results of the digital marketing and Internet skills indices. From the results, the coefficient value of the Internet skills index, $\beta = 0.564$, indicates that the digital marketing index is positively related to the Internet skills index. The statistical test indicates a positive and significant

relation ($p < 0.01$), providing evidence supporting hypothesis 1. Therefore, for an increase of 1 percentage point in the Internet skills indicator, the digital marketing index increases by 0.564 percentage points.

Table 3
Digital marketing and Internet skills indices

	Model 1 Y: digital marketing index	Model 2 Y_1: strategic emphasis	Model 3 Y_2: digital intelligence generation	Model 4 Y_3: resource planning and provision
Constant	23.825*** (7.207)	12.5018** (5.53)	20.816** (8.792)	27.415*** (9.469)
Internet skills index	0.564*** (0.088)			
Internet skills				
X1: E-Management		−0.095 (0.090)	−0.299** (0.143)	−0.332** (0.154)
X2: Content creation and posting on social networks		0.147 (0.098)	0.335** (0.155)	0.311* (0.167)
X3: Autonomous learning		0.236** (0.091)	0.496*** (0.144)	0.491*** (0.155)
X4: Privacy and security		0.044 (0.082)	0.109 (0.131)	0.091 (0.141)
X5: Information and communication		0.428*** (0.086)	−0.030 (0.137)	−0.020 (0.147)
Mean of variable Y	68.260	74.138	64.944	66.126
R-squared	0.215	0.497	0.223	0.174
F-statistic	F(1, 147)= 40.345	F(5, 143)= 28.311	F(5, 143)= 8.216	F(5, 143)= 6.063
P-value (of F)	0.000	0.000	0.000	0.000
Observations	149	149	149	149

The values in parentheses correspond to the standard deviation of the estimator.
*,**;***: Statistical significance at 10%, 5%, and 1%, respectively.

Models 2, 3, and 4 present the results of the econometric model estimation of the three components of digital marketing (strategic emphasis, digital intelligence generation, and resource planning and provision), considering the 5 Internet skills indices (E-Management, content creation, and posting on social networks, autonomous learning, privacy and security, and information and communication) as independent variables.

Models 2, 3, and 4 identify that the three components of digital marketing are positively related to the ability of autonomous Internet learning. The relation is positive and significant ($p<0.01$), providing evidence supporting hypothesis 2. According to the value of the β coefficient, the effect is greater in the

digital intelligence generation component and in resource planning and provision (β=0.496 and β=0.491,respectively). With an increase of 1 percentage point in the autonomous learning indicator, the digital intelligence generation indicator increases by 0.496 percentage points.

The results of model 2 identify that strategic emphasis on digital marketing is positively and significantly related to Internet information and communication skills (β=0.428;p<0.01), which provides evidence in favor of hypothesis 2. With an increase of 1 percentage point in the sub-indicator of Internet information and communication skills, the indicator of strategic emphasis increases by 0.428 percentage points.

Also, in models 3 and 4, the results indicate that both the digital intelligence generation index and the resource planning and provision index are negatively related to E-Management skills (β=-0.299;p<0.05) and (β=-0.332;p<0.05), which favors hypothesis 2.

Models 3 and 4 show that both the digital intelligence generation and the resource planning and provision components are related to content creation and posting on social networks. In both cases, the relation is positive and significant, (β=0.335,p<0.05) and (β=0.311;p<0.1), respectively, which provides evidence in favor of hypothesis 2. With an increase of 1 percentage point in the sub-indicator content creation and posting on social networks, the digital intelligence generation sub-indicator increases by 0.335 percentage points, while the resource planning and provision indicator increases by 0.311 points.

Table 4 presents the results of estimating the econometric model of the digital marketing index, considering as independent variables the Internet skills index and the business characteristics (number of collaborators, age of business, sector). From the results, it is identified that in models 5, 6, 7, and 8 the relation between the digital marketing index and the Internet skills index is positive as in model 1, but none of the business characteristics presents a significant relation.

Table 4
Digital marketing index, Internet skills index, and business characteristics

	Model 5 Y: digital marketing index	Model 6 Y: digital marketing index	Model 7 Y: digital marketing index	Model 8 Y: digital marketing index
Constant	23.182*** (7.220)	24.540*** (7.509)	22.903*** (7.245)	23.535*** (7.545)
Internet skills index	0.563*** (0.088)	0.545*** (0.089)	0.559*** (0.089)	0.539*** (0.089)
Business characteristics				
Z1: Number of collaborators				
Dichotomous: 1 collaborator (RC)				
Dichotomous: 2 to 5 collaborators				
	6.182			4.480

	(5.316)			(5.402)
Z2: Age of business				
Dichotomous: 0 to 2 years (RC)				
Dichotomous: 3 to 5 years		4.588		3.784
		(3.856)		(3.940)
Dichotomous: 6 years or more		−4.588		-5.120
		(5.055)		(5.094)
Z3: Business sector				
Dichotomous: Goods (RC)				
Dichotomous: Services			2.888	3.857
			(6.007)	(6.102)
Dichotomous: Goods and services			6.546	5.941
			(4.770)	(4.804)
Mean of variable Y	68.260	68.260	68.260	68.260
R-squared	0.222	0.231	0.225	0.245
F-statistic	F(2, 146) =20.897	F(3, 145) =14.576	F(3, 145) =14.101	F(6, 142) =7.715
P-value (of F)	0.000	0.000	0.000	0.000
Observations	149	149	149	149

Note: Values in parentheses correspond to the standard deviation of the estimator. The acronym in parentheses (RC) indicates the reference category. *,**;***: Statistical significance at 10%, 5%, and 1%, respectively.

Table 5 presents the results of the estimation of the econometric model of each digital marketing component (model 9, model 10, and model 11), considering the indicators of Internet skills and business characteristics as independent variables. In the results of model 9, the significant relation between the strategic emphasis indicator and the business characteristics is identified, which provides evidence in favor of hypothesis 3.

Table 5
Components of the digital marketing index

	Model 9 Y_1: strategic emphasis	Model 10 Y_2: digital intelligence generation	Model 11 Y_3: resource planning and provision
Constant	14.048**	18.560**	26.579***
	(5.610)	(9.338)	(10.150)
Internet skills			
X1: E-Management	−0.111	−0.299**	−0.344**
	(0.087)	(0.145)	(0.157)
X2: Content creation and posting on social networks	0.115	0.292*	0.286*
	(0.094)	(0.158)	(0.171)
X3: Autonomous learning	0.243***	0.519***	0.514***
	(0.087)	(0.146)	(0.158)

X4: Privacy and security	0.071	0.097	0.0954
	(0.080)	(0.133)	(0.145)
X5: Information and communication	0.408***	−0.018	−0.022
	(0.084)	(0.139)	(0.152)
Business characteristics			
Z1: Number of collaborators			
Dichotomous: 1 collaborator (RC)			
Dichotomous: 2 to 5 collaborators	7.224*	3.769	2.109
	(3.884)	6.465	(7.028)
Z2: Age of business			
Dichotomous: 0 to 2 years (RC)			
Dichotomous: 3 to 5 years	2.380	7.317	1.656
	(2.877)	(4.789)	(5.205)
Dichotomous: 6 years or more	−9.613**	−2.031	−2.346
	(3.762)	(6.261)	(6.806)
Z3: Business sector			
Dichotomous: Goods (RC)			
Dichotomous: Services	−0.845	1.752	−0.353
	(4.465)	(7.432)	(8.079)
Dichotomous: Goods and services	6.685*	5.445	8.310
	(3.472)	(5.779)	(6.282)
Mean of Variable Y	74.138	64.944	66.126
R-squared	0.558	0.250	0.189
F(10, 138)	17.43921	4.613098	3.221
P-value (of F)	0.000	0.000	0.000
Observations	149	149	149

Note: Values in parentheses correspond to the standard deviation of the estimator. The acronym in parentheses (RC) indicates the reference category. *,**;***: Statistical significance at 10%, 5%, and 1%, respectively.

The strategic emphasis on digital marketing is positively related to the number of collaborators (2 to 5 collaborators) and to the business sector goods and services ($\gamma = 7.22, p < 0.1$; $\gamma = 6.68, p < 0.1$, respectively); while the strategic emphasis on digital marketing is negatively related to the age of business for the category 6 years or more ($\gamma = -9.613, p < 0.05$). Therefore, when the business is older (6 years or more), the emphasis on digital marketing decreases by 9.16 percentage points.

Results and discussion

This research aims to determine whether there is a significant relation between digital marketing and Internet skills in Latin American female digital entrepreneurs. Furthermore, it seeks to determine the relation between digital marketing with Internet skills and business characteristics (number of collaborators, age of business, and business sector).

The econometric model results provide evidence for Hypothesis 1: digital marketing is positively and significantly related to Internet skills in female entrepreneurs. This result is consistent with that reported by Bhagat and Sambargi (2019), who found that the intention of digital marketing adoption is significantly related to the digital skills exhibited by female entrepreneurs. For their part, Ramli, Mahat, and Abd Razak (2022) identified a relation between the low participation of female entrepreneurs and online businesses with low digital literacy. In this regard, Valdez et al. (2019) state that the lack of training in the use of digital tools limits the use of digital marketing, acting as a consequent impediment to improving the welfare of their lives and businesses (Domínguez et al., 2022). Consequently, Ramli, Mahat, and Abd Razak (2022) emphasize that female entrepreneurs are indeed prepared to venture into online business, but they need to be trained in communication strategies and digital copywriting for advertising and marketing strategies.

Likewise, the econometric model provides evidence that the three components of digital marketing are positively and significantly related to the skill of autonomous Internet learning, which provides evidence in favor of hypothesis 2. In this regard, Olson and Bernhard (2021) state that female entrepreneurs have to constantly learn new skills, even informally, to take advantage of the potential of digitization, especially the knowledge and use of social networks, which would allow them to remain competitive and generate business growth.

The results show a relation between the components of digital marketing and Internet skills for autonomous learning, but with a greater effect on the component of digital intelligence generation. Thus, autonomous learning by Latin American female entrepreneurs through Internet tutorials, comments from other people on the Internet to solve doubts, and consulting technical support services to solve problems influence digital marketing. These results are consistent with the results reported by Cab Pech et al. (2021), which show that 64.4% of female entrepreneurs use the Internet as a support tool for business education and training.

Moreover, the results of the model show that the component of strategic emphasis on digital marketing is negatively and significantly related to the age of the business, which supports hypothesis 3. That is, the older the business is (in the results of this research, 6 years or more), the lower the emphasis on digital marketing, which is consistent with the results reported by Valdez et al. (2019). In this regard, Gulati (2019) states that the digital approach to market products and services is an integral quality of entrepreneurs; therefore, in the case of newly established companies, entrepreneurs exploit this imperative advantage that does not require large investments.

From the calculations obtained, the digital marketing index score is 68%, and the Internet skills index score is 79%. Latin American female entrepreneurs scored higher on the digital marketing index than 44% of Indonesian companies, as reported by Masrianto et al. (2022).

From the descriptive results, about 60% of female digital entrepreneurs use the Internet very frequently to perform E-Management-related activities. This result contrasts with that reported by Cab Pech et al. (2021), who identified a low rate of Internet use for business: 15.9% of the female entrepreneur participants in marginalized areas use the Internet for online banking, and 18% make online purchases. In contrast, in the case of young female students, Internet use for digital administration and business procedures is more frequent (Jiménez et al., 2016).

Conclusions

The relation between digital marketing and Internet skills is a topic that has gained relevance both from theoretical and empirical points of view. The results of this research provide evidence of the relation between digital marketing and Internet skills in Latin American female entrepreneurs, which supports the proposed hypothesis H1. The econometric model results show that the three components of digital marketing are positively and significantly related to autonomous Internet learning skills but with a greater effect on the digital intelligence generation component, which provides evidence in favor of hypothesis 2. Likewise, there is evidence that the strategic emphasis on digital marketing component is negatively and significantly related to the age of the business, which supports hypothesis 3. These results corroborate the importance of training women entrepreneurs in Internet skills and allow an understanding of these skills' impact on digital marketing strategies, which applies to businesses with different characteristics in terms of size, age, and sector in which they operate.

On the other hand, it should be noted that the size of the sample was one of the main limitations of this study. First of all, a broader spectrum of cases in different countries would have allowed a better x-ray of the topic, female entrepreneurs' digital marketing and Internet skills. Moreover, larger and more representative samples lead to better and more conclusive results. Added to this is the time assigned for the fieldwork since it had to be closed by a certain date to continue the study process.

For the above reasons, it would be advisable to replicate the model used in this work in a subsequent attempt to obtain data on female entrepreneurs in more Latin American countries. Similarly, it would be useful to extend the area of research to the involvement of other sociodemographic and socioeconomic variables, as referred to by Scheerder et al. (2017). Finally, it is suggested to address a gap that has been little studied by including social and cultural factors in the econometric model, as well as the different levels of education and regions.

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