Does human resource performance contribute to the success of the university entrepreneurial project?

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A B S T R A C T
Objective: This article aims to verify the influence exerted by the performance of human resources on university entrepreneurship.
Research Design & Methods: The methodology used in the research was cross-sectional, observational, and explanatory. Regarding the sample used, 434 university entrepreneurial leaders from the state of Guanajuato, Mexico were considered. A structural equation model (SEM) was designed for the hypothesis test. According to the goodness and fit indices of the model, they turned out to be satisfactory.
Findings: I confirmed that the management of human resources positively influenced the performance of HR. Similarly, the HR performance positively influenced the management and success of the entrepreneurial project and finally, the management of the project positively influenced the success of the university entrepreneurial project.
Implications & Recommendations: The practical implications and recommendations focus on university entrepreneurs of SMEs, who must consider the entrepreneurial processes of business entities and the necessary human resources, which impact the new firm as well as the positioning of their venture, considering human resources as the main factor for the development and growth of entrepreneurship. Therefore, the management of human resources plays a very important role in the development of the entrepreneurial project, and in the same way, represents a management tool focused on the people involved in the development of the entrepreneurial project.
Contribution & Value Added: This study highlights the management and performance of human resources and the success of the business project previously studied specifically in the university enterprise in Mexico. The results obtained contribute to the literature by shedding light on the process of human resource management in entrepreneurship.
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INTRODUCTION

For progress, development, growth, and economic prosperity within a country, the role played by the business sector is important, as are the government organizations (Bucardo, Saavedra, & Camarena, 2015). According to the data of the 2020 economic census of the National Institute of Statistics and Geography (INEGI), of the 4.9 million registered economic units, the micro, small, and medium enterprises (MSMEs) represent 99.8% of these (INEGI, 2023) and also generate 72% of employees in Mexico (Senate of the Republic, 2023). As mentioned above, enterprises represent the main trigger and engine

of the region's economic and social development. In the same way, the enterprise represents an alternative that favours technological, economic, and social development (Amorós, 2011; Lopez & Alvarez, 2018; Astebro, Bazzazian, & Bazzazian, 2012) both at the regional level of the nation.

In a study carried out by INEGI, it was reported that in 2020, economic censuses found 4.9 million microenterprises and SMEs in Mexico, of which 79.2% survived, and 20.8% of these closed their doors permanently. That is, they died (INEGI, 2023). According to the Failure Institute, one of the main factors that induce enterprises' failure is the lack of correct management of human resources, where specifically of 100%, 29% of this is due to the lack of development of personnel, 21% is related to compensation problems, 20% to the lack of adequate selection, 16% to theft by staff, and finally, 14% to staff turnover (The Failure Institute, 2023).

Various investigations carried out in the literature mention that an enterprise can survive when it makes good and adequate use of its resources, among which researchers include human resources (Acs, 2010; Wang, Tsai, Lin, Enkhbuyant, & Cai, 2019; Alvarez, 2020), one of the main factors that promote sustainability, performance, and economic profitability of the MSMEs that are developed in the region.

Currently, universities play an extremely important role in the business sector. According to various studies, university students' entrepreneurship endeavours tend to have a higher percentage of success than those carried out by individuals with a lower education level, so universities are an incubator for university entrepreneurship (Davey, Hannon, & Penaluna, 2016; Guven & Yildirim, 2022) and represent an area of opportunity for the generation and development of new business initiatives that may contribute to the economic development of the region.

In this sense, it is extremely important to focus efforts on the performance of human resources, which allows companies – and the business sector that continually undertakes new products and services – to achieve objectives and thus high performance (Scapolan, Montanari, Bonesso, Gerli, & Mizzau, 2017), allowing one to position themselves and stay in a highly competitive market.

This study aimed to verify the influence exerted by the performance of human resources on university entrepreneurship. Based on this, it intended to generate strategies that could contribute to the management of projects carried out in university environments and the development and progress of new business initiatives. The originality of this study stands out because it investigates both university entrepreneurship in Mexico through the study of management and the influence of human resource performance on the success of the entrepreneurial project. To do this, a structural equation model was designed to measure the causal effects of the variables analysed.

The article is structured as follows. Firstly, we will present a review of the literature and the development of the hypotheses raised in the study. Subsequently, we will outline the methodology used in this study and describe the statistical techniques and the development of the SEM model. Next, the direct and indirect effects of the exogenous variables on the endogenous ones corresponding to a proposed hypothetical model will be described and analysed. Then, results and discussion will be presented. Finally, in the conclusions, we will analyse each of the findings and compare them with the results of other studies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Baumol (1968) defines the entrepreneur as a person who manages the resources available to generate and do business, visualizes the possibility of innovating products and services, obtains new sources necessary to manage and potentiate the organization, plans to open new markets, and of course, seeks the design and administration of a new organization (Bucardo, Saavedra, & Camarena, 2015). Entrepreneurship allows new knowledge to be identified and explored, which in turn generates entrepreneurial opportunities.

According to Qian and Acs (2013), 'the entrepreneur acts as an agent of change, to the extent that he can start a business motivated by the possibility of exploring, exploiting and making profitable a new knowledge, a technological innovation or a new product' (Sánchez, Garcia, & Mendoza, 2015, p. 2).

According to the model proposed by Mehlum, Moene, and Torvik (2003), the countries that have a high level of economic income, development, and employment, as well as those that acquire high levels of growth rates in the short, medium, and the long term are characterized by promoting and

generating a greater number of enterprises (Aeeni, Motavaseli, Sakhdari, & Mobini, 2018) in any business field, hence the government sectors and educational entities focus on potentiating the management of entrepreneurship through its plans and programs alluding to the fact that many universities have opted to create incubators to generate and develop entrepreneurship.

Various investigations affirm that university entrepreneurship occurs through the influence of internal and external factors, where the business and market sector is related to universities to promote an entrepreneurial education among students, thus bringing with it an opportunity to opt for a business vocation and make it more probable that the emerging ventures will be successful (Karra, Phillips, & Tracey, 2008; The Failure Institute, 2023).

More and more business institutions are focusing on entrepreneurship (Wach, 2014) because it is relevant to the region's economic and social attractiveness. Therefore, a university entrepreneur is also the one who decides to pursue a professional career that allows him to generate and do business because he dedicates efforts, resources, and time to training, obtaining knowledge, skills, and competencies that will help him achieve the success (Borrayo, Valdez, & Delgado, 2019) regardless of the chosen career path. Likewise, it is necessary to consider that entrepreneurship is interested in analysing factors that promote the economic growth of countries, (Galindo-Martín, Méndez-Picazo, & Castaño-Martínez, 2016), with HR being one of the strategies used to achieve business objectives such as entrepreneurship.

Universities are the origin of a big part of the research and innovation carried out in entrepreneurship, as well as the generation of businesses. It is also the field of training new talents and the identification of business opportunity areas. In this sense, universities are within the entrepreneurial environment and contribute through their students to the process of generating business ideas, empowering them with the ability to develop their business skills, to later shape and use them to generate success within the entrepreneurial project, either by creating some type of company that offers products/services or forging the idea of being self-employed entrepreneurs. Thus, universities serve as an incubator for the generation of this type of undertaking called university entrepreneurship (Davey, Hannon, & Penaluna, 2016; Guven & Yildirim, 2022; Tunio, Chaudhry, Shaikh, Jariko, & Brahmi, 2021) that can respond to the needs of an emerging market.

Tunio, Chaudhry, Shaikh, Jariko, and Brahmi (2021) point out that in recent years, employment opportunities in some countries have been scarce, so entrepreneurship helps society to reach financial independence. For entrepreneurs to prosper, key elements are required, and university education is recognized as a key element for the success of an entrepreneurial project (European Commission, 2013; Isenberg, 2014; Spigel, 2017). In their report for the National Council for Graduate Entrepreneurship (NCGE) of the United Kingdom, Gibb and Haskins (2014) mention that university entrepreneurship defines those universities that provide opportunities, practices, and suitable environments to motivate and help their university students and graduates to undertake (Williams, Knight, Rutter, & Mathias, 2022).

Universities are the reservoirs of knowledge and skills in a society that seeks positive change through the exchange of knowledge and the development of human resources oriented towards competence and performance generation. University entrepreneurship uses the potential of each of its students to analyse and develop economic, political, and social opportunities within the environment (Ahmed, Chandranb, Klobas, Liñánde, & Kokkalis, 2020). The university entrepreneur combines his academic knowledge with that of an entrepreneur, to create self-employment opportunities and thus generate income and profit (Abreu, Demirel, Grinevich, & Karataş-Özkan, 2016; Astebro, Bazzazian, & Bazzazian, 2012).

Entrepreneurship contributes to competitiveness, economic growth, and job creation in a country, because business actions such as starting or establishing a company are considered a means for generating self-employment and income. In university entrepreneurship, an entrepreneurial attitude based on social needs in terms of business development and job creation is sought (Dehter, 2001; Formichella, 2004). The social and cultural dimensions play a role in entrepreneurship. Hofstede (2001) mentions that culture explains human behaviour which, according to different investigations, is an ideal behaviour of the human memory of an enterprise, this will be a factor positively influential in entrepreneurship because it will promote proactive attitudes and behaviour that allow generating knowledge to create and reinvent businesses necessary for your ventures (Vargas, 2022).

The key element of a developed or developing entrepreneurial country is its financial system, so it is important to know how it is managed and what is the level of the financial education of its population. The teaching of financial education at universities is very relevant for the future preparation of students, because university students need it now and will need it in the future to perform better in their professions and while pursuing any goal. For example, various investigations carried out to affirm that the Millennial generation, meaning people born between 1981-2000 (Vargas, 2022) is a generation focused on entrepreneurship, whose financial education can help them enjoy a better life quality and improve their entrepreneurial success probability (Vargas & Higuera, 2022).

The performance of the human resource can be defined as 'the extent to which the individual can meet the established objectives of quality, cost, and time' (Hoegl & Gemuenden, 2001, p. 438). For the performance of the human resource to be of quality, six key elements are required. These include communication, coordination, the balance of member contribution, mutual support, effort, and cohesion coverage (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016).

In recent years, the success of a venture such as a university venture has taken on great relevance, because the success of a venture occurs as the business objectives specified in strategic planning are achieved. This is revealed by indicators (KPI) related to the management and performance of human resources measured through their efficiency and effectiveness (Salas-Arbeláez, García, & Murillo, 2017; Zhang & Zhu, 2012).

Various studies in the literature suggest that the performance of human resources has a positive influence on the success of an enterprise (Capelleras, Domi, & Belletti, 2021). In this sense, the performance of human resources turns out to be one of the main strategies that allow business units, as well as entrepreneurship promoted in universities, to achieve success. That is, the enterprise manages to position itself in a highly competitive market.

Kim, Dibrell, Kraft, and Marshall (2021) and Pocztowski (2008) define human resources management (HRM) as a strategy to support employees or work teams in their capacities, which they seek to potentiate, hoping that they will achieve the expected results. It is a strategy that seeks to achieve business or entrepreneurial objectives by enhancing the capabilities of the work team (Badzińska, 2016; Gawlik & Jacobsen, 2016). Tam, Da Costa, Oliveira, and Varajão (2020) state that the capacity of the work team represents one of the main strategies to manage HR due to knowledge management as well as the conditions necessary to complete tasks. Likewise, Misra, Kumar, and Kumar (2009) indicate that a highly trained and managed work team allows activities to be carried out in a timely and functional manner, because it seeks to meet customer satisfaction by achieving success. On the other hand, Chow and Cao (2008) state that the motivation and commitment of the personnel under adaptability management and constant training make the enterprise more likely to succeed in a given project.

Likewise, the employees or people who are closely linked to the development, creation, and support of the university entrepreneurial project are considered the most important human resource since they will generate prosperity (Omotoye, Abdulazeez, & Olusesi, 2022; Rachwał, Kurek, & Boguś, 2016) for the new business initiative. That is why the capacity of the team (Tam, Da Costa, Oliveira, & Varajão, 2020), in this sense, of the human resource, plays an important role in the development of the entrepreneurial project.

One of the challenges facing entrepreneurship is related to the performance of human resources with efficiency and effectiveness, that is, towards maximum performance. The personnel of a company is a key element for any type of adaptation that arises in the organization based on the established objectives. Therefore, when suitable and committed human capital is achieved, the organization gets added value and a competitive advantage (Montoya & Boyero, 2015) that guarantees the success of the business unit or university entrepreneurship in the business sector. Based on the above, we hypothesised the following:

H1: Human resource management is positively and significantly related to human resource performance.

Organizations have realized that to survive in a market in a globalized environment, it is necessary to quickly adapt to the changes that arise and thus, the human resource within organizations plays a

very important role in the adaptation process. Therefore, it turns out to be one of the main concerns of managers to maintain good levels of efficiency and effectiveness in the work performance of their workers (Lin, Wang, Chen, & Chen, 2019; Luthans, Luthans, & Luthans, 2004; Soares, Teixeira, & Verwaal, 2018; Volberda, Van, Verwaal, & Stienstra, 2012; Luthans, Luthans, & Luthans, 2004)

The performance of human resources should not be the sole responsibility of the organization or the employee himself, rather, it should be a union between the two to achieve the stated objective (Lee & Young, 2017; McDonald & Hite, 2016; McElroy & Weng, 2016). The aim should be to generate synergy between human resources and senior management to achieve more-than-expected results and thereby achieve and guarantee success in the university entrepreneurial project.

To achieve the success of a university entrepreneurial project, important factors that will affect the achievement of the objective must be taken into consideration, among which is the performance of human resources. According to He, Song, Yang, and Chen (2021), the concept of performance can be defined as the point at which the human resource achieves the stated objectives and in turn, the result obtained meets the organization's mission. Human resource performance is the extent to which employees achieve results to the expected standard (Zulfadil, Hendriani, & Machasin, 2020). However, Lin, Wang, Chen, and Chen (2019) define the performance of human resources as using the capabilities of each member of the organization to mobilize motivation and resources, and taking actions necessary to succeed (Rico *et al.*, 2021).

Sharp and Robinson (2010) describe how the performance of human resources enables collaboration, coordination, and communication within an entrepreneurial project. Various studies in the literature show the relationships between various aspects of job quality based on the performance of human resources through the efficiency and effectiveness of human resources. In this sense, the present study focused on the factors described by Hoegl and Gemuenden (2001), which mention that the performance of human resources focuses on two main factors: (1) effectiveness and (2) efficiency, in which effectiveness refers to the point at which the human resource meets expectations regarding the quality of work (Bergersen, Hannay, Sjøberg, Dybå, & Karahasanovi, 2011). In this sense, human resources can achieve the objectives established through strategic planning through functionality, solidity, and reliability, which leads to the high performance of tasks and thereby position the business initiative through entrepreneurship (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016) managed through university institutions.

Efficiency refers to the point at which human resources meet all expectations regarding quality, time, and cost, as well as comply with the program established to achieve the objectives considering the adequate use of the budget assigned to university entrepreneurship. In this sense, the efficiency of human resources makes it possible to relate the resources with respect to the objectives set in order to achieve competitiveness through university entrepreneurship and thereby position the university in the market. Based on the above, we hypothesised the following:

H2: The performance of human resources is positively and significantly related to the management of the university entrepreneurship project.

If human resources are not well-trained, organizations tend to lose the ability to compete in the national and international market, which brings with it a decrease in the success of the proposed project (Tomaka, 2001). Executive directors and managers and business schools that promote entrepreneurship must implement strategies and practices toward human resources so that they can create and retain a workforce with the capacity to generate performance, which will increase the success probability of the entrepreneurial project. Furthermore, organizations that implement more inputs for human resources tend to be more likely to have resource management practices with higher levels of performance, considering business management practices through an ideal human resource can add value to a venture with a competitive advantage (Barney & Wright, 1998; Ferguson & Reio, 2010).

The environmental changes of globalization and the influence of the economic crisis put pressure on companies and university educational institutions to improve business competitiveness and thereby guarantee success through entrepreneurship. For this reason, it is of interest to study the determinants of business performance through human resources. Likewise, changes in business practices

offer greater flexibility to the labour market and encourage the development of incentives to be able to attract and maintain a high-performance human resource and thereby become a more competitive and successful company. Milliman, Von Glinow, and Nathan (1991) define the concept of flexibility within an enterprise as the ability of human resources to manage the organization so that they adapt more easily and effectively to changes in the national and international markets (Madero & Barboza, 2015) and represents one of the main factors that contribute to the success of the entrepreneurial project. Based on the above, we hypothesised the following:

H3: The performance of human resources is positively and significantly related to the success of the entrepreneurial project.

Likewise, Wheelwright and Clark (1992) and Grant (1996) argue that two of the most important contributions to success in entrepreneurship are the practices of human resource management and the knowledge absorption capacity of the human resource project within the enterprise. Human resource management practices are significantly related to the success of the entrepreneurial project. Human resource management practices help the organization to prepare for potential future projects, assigning a suitable human resource to participate in them, and change management so that they can be coupled to the long-term strategy (Popaitoon & Siengthai, 2013). In this sense, the enhancement of the performance of human resources through efficiency and effectiveness plays a fundamental role in the development of the university entrepreneurship project and factors that allow the success of the entrepreneurial project. Thus, we hypothesised the following:

H4: The management of the university entrepreneurship project is positively and significantly related to the success of the entrepreneurial project.

Figure 1 shows the hypothetical model with specified hypotheses of the present study.
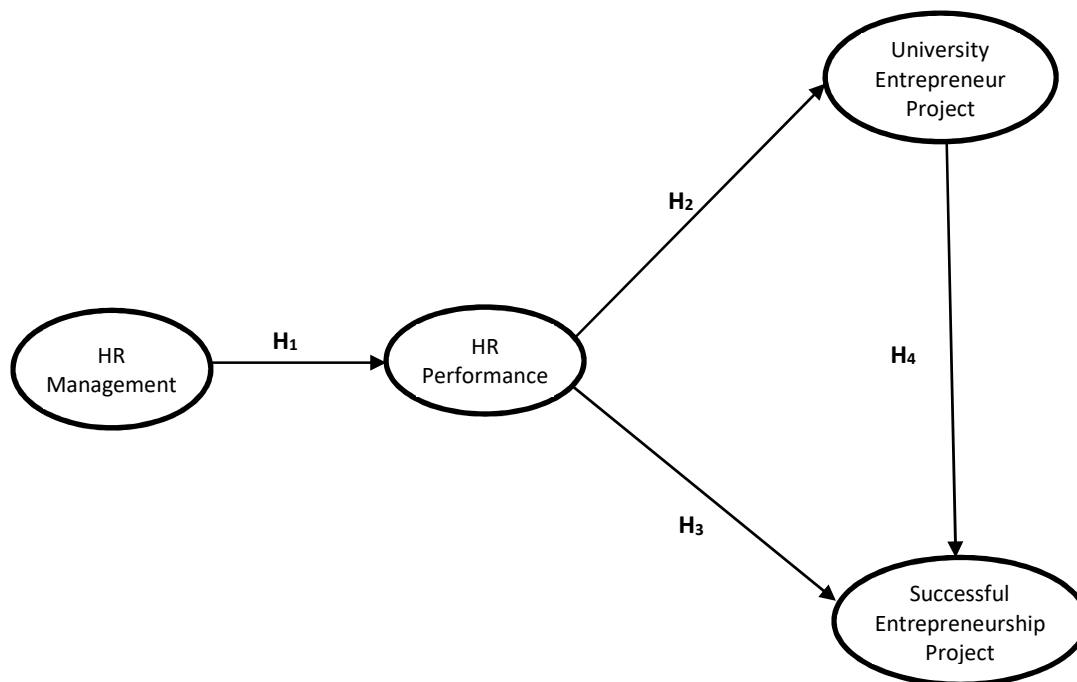

Figure 1. Theorized hypothetical model
Source: own elaboration.

RESEARCH METHODOLOGY

The type of sampling applied in the research was intentionally non-probabilistic, because it was intended to obtain the largest number of participants in the study. Regarding the inclusion criteria, they were young university entrepreneurial leaders who had a business and had at least one year of experience in the management of the entrepreneurial initiative, one year of seniority in positioning the

business in the market, and the leader had at least five dependents. Likewise, leaders with a venture whose ideas have been incubated through a university were considered. To obtain the data, an internet page was created which the participants entered to fill the questionnaires, thus providing the necessary information to statistically analyse information.

In this way, it was possible to obtain a sample of 434 entrepreneurs from public and private universities in the state of Guanajuato. Mexico. Of these, 59.4% (n=258) were women while 40.6% (n=176) were men. Regarding the age of the participants, 12.9% (n=56) were under 20 years old, 63.6% (n=276) were between 21 and 30 years old, 13.1% (n =57) – 31 and 40 years old, 10.3% (n=45) – older than 40 years. Regarding the sector of business initiatives, 42.6% (n=185) were from commerce, 48.2% (n=209) – services, and 9.2% (n=40) – the industrial sector.

For the analysis of the data obtained, the statistical software SPSS v.21 was used, for the verification of the hypotheses – SEM model designed using Amos v.21, and to calculate the force effect size and statistical power – software G * Power v.3.1.9.4.

The correlation of the analysed variables was analysed in the same way. In this way, it was shown that there is a positive and significant relationship (Bonett & Wright, 2000; Pearson, 1929; Pearson, 1931) between the latent variables: human resource management, human resource performance, university entrepreneurship project, and the success of the project. The entrepreneurial project was measured through the Pearson correlation coefficient as shown in Table 1.

Table 1. Descriptive statistics

Variables	Mean	Standard Deviation	Variance	1	2	3	4
Human resource management	5.64	1.10	1.21	1.00	–	–	–
Human resource performance	6.14	0.86	0.74	0.15^{**}	1.00	–	–
Management of the university entrepreneurial project	6.07	1.02	1.05	0.10^{*}	0.68^{**}	1.00	–
Successful entrepreneurship project	6.05	0.94	0.90	0.15^{**}	0.67^{**}	0.80^{**}	1.00

Note: * $p<0.05$; ** $p < 0.001$.
Source: own study.

Likewise, to improve the internal consistency of the test, the effect size of the statistical force (f^2) and the statistical power (1-β) of the correlations were calculated. For this, the F-test analysis was performed under the multiple linear regression statistical test based on the coefficient of absolute determination (ΔR^2) or squared effect size (ρ^2) considering the type of analysis: post-hoc computed achieved power (Cohen, 1988; Faul, Erdfelder, Buchner, & Lang, 2009; Hair, Hult, Ringle, & Sarstedt, 2017) (Table 3).

According to the criteria of the values corresponding to the size of the statistical force effect (f^2), Cohen (1988), Faul, Erdfelder, Buchner, and Lang (2009), as well as Hair, Hult, Ringle, and Sarstedt, (2017), consider value less than 0.02 a small force, greater than 0.02 but less than 0.35 with a reference of 0.15 as a medium force, while the value equal to or greater than 0.35 as a strong statistical force. On the other hand, Cohen (1988) considers the statistical power (1-β) criteria greater than 0.70 as adequate, greater than 0.80, to be acceptable, and greater than 0.90, to be excellent (Cohen, 1988; Faul, Erdfelder, Buchner, & Lang, 2009).

The constructs were investigated through questionnaires developed in a way that allowed a group of experts to measure them. In the same way, for the construction of some items, the main ideas were taken from the studies carried out by Lindsjørn, Sjøberg, Dingsøyr, Bergersen, and Dybå (2016), Stankovic, Nikolic, Djordjevic, and Cao (2013), Tam, Da Costa, Oliveira, and Varajão (2020), Zhang, Sun, Yang, and Wang (2018). These instruments use a 7-point Likert scale in which 1 represents 'totally disagree' and 7 'totally agree.' To measure the internal consistency of the instrument, Cronbach's alpha (α), McDonald's omega (Ω), as well as the Dillon-Goldstein composite reliability (ρc) were used. For the validity of the instruments, the structural equation model (SEM) was designed under the bootstrapping technique, and the maximum likelihood method (ML) using resampling of 1000 bootstraps through the construct validation is the most important (Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981; López-Lemus, De la Garza, Atlatenco, & López-Lemus, 2021). Likewise, the convergent

validity was verified through the standardized factor loadings (λ) of the same observable variables that were greater than 0.40 (Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981).

Human Resource Management

The human resource management instrument is made up of five manifest variables (Tam, Da Costa, Oliveira, & Varajão, 2020). According to the results of the analysis of the internal consistency of the instrument measured through reliability (α=0.90; Ω=0.90; ρc=0.90), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald, 1999). Regarding the validity of the human resource management instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=15.66 / *df*= 3; *p<0.001*) along with the partial adjustment indices of an absolute nature: the goodness of fit index (GFI=0.98), and adjusted goodness of fit index (AGFI=0.92). In the same way, the incremental fit indices were considered: comparative fit index (CFI=0.98), Tucker-Lewis index (TLI=0.96), normalized fit index (NFI=0.98), and incremental fit index (IFI=0.98). Finally, the parsimonious fit indices were considered: root mean square error approximation index (RMSEA=0.09), root mean square residual (RMR=0.02), and standardized mean square residual (SRMR=0.01). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 2.

Human Resource Performance

The human resource performance instrument is made up of 10 manifest variables that the efficacy factor measures, while the efficiency factor uses five manifest variables (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016). According to the results obtained from the reliability analysis of the instrument, both the efficacy dimension (α=0.91; Ω=0.91; ρc=0.92) and the efficiency dimension (α=0.85; Ω=0.85; ρc=0.86), as well as the internal consistency of the entire instrument (7=0.93; 7=0.94; ρc=0.9), turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald & Hite, 2016; McDonald, 1999). Regarding the validity of the human resource performance instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=289.71 / *df*= 89; *p<0.001*) along with the absolute partial adjustment indices (GFI=0.91; AGFI=0.90), the incremental adjustment indices (CFI=0.94; TLI=0.93; NFI=0.92; IFI=0.94) and the adjustment indices of parsimonious character (RMSEA=0.07; RMR=0.05; SRMR=0.04). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 3.

Management of the University Entrepreneurial Project

This instrument is made up of four manifest variables (Stankovic, Nikolic, Djordjevic, & Cao, 2013). According to the results obtained from the analysis of the internal consistency of the instrument (α=0.90; Ω=0.90; ρc=0.90), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; McDonald, 1999). Regarding the validity of the management of the university entrepreneurial project instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=1.29 / df= 2; $p<0.001$), along with the absolute partial adjustment indices (GFI=0.99; AGFI=0.99), the incremental adjustment indices (CFI=1.00; TLI=1.00; NFI=0.99; IFI=1.00), and the adjustment indices of parsimonious character (RMSEA=0.01; RMR=0.07; SRMR=0.05). Therefore, all the goodness and adjustment indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 4.

Successful Entrepreneurship Project

This instrument considers four manifest variables (Zhang, Sun, Yang, & Wang, 2018). According to the results obtained from the analysis of the internal consistency of the instrument (α=0.87; Ω=0.86; ρc=0.87), they turned out to be satisfactory (Cronbach, 1951; Dillon & Goldstein, 1984; Hair, Hult, Ringle, & Sarstedt, 2017; Hayes & Coutts, 2020; INEGI 2023; McDonald, 1999). Regarding the validity of the successful entrepreneurship project instrument, a CFA was developed through an SEM model. For SEM validation, the Chi-square test was considered (χ^2=6.19 / df= 3; $p<0.001$) along with the absolute partial adjustment indices (GFI=1.00; AGFI=1.00), the incremental adjustment indices (CFI=1.00; TLI=1.00; NFI=1.00; IFI=1.00), and the adjustment indices of parsimonious character (RMSEA=0.01; RMR=0.01; SRMR=0.02). Therefore, all the goodness and adjustment indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996). See Table 5.

Table 2. Human resource management

Variable: Human resource management	Factorial load	Reliability		
HRM1. The human resource has high technical competence and experience	0.79**			
HRM2. Human resources are highly motivated and committed to the success of the entrepreneurial project.	0.82**			
HRM3. Adequate technical training is provided to human resources to manage the processes of the entrepreneurial project	0.85**	0.90	0.90	0.9
HRM4. The human resource knows the principles and management processes of the entrepreneurial project.	0.67**			
HRM5. Human resource management has a flexible and/or adaptive style towards the development of the entrepreneurial project	0.69**			

χ^2	df	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
15.66	3	0.980	0.960	0.980	0.920	0.980	0.980	0.09	0.01	0.90	0.90	0.90

Note: ** p<0.001.
Source: own elaboration based on Tam, Da Costa, Oliveira, and Varajão (2020).

Table 3. Human resource performance

Variable: Human resource effectiveness (EFCIA)	Factorial load	Reliability		
RE_EF1 Following the results, teamwork can be considered a success	0.702**			
RE_EF2 All customer demands are satisfied.	0.716**			
RE_EF3 From the opinion of the company, the objectives of the team are achieved	0.796**			
RE_EF4 The image of the company grows according to the performance of the work team	0.747**			
RE_EF5 The result of teamwork is of high quality	0.819**	0.91	0.91	0.92
RE_EF6 The client is satisfied with the quality of the result of teamwork.	0.792**			
RE_EF7 The work team is satisfied with the results achieved	0.782**			
RE_EF8 The product produced on the computer requires a few modifications.	0.598**			
RE_EF9 The product/service is stable in its operation	0.765**			
RE_EF10 The product/service developed proves to be complete and functional	0.551**			
Variable: Human resource efficiency (EFCA)				
RE_EC1 The organization is satisfied with the work carried out by the work team	0.824**			
ER_EC2 In general, the team works profitably	0.798**			
RE_EC3 In general, the team works efficiently	0.837**	0.85	0.85	0.86
RE_EC4 The team is on schedule	0.602**			
RE_EC5 The equipment is within budget	0.607**			

χ^2	df	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
289.71	89	0.94	0.93	0.91	0.9	0.92	0.94	0.07	0.04	0.93	0.94	0.94

Note: ** $p < 0.001$.

Source: own elaboration of Lindsjørn *et al.*, 2016..

Table 4. Management of the university entrepreneurial project

Variable: Management of the university entrepreneurial project	Factorial load	Reliability		
UEP1. The university entrepreneurship project was successful in terms of quality	0.80**			
UEP2. The university entrepreneurship project was successful in terms of scope and project requirements met	0.89**			
UEP3. The university entrepreneurship project was successful in terms of timeliness in project completion	0.79**	0.90	0.90	0.90
UEP4. The university entrepreneurship project was successful in terms of costs and efforts under budget or within estimates	0.80**			

χ^2	df	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
1.29	2	1.000	1.000	0.990	0.990	0.990	1.000	0.01	0.05	0.90	0.90	0.90

Note: ** $p < 0.001$

Source: own elaboration of Stankovic *et al.*, 2013.

Table 5. Successful entrepreneurship project

Variable: Successful entrepreneurship project	Factorial load	Reliability		
The project was accomplished:				
SEP1. On-time	0.82**			
SEP2. Within budget	0.85**	0.87	0.86	0.87
SEP3. According to specifications	0.69**			

χ^2	df	CFI	TLI	GFI	AGFI	NFI	IFI	RMSEA	SRMR	α	Ω	ρc
6.19	3	1.000	1.000	1.000	1.000	1.000	1.000	0.01	0.02	0.87	0.86	0.87

Note: ** $p < 0.001$.

Source: own elaboration of Zhang *et al.*, 2018.

RESULTS AND DISCUSSION

To evaluate the hypothetical structural equation model (SEM) under the bootstrapping technique and the maximum likelihood (ML), the robustness method (Satorra & Bentler, 1994) considered a resampling of 1000 bootstraps. To evaluate the hypothetical SEM model, the Chi-Square test was considered (χ^2=197.74 / df= 73; χ^2/df=2.70; p<0.001) along with the partial adjustment indices of an absolute nature: the goodness of fit index (GFI=0.94), and adjusted goodness of fit index (AGFI=0.91). Likewise, the incremental fit indices of the SEM model were analysed: comparative fit index (CFI=0.97), Tucker-Lewis index (TLI=0.96), normalized fit index (NFI=0.95), and incremental fit index (IFI=0.97). Likewise, the variances of the factors of which it was possible to verify that there was no collinearity between the exogenous and endogenous variables as well as the mediating variables were analysed.

Finally, the parsimonious fit indices were considered: root mean square error approximation index (RMSEA=0.06), root mean square residual (RMR=0.03), and standardized mean square residual (SRMR=0.03). Therefore, all the goodness and fit indices considered to evaluate the SEM model turned out to be satisfactory (Bollen, 1989; Hair, Hult, Ringle, & Sarstedt, 2017; Jöreskog & Sörbom, 1981; López-Lemus & Zavala, 2019; Muthén & Muthén, 1998-2007; Rigdon, 1996; Tucker & Lewis, 1973), see Figure 2.

According to the analysis of the structural loads (β) of the theoretical and hypothetical SEM model (Figure 2), the hypotheses established for the present investigation were evaluated. In this sense, to evaluate hypothesis H_1, I analysed the structural load corresponding to the path via HR Management → HR Performance (β_1). According to the structural load, there was sufficient statistical evidence to affirm that human resource management is positively and significantly related (β_1=0.18; p<0.001) to human resource performance, which is 3.24% (ΔR^2= 0.032) of the total variance explained by the SEM model.
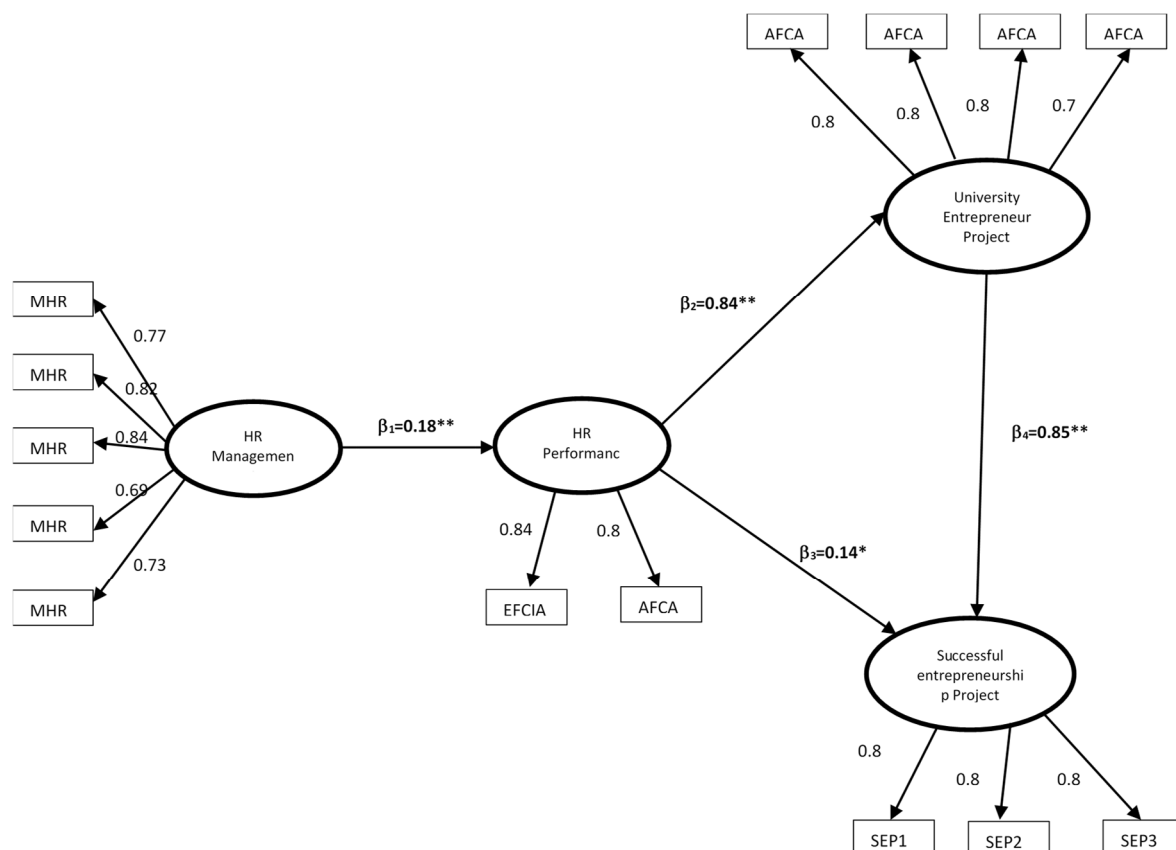

Figure 2. Standardized structural loads of the SEM model
Notes: ** p<0.001. * p<0.05
Source: own elaboration based on investment results.

Following the recommendations of Mayr, Erdfelder, Buchner, and Faul (2007), we proceeded to calculate the force (f^2) and statistical power (1- β) of the structural load ($β_1$) of the SEM model. The calculation of the statistical strength was determined using the F-test: multiple linear regression through a Post hoc test considering the coefficient of absolute determination (ΔR^2=0.0324) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a moderate statistical force (f^2=0.033; *p<0.001*) was obtained (Cohen, 1988) (Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, the statistical power was calculated considering the reliability level of the structural load ($β_1$=0.18; α=0.01), the calculated statistical force (f^2=0.033) as well as the size of the sample used in the study (N=434). under a predictor. According to the results obtained, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 14.53) the statistical power (1 − β = 0.90; p<0.001) of the structural load ($β_1$) was excellent (Faul, Erdfelder, Buchner, & Lang, 2009). According to the analysis carried out through the structural load $β_1$ of the SEM model, hypothesis H_1 was accepted.

To evaluate hypothesis H_2, I analysed the structural load corresponding to the path via HR performance → university entrepreneurial project ($β_2$). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related ($β_2$=0.84; p<0.001) with the management of the university entrepreneurship project, which represents 70.5% (ΔR^2= 0.705) of the total variance explained by the SEM model.

In the same way, the strength and statistical power of the structural load (β2) of the SEM model were calculated. To calculate the statistical force, we considered the coefficient of absolute determination (ΔR^2=0.705) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a strong statistical force (f^2=3.10; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, the statistical power was calculated considering the reliability level of the structural load ($β_2$=0.84; α=0.01), the calculated statistical force (f^2=3.10), as well as the size of the sample used in the study (N=434) under a predictor. According to the results obtained, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 1344.69) the statistical power (1 − β = 1; p<0.001) of the structural load ($β_2$) was excellent (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load $β_2$ of the SEM model, hypothesis H_2 was accepted.

To evaluate hypothesis H_3, I analysed the structural load corresponding to the path via HR performance → successful entrepreneurship project ($β_3$). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related ($β_3$=0.14; p<0.05) to the success of the entrepreneurial project, representing 1.96% (ΔR^2= 0.019) of the total explained variance.

Subsequently, the strength and statistical power of the structural load (β3) of the SEM model were calculated. To calculate the statistical force, we considered the coefficient of absolute determination (ΔR^2=0.019) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a moderate statistical force (f^2=0.02; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently, we calculated the statistical power considering the reliability level of the structural load (β3=0.14; α=0.05), the calculated statistical force (f^2=0.02), and the size of the sample used in the study (N=434) under a predictor. According to the results, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 8.68), the statistical power (1 − β = 0.64; p<0.05) of the structural load ($β_3$) was adequate (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load $β_3$ of the SEM model, hypothesis H_3 was accepted.

Finally, to evaluate hypothesis H_4, I analysed the structural load corresponding to the path via the university entrepreneurial project → successful entrepreneurship project ($β_4$). According to the corresponding structural load, there was sufficient evidence to affirm that the performance of human resources was positively and significantly related ($β_3$=0.85; p<0.001) to the success of the entrepreneurial project, representing 72.2% (ΔR^2= 0.722) of the total explained variance.

Consequently, the strength and statistical power of the SEM model's structural load ($β_4$) were calculated. To calculate the statistical force, I considered the coefficient of absolute determination (ΔR^2=0.722) (Mayr, Erdfelder, Buchner, & Faul, 2007). Based on the result, a strong statistical force (f^2=2.60; *p<0.001*) was obtained (Cohen, 1988; Hair, Hult, Ringle, & Sarstedt, 2017). Subsequently,

we calculated the statistical power considering the reliability level of the structural load (β_3=0.85; α=0.01), the calculated statistical force (f^2=2.60) and the size of the sample used in the study (N=434) under a predictor. According to the results, the F-critical value (F_{432} = 6.69) and the non-centrality parameter (λ = 1127.15), the statistical power ($1 - \beta = 1$; p<0.01) of the structural load (β_4) was adequate (Faul, Erdfelder, Buchner, & Lang, 2009). Based on the analysis of the structural load β_4 of the SEM model, hypothesis H_4 was accepted.

The findings obtained in this study are important and relevant because they are similar to the results obtained in the studies carried out by Lindsjørn, Sjøberg, Dingsøyr, Bergersen, and Dybå (2016) as well as those obtained by Tam, Da Costa, Oliveira, and Varajão (2020).

CONCLUSIONS

One of the main findings obtained in the study was to identify one of the main factors that induce the performance of human resources is mainly focused on providing them with the adequate and necessary training to promote in them high technical and professional competence. Knowing each one of the management principles as well as the processes of the entrepreneurial project is extremely relevant because motivation and commitment project and potentiate in HR. Moreover, it generates a flexible and adaptive culture for developing and achieving the success of the project that is being undertaken, thus generating in them a performance of human resources based on their efficiency and effectiveness.

On the other hand, the performance of human resources is a factor that influences the university entrepreneurship project, as well as the success of the entrepreneurial project. That is, the performance of the human resource framed by its efficiency and effectiveness promotes that the HR is specifically focused on achieving results established in the entrepreneurial project and that HR is high quality thus able to achieve its objectives by satisfying the needs of the client highlighting in them a proactive image in the performance of the work team, respecting at all times the budget, time, schedules that allude to promoting each of the activities scheduled in the project (Lindsjørn, Sjøberg, Dingsøyr, Bergersen, & Dybå, 2016; Stankovic, Nikolic, Djordjevic, & Cao, 2013; Tam, Da Costa, Oliveira, & Varajão, 2020).

Given the above, it is extremely important because considering the performance of human resources in entrepreneurship because it promotes the university entrepreneurship project to achieve success in terms of meeting its objectives through the requirements established in the time established for the completion of the project entrepreneur, always achieving the necessary quality for developing the enterprise considering reaching them below budget. Likewise, the success of the entrepreneurial project is based mainly on the fact that it is carried out within the budget, consequently, that the project is established in the planned time, and finally, that it is developed according to the set specifications (Stankovic, Nikolic, Djordjevic, & Cao, 2013).

The results are extremely important for universities, because they generate important strategies to promote entrepreneurship through business schools or faculties, and for entrepreneurs, for whom the results allow to manage human resources so that the entrepreneurship project is successful. We should consider this while considering that the management of HR plays a fundamental role in developing the university entrepreneurial project, so achieving the success of the entrepreneurial project is mainly based on positioning in the market as well as the fulfilment of the objectives established through the budget, in the planned time, and by aligning at all times with the specifications of the project, thus keeping the performance quality of the human resources that participate in the specific entrepreneurial project (Stankovic, Nikolic, Djordjevic, & Cao, 2013; Tam, Da Costa, Oliveira, & Varajão, 2020; Zhang, Sun, Yang, & Wang, 2018).

The practical implications and recommendations focus on university entrepreneurs of SMEs, who must consider in their entrepreneurial processes of business entities and in entrepreneurial projects the necessary human resources that intensify the opening as the positioning of business units, which are the human resource as the main factor in the stability and continuity of practice and knowledge (Montoro-Sánchez & Ribeiro Soriano, 2011). Therefore, the management of human resources plays a very important

role in the development of the entrepreneurial project, and in the same way, it represents a management tool focused on the people who are involved in the development of the entrepreneurial project.

The study identified the relevance of human resources and its relationship with the success of university entrepreneurship. In the present study, the authors presented some significant contributions regarding human resources that have been neglected through the studies on university entrepreneurship. One of the main limitations is that only entrepreneurs who have an entrepreneurship project through the educational institution were considered. Therefore, it is suggested that the variables be analysed by university entrepreneurs and entrepreneurs who carry out a business project considering their years of experience in developing their venture in other contexts.

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Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.