

Scientific
Journal of
**Applied
Social and
Clinical
Science**

**CORRELATIONAL
ANALYSIS OF THE
PSYCHOLOGICAL
PROFILE AND
ENTREPRENEURIAL
PROFILE CONSTRUCTS:
CASE OF INDUSTRIAL
AND SYSTEMS
ENGINEERING
STUDENTS OF
UNIVERSIDAD DE
SONORA, NORTHERN
REGIONAL UNIT**

Rafael Hernández León

Department of Physics, Mathematics and Engineering, Division of Science and Engineering. Universidad de Sonora, Caborca, Sonora, Mexico
<https://orcid.org/0000-0001-8720-7757>

Martín Cadena-Badilla

Department of Physics, Mathematics and Engineering, Division of Science and Engineering Ingeniería. Universidad de Sonora, Caborca, Sonora, Mexico
<https://orcid.org/0000-0002-2644-1424>

Joaquín Vásquez Quiroga

Department of Physics, Mathematics and Engineering, Division of Science and Engineering. Universidad de Sonora, Caborca, Sonora, Mexico,
<https://orcid.org/0000-0003-2768-8178>

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



Arturo Vega-Robles

Department of Physics, Mathematics and Engineering, Division of Science and Engineering. Universidad de Sonora, Caborca, Sonora, Mexico
<https://orcid.org/0000-0002-4588-6066>

Abstract: The development of entrepreneurship in university students deserves special attention. An entrepreneur is one who assumes risks, identifies and creates opportunities for the benefit of society. The central purpose of the guidelines of ``Universidad de Sonora`` is to lay the foundations for the creation of a curricular model where teaching is developed based on the learning that the student performs. In this sense, the questions arise: how is the Psychological profile and the Entrepreneurial Profile of the students correlated? The objective of this research was to describe the correlational relationship between the constructs: Psychological profile and Entrepreneurial Profile of Industrial and Systems Engineering students from the fourth to the eighth semester, of the 2018-2 cycle, of the Universidad de Sonora Regional Unit North. The methodology was to consider the population of students enrolled from the fourth to the eighth semester in the 2018-1 cycle of the Industrial and Systems Engineering degree at ``Universidad de Sonora``, northern regional unit. Carry out a survey by means of an intentional non-probability sampling, surveying the entire population. The data obtained is statistically analyzed with the support of the SPSS software, determining the correlation between the Psychological profile and Entrepreneurial Profile variables of the students. The results showed a critical level less than the 0.05 significance level. In this case, the null hypothesis of independence was rejected. It is concluded that the Psychological profile and Entrepreneurial Profile variables correlate significantly, however, there is still much to be done to improve the Entrepreneurial Profile of university students.

Keywords: Entrepreneurship, Industrial Engineering, Correlational analysis.

BACKGROUND

Entrepreneurship within public and private universities is a subject that requires timely and special attention. According to Ceballos (2006) it is an issue that takes over the work of people involved in the university environment and that, like the issues on the creation of sources of employment, is of great interest due to the current employment situation that harms most countries, due to changes and political, technological, and financial transformations, worldwide, causing serious problems in the field of work. And for this reason, he mentions the need for innovative alternatives to emerge, among which is entrepreneurship and as its main actor, the entrepreneur capable of opening new companies and businesses, promoting self-employment and producing new sources of employment. An entrepreneur is understood as one who *“it is taken risks, pursue some benefit; innovates, identifies and creates opportunities; establishes and coordinates new combinations of resources; and conceives new ways of doing things”* (Toca, 2010).

According to the Group Entrepreneurship Monitor (GEM) (2008), in countries that are not sufficiently developed, ventures out of necessity outperform ventures out of opportunity, this is due to the lack of education on how to develop new companies, as well as the absence of their own cognitive and business skills to develop new and nascent companies. The teaching and learning process in universities, in addition to being a generator of knowledge, skills and attitudes, which lead graduates in their free profession, is also a generator of entrepreneurship.

Currently, the development of an entrepreneurial culture has become an important challenge for economists, academics and politicians in most countries, in order to create new companies that strengthen employment. Today's economies

demand entrepreneurs who carry out successful business projects and contribute to the generation of employment and innovation. One of the target business areas are micro-small and medium-sized enterprises (Mi PYMES) that play a fundamental role in the economy and represent a fundamental piece for the economic growth of the country.

Universities have changed their perspectives to train students with entrepreneurial profiles, in order to train creative, innovative professionals with entrepreneurial characteristics that contribute to the formation of companies as an alternative to reducing unemployment. Some researchers such as Guerrero and Urbano (2010), O'Shea et al. (2007), Ropke (1998), Rothaermel et al. (2007), Ryu (1998), Salamzadeh et al. (2011), Subotzky (1999), Schmoch (1999) and Zhao (2004), have carried out research in universities, agreeing on the importance of universities promoting entrepreneurship in students aimed at generating business projects.

In this sense, in the article “Importance of the Training of Entrepreneurs in Higher Education”, (Revista Ciencias de la Educación, Oluctra, Coromoto Casamayor pp. 15-25), it is highlighted that one of the challenges of higher education institutions, with respect to training agents, is to anticipate social transformations and the demands posed by a highly dynamic and demanding environment, for which an indicator of quality for universities is the ability to adapt the offer of graduates and the training to the demands of the current labor market. In this sense, the new contexts of higher education outlined by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 1998) are related to: the unpredictability of the new productive and employment needs, in which a large part of the occupations of 2020 are yet to appear and the incorporation of young

people into the labor market, generating the need to develop self-employment systems. In addition, the article exposes the important aspects that must be taken into account in any training program for entrepreneurial professionals, based on the changes that have occurred in the environment and, to which, universities have had little response in relation to the training of professionals.

By using new methods and forms of teaching, universities will be prepared to develop the entrepreneurial skills of students, promoted by their trainers to achieve an entrepreneurial culture incorporated into the different training areas of the University.

According to UNESCO (1998), innovation, creation, communication and criticism are the necessary skills to act and face the reality of the 21st century as a responsible citizen. These competencies must be integrated into the acquisition of knowledge, know-how and knowing how to live together.; *“Educational systems must focus their activity on the development of certain personal qualities and on the so-called soft skills aimed at integration and adaptability to change”* (p. 66).

According to the National Development Plan of the Federal Government 2013-2018, sector objective 3 is to encourage entrepreneurs and strengthen the business development of micro, small and medium-sized enterprises (MIPYMES) and organizations of the social sector of the economy. To leverage the development of MSMEs in Mexico, the Government of the Republic determined the creation of the National Network of Support for the Entrepreneur (INADEM), to promote the democratization of productivity and the inclusion of economic units in the formality. INADEM makes instruments, programs and tools available to entrepreneurs and MSMEs that facilitate access to financing and capital; innovation; productive scaling; market entry; access to relevant information and

incorporation of technologies.

In the same vein, the State Development Plan 2016-2021, in axis 3.- Economy and future, Challenge 3 “to promote the professionalization and development of human capital, according to the needs of companies, as well as to have scientific and technological capacities, which contribute to boosting competitiveness”, strategy 3.1.- Review the relevance of study programs, in terms of their scientific and technological content from the upper secondary level to postgraduate.

At “Universidad de Sonora”, in the Institutional Development Plan 2013-2018, in its Priority Objective 1, “Consolidate the integral formation of the student”, objective 1.2 “To promote creativity and the entrepreneurial culture has as a general objective to strengthen, organize and promote the culture of creativity and entrepreneurship of the university student that allows them as graduates to have the appropriate profile to generate and present innovative proposals and the knowledge, skills and abilities in the development of socially responsible entrepreneurial projects”. Specific objectives

- “To foster in the student the spirit and the ability to modify, create, invent and develop ideas that protect and preserve natural resources, improve activities in the social and economic environment, and offer necessary goods and services for society”.

Likewise, “Universidad de Sonora” in its general guidelines for a curricular model mentions:

“The main purpose of the general guidelines is to lay the foundations for building a curricular model where teaching is developed based on the learning that the student performs. This way, the strategic objective of academic policies is the generation of a student with a new profile, with a sense of updating and an attitude of self-learning, capable, competent, prone to interdisciplinarity and teamwork,

responsible, aware of their duties and demanding in sharing attitudes, skills and knowledge that is increasingly certified and accredited.

In addition, ``Universidad de Sonora`` has a University Entrepreneurs Program, where its mission is: "We are a Support Program for Entrepreneurs focused on improving the academic quality of students at ``Universidad de Sonora`` and the general public, promoting links and the exchange of experiences between the academic and business sectors, and promoting the development of new businesses through our different programs, managing to offer direct benefits to society", and its objective is: "To promote entrepreneurial and business spirit, promoting creativity towards productivity, quality and competitiveness, through the development of innovative work that contributes to regional development that offers direct benefits to society."

Taking into consideration, the aforementioned, and you are aware that the economic boost of a country depends in part on entrepreneurial people with the ability to devise competitive and innovative solutions that promote the development of new forms of progress and impact local, regional and national economic performance. ``Universidad de Sonora`` has a commitment to society to train professionals who face current and future challenges, a commitment that contemplates it in its Institutional Development Plan, which is why it is currently reviewing and updating its academic programs, where with the information provided, it is appropriate to consider thematic content and strategies that lead us to the training of graduates with an entrepreneurial attitude and skills.

DEFINITION OF THE PROBLEM

The study plans of the Industrial and Systems Engineering degree that are taught in the Department of Physics, Mathematics and Engineering of ``Universidad de Sonora``, do not have a program whose thematic content

has to do with all or some aspects that can promote and develop an entrepreneurial attitude in students, this situation is resulting in graduates with limited development alternatives and professional skills, compared to graduates of other higher level institutions, who do have adequate professional training programs with an Entrepreneurial Profile, or alternatively They develop projects that collaborate in the discovery and strengthening of entrepreneurial capacities.

The level of unemployment that exists in the economy at the local, regional, state and national level, and the lack of an entrepreneurship program in the study plans of these careers, is one of the factors, among others, of the main causes that graduates become part of the statistics of unemployed or underemployed that are registered daily, addressing these causes, therefore, represents an unavoidable task that must be faced if you do not want to continue training graduates without viable prospects for professional development.

The scarce measurement of the degree of importance of the current training in entrepreneurship of the students of the Bachelor of Industrial and Systems Engineering at ``Universidad de Sonora``, is why this research consists of analyzing and identifying the variables that explain the entrepreneurial intention and attitude of these students and the influence exerted by sociodemographic characteristics, personality traits, innovation and self-esteem in the entrepreneurial attitude, among others, of these students of ``Universidad de Sonora``, information that will be shared with the instances in charge of updating the academic programs. s.

That is why it is important to contrast the characteristics of an entrepreneur with the characteristics shown by the students of ``Universidad de Sonora``, in order to

identify the areas of training opportunity to reinforce educational programs in the area of entrepreneurship. Under this problem, the promotion of an entrepreneurial training in the students of the Degree in Industrial and Systems Engineering at ``Universidad de Sonora``, acquires a relevant importance, since this will allow them to strengthen and resize their capacities to venture into any labor activity, above all, in the creation of new companies and by combining their physical, intellectual and professional capacities, future graduates will be able to expand and consolidate the opportunities that are presented to them and, therefore, they will be able to face the social and economic environment in which they find themselves in better conditions. find.

This situation allowed us to ask the following question: how is the Psychological profile and the Entrepreneurial Profile of Industrial and Systems Engineering students from the fourth to the eighth semester of the 2018-2 cycle of the Universidad de Sonora Regional Unit North correlated?

JUSTIFICATION

``Universidad de Sonora`` is aware of the new challenges, the current dynamic changes, the new trends and challenges of higher education, and the commitment embodied in the Institutional Development Plan 2017-2021, the academic programs are periodically being reviewed and updated, so the university complies with providing the business world with graduates according to their requirements, and the student has a greater opportunity to position himself better in the labor field, likewise, the society has professionals who contribute to improving the economy of the country, regional and local.

With this study, ``Universidad de Sonora`` will have an updated database where students express the characteristics

and factors that identify their entrepreneurial attitudes, and henceforth, in the revisions of the Industrial and Systems Engineering study programs, make modifications to reinforce innovation and creativity focused on business entrepreneurship in the student.

In this sense, the students and the community will benefit, because the graduates will better exploit the skills and knowledge acquired, directing them to the formation of new companies, combating unemployment and increasing the country's economy.

GOALS

GENERAL GOALS

Describe the correlational relationship between the constructs: Psychological profile and Entrepreneurial Profile of Industrial and Systems Engineering students from the fourth to the eighth semester, of the 2018-2 cycle, of ``Universidad de Sonora``, Northern Regional Unit.

SPECIFIC OBJECTIVES

1. Know the Psychological profile of the students of the Bachelor of Industrial and Systems Engineering at ``Universidad de Sonora``, which helps them to have an entrepreneurial attitude.
2. Know the Entrepreneurial Profile, which is perceived of the students of the Bachelor's Degree in Industrial and Systems Engineering of ``Universidad de Sonora`` and who can help develop it.
3. Carry out a correlational statistical analysis to find out the behavior between the constructs of the constructs: Psychological profile and Entrepreneurial Profile

HYPOTHESIS

The Psychological profile and Entrepreneurial Profile constructs of the Industrial and Systems Engineering students from the fourth to the eighth semester, of the 2018-2 cycle, of ``Universidad de Sonora``, Regional Unit North, present a positive correlation.

VARIABLES

INDEPENDENT VARIABLE

Psychological profile

DEPENDENT VARIABLE

Entrepreneurial Profile

RESEARCH QUESTIONS

What is the Psychological profile of the students of Industrial and Systems Engineering from the fourth to the eighth semester, of the 2018-2 cycle, of the Universidad de Sonora Regional Unit North?

What is the Entrepreneurial Profile of the Industrial and Systems Engineering students from the fourth to the eighth semester, of the 2018-2 cycle, of the Universidad de Sonora, Northern Regional Unit?

How are the Psychological profile and Entrepreneurial Profile constructs of Industrial and Systems Engineering students from the fourth to the eighth semester of the 2018-2 cycle of the Universidad de Sonora Regional Unit North correlated?

CONTEXTUALIZATION

The present investigation was carried out at ``Universidad de Sonora``, and will have as its scope the Department of Physics, Mathematics and Engineering of ``Universidad de Sonora``, Northern Regional Unit, in its academic program of the Bachelor's Degree in

Industrial and Systems Engineering.

A field work was carried out limited to students of the Bachelor's Degree in Industrial and Systems Engineering of the Universidad de Sonora Regional Unit North, from the fourth to the eighth semester of the 2018-1 school year, supported by a survey as an instrument to gather information from studies carried out on challenges and opportunities of entrepreneurship in university students, which allows them to be developed with Entrepreneurial Profile.

The surveys were applied in the classroom, asking teachers for part of their time when teaching their subject, generally at the end of their class, so as not to delay their program, for which their support was very useful, as well as occupying the facilities and furniture of the University itself.

The facility for the application of the survey was a field work without many obstacles, since with the consent of the teacher they cooperated with greater willingness.

Given the size of the population made up of students of the Bachelor's Degree in Industrial and Systems Engineering, of the nine semesters they are currently studying, only students enrolled from the fourth semester onwards are surveyed, therefore, it is considered a limitation to only have available students from the fourth semester onwards, in addition to the lack of availability, resistance, responsibility, seriousness, to answer the questionnaire, there may be bias in the results.

METHODOLOGY

UNIVERSE, SAMPLE AND SAMPLING TECHNIQUE

The population considered for this research corresponds to the students enrolled from the fourth to the eighth semester in the 2018-1 school year of the Industrial and Systems Engineering Degree of the Northern Regional

Unit of ``Universidad de Sonora``.

The sampling is of an intentional non-probabilistic type, that is, the entire student population was surveyed, with the exception of those students who did not attend classes the day the survey was applied, being made up of 66 students enrolled in the 2018-1 school year in the fourth, sixth and eighth semester.

ANALYSIS OF DATA INTERPRETATION AND CONCLUSIONS

The analysis of this research is carried out with the support of the software as a qualitative data analysis instrument in SPSS (Statistical Product and Service Solutions), it is presented based on the structured survey on the Likert scale from 1 to 5 where 1 indicates that you totally disagree, and 5 that you totally agree and used for the survey.

RESULTS

The results are shown in Table 1, 2 and 3.

	Average	Deviation	N
Psychological profile	3.8788	.51186	66
Entrepreneurial Profile	3.9091	.57452	66

Table 1. Descriptive Statistics

		Psychological profile	Entrepreneurial Profile
Psychological profile	Pearson correlation	1	.590**
	Next (bilateral)		.000
	Sum of squares and vector products	17.030	11.273
	Covariance	.262	.173
	N	66	66
Entrepreneurial Profile	Pearson correlation	.590**	1
	Next (bilateral)	.000	
	Sum of squares and vector products	11.273	21.455
	Covariance	.173	.330
	N	66	66

Table 2. Correlations

** . The correlation is significant at the 0.01 level (bilateral).

		Psychological profile	Entrepreneurial Profile
Tau_b de Kendall	Psychological profile	1.000	.573**
	Next (bilateral)	.	.000
	N	66	66
Entrepreneurial Profile	Correlation coefficient	.573**	1.000
	Next (bilateral)	.000	.
	N	66	66
Spearman's Rho	Psychological profile	1.000	.600**
	Next (bilateral)	.	.000
	N	66	66
Entrepreneurial Profile	Correlation coefficient	.600**	1.000
	Next (bilateral)	.000	.
	N	66	66

Table 3. Nonparametric Correlations

** . The correlation is significant at the 0.01 level (bilateral).

ANALYSIS AND CONCLUSIONS

Table 1 shows the descriptive information of the arithmetic mean, the standard and biased deviation, and the number of valid cases for each variable considered.

Table 2 offers the information referring to the Pearson correlation coefficient, each cell contains five values referring to the crossover between each two variables: One, the value of the Pearson correlation coefficient. Two, the bilateral critical level that corresponds to that coefficient Next (bilateral), (the unilateral critical level can be obtained by dividing the bilateral by two). Three, the sum of squares for the crossing of a variable with itself, and the sum of crossed products for the crossing of two different variables. Four, the covariance. Five, the number of valid cases n on which the calculations have been made. The critical level allows us to decide on the null hypothesis of linear independence or, what is the same, on the hypothesis that the correlation coefficient

is zero in the population, we will reject the null hypothesis of independence and we will conclude that there is a significant linear correlation when the critical level is less than the established significance level, generally 0.05, thus, based on the critical levels of the second table, we can conclude that the variables Psychological Profile and Entrepreneurial Profile correlate significantly, Sig (bilateral) 0.000. SPSS cannot calculate a correlation coefficient when all cases of one or both of the variables are missing value cases or when all cases have the same value in one or both of the correlated variables.

The third table contains the information referring to the Kendall's Tau_b and Spearman's Rho coefficients. In this table, three values appear for each crossover of variables: one, the value of the correlation

coefficient, two, the critical level associated with each Next (bilateral) coefficient, and three, the number of cases for which each coefficient has been calculated. Since these coefficients are based on the ordinal properties of the data, their value and critical level do not have to be the same as those obtained by the Pearson correlation coefficient; however, both the Tau_be coefficient and the Rho coefficient, the relationship between the variables Psychological Profile and Entrepreneurial Profile remain significant 0.000. On the other hand, according to Pearson's correlation values (0.590) and Kendall's Tau_b (0.573) and Spearman's Rho (0.600) correlation coefficients, we can recommend that psychologically assisting students can improve their Entrepreneurial Profile.

REFERENCES

- Ceballos, D. C. (2006). *Emprendedurismo dentro del ámbito universitario; Resultados obtenidos en una investigación hecha a 50, estudiantes de educación superior emprendedores empresarios que desarrollan sus ideas dentro del campus universitario*. Recuperado el 29 de septiembre de 2011 de: <http://www.uv.es/motiva/MarDelPlata06/Ponencias/ponenciaCandidaCabello.pdf>
- Guerrero, M., & Urbano, D. (2007). *Entrepreneurial Universities: The case of Autonomous University of Barcelona*. Barcelona, España: Universidad Autónoma de Barcelona.
- Ropke, J. (1998), "The Entrepreneurial University: Innovation, Academic Knowledge Creation and Regional Development in A Globalized Economy"; working paper, Philipps Universitat Marburg, Germany
- Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). "University entrepreneurship: a taxonomy of the literature". *Industrial and Corporate Change*, Vol.16 No.4, pp.691-791
- Ryu, M. (1998). "A muted voice in academe: the Korean version of entrepreneurial scholarship". *Higher Education*, Vol.35 No.1, pp.9-26.
- Salamzadeh, A., Salamzadeh, Y., & Daraei, M. (2011). "Toward a Systematic Framework for an Entrepreneurial University: A Study in Iranian Context with an IPOO Model". *Global Business and Management Research*, Vol.3 No.1, pp.30-37.
- Schmoch, U. (1999). "Interaction of universities and industrial enterprises in Germany and the United States a comparison". *Industry and Innovation*, Vol.6 No.1, pp.51-68.
- Toca, T. C. (Oct./Dec. de 2010). Consideraciones para la formación en emprendimiento: explorando nuevos ambitos y posibilidades. (SCIELO, Ed.) *Estudios Gerenciales*, 14, 4-80.
- UNESCO (1998). Informe Final: Conferencia Mundial sobre la Educación Superior, París, Francia: UNESCO.
- Zhao, F. (2004). Academic entrepreneurship: case study of Australian universities. *The International Journal of Entrepreneurship and Innovation*, Vol.5 No .2, pp.91-97.