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Assessment of entrepreneurs' performance; Factors to consider in defining entrepreneurial success

Evaluación del desempeño de los emprendedores; factores a considerar en la definición de éxito empresarial

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Abstract

The main purpose of this paper is to propose a new method for assessing the level of success achieved by entrepreneurs. Although the concept of success is subjective and has many aspects, it needs to be measured, for instance, in order to improve support systems for entrepreneurs. In a first step, the approaches developed for assessing business performance are revised and transformed. On the basis of the real case of the European region with the highest unemployment rates, the most relevant variables for detecting success are studied and an algorithmic process is established in order to determine whether an entrepreneur has achieved success or failure. The model provides a minimal set of variables to assess the level of success in each particular case. At the same time, a simple set of questions is stablished, which serves to classify most entrepreneurs by their level of success (more than 98% in the case presented).

JEL Codes: L26, M13, J24
Keywords: sponsorship; performance; artificial intelligence; success; Andalusia

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Resumen

El propósito principal de este artículo es proponer un nuevo método para evaluar el nivel de éxito alcanzado por los emprendedores. Si bien el concepto de éxito es subjetivo y tiene muchos aspectos, debe tratar de evaluarse para conseguir objetivos como el de mejorar los sistemas de apoyo al emprendimiento. En un primer paso, se analizan y aprovechan los enfoques preexistentes habituales para la evaluación del desempeño de pequeñas empresas. Sobre la base del caso real de la región con las tasas de desempleo más altas de Europa, se estudian las variables más relevantes para detectar el éxito y se establece un proceso algorítmico para determinar si un emprendedor ha logrado o no el éxito. El modelo proporciona un conjunto mínimo de variables para evaluar el desempeño en cada caso particular. Al mismo tiempo se establece un conjunto simple de preguntas, que sirve para clasificar a la mayoría de los empresarios por su nivel de éxito (se clasifica a más del 98% en el caso que se presenta).

Código JEL: L26, M13, J24
Palabras clave: apoyo al emprendimiento; desempeño; inteligencia artificial; éxito; Andalucía

Introduction

Evaluation of good performance in entrepreneurs presents three major challenges: subjectivity, multidimensionality, and the difficulties arising from data validation for different contexts (Gómez-Gómez et al., 2016).

It seems obvious that the definition of success is subjective. Hence, it is not possible to give a universally accepted quantitative definition of this concept (Xie & Wu, 2022). Nevertheless, to analyze the factors that enable or favor success, it is necessary to have a reasonable definition that allows its evaluation using mathematical or statistical techniques, trying to understand success from objective information resulting from each case (Li et al., 2022). Success in entrepreneurship is also somewhat subjective, particularly before an entrepreneurial venture begins. Entrepreneurs dream of having a good idea and designing a business model that will lead to an improved situation (Zhao et al., 2021). Achieving that dream is closely related to the definition of 'entrepreneurial business success'.

A quantitative approach implies several consequences. One of them is that different dimensions must be considered (Wach et al., 2016), and even if they were integrated into a single synthetic indicator, there would not be a single level of success. Thus, failure, understood as the non-survival of the entrepreneur's business idea when it is intended to continue with the activity, would be at the opposite pole for successful entrepreneurs. Given the complexity of the concept to be assessed and the enormous differences that can be detected between those who do not fail, it seems appropriate to consider at least a third category. Consequently, the simplest classification would consist of (i) success, (ii) (unsuccessful) survival, and (iii) failure.

The environment in which an entrepreneurial project is developed also conditions the definition of success (Benner, 2021). On the one hand, it is neither easy nor convenient to compare data from very different socioeconomic contexts; on the other hand, the entrepreneurial culture can substantially alter the assessment of what is a success and what is a failure.

A new methodology based on Artificial Intelligence techniques related to decision trees is proposed to deal with the above difficulties. The technique is illustrated with a particularly relevant case due to the high unemployment rates it has historically experienced: the Andalusia region in Spain.

Since entrepreneurial success is a concept that combines numerous meanings and interpretations, the following section reviews the variables considered to have a direct bearing on it. Subsequently, the novel procedure for obtaining a composite definition of success, based on decision trees and three approaches, positioning, expectations, and evolution, is described. In this section, the questions that would allow entrepreneurs to be classified according to their level of success are also explicitly presented. The following section presents an example that serves to verify the validity of the designed model; specifically, data from Andalusian entrepreneurs is used. This paper concludes with a presentation of the results, a brief discussion, and the most relevant conclusions.

Review of the literature

Whether or not a public institution supports entrepreneurs, understanding the most determining factors for survival, growth, and success is critical to decision making during the first years of the life of new businesses (Gómez et al., 2018). Experts have analyzed the success or failure of entrepreneurs from multiple points of view characterized by who is the beneficiary of this success: (i) the entrepreneur (considering the personal and professional satisfaction it brings); (ii) the project itself (as a business and looking at its net return); (iii) the employees (with benefits and professional repercussions); (iv) society (thanks to economic development and the low impact on the resources of the activity). Understandably, this benefit has been measured using very different indicators (Harms et al., 2007). However, most of the research on this type of evaluation of business profit does not refer to the particular case of entrepreneurs.

Gómez-Gómez et al. (2016) indicate that the main problem when assessing business excellence is that multiple dimensions are involved. Furthermore, each dimension can refer to different variables, with each variable being measured with different scales that are almost never comparable when the data comes from different companies. Added to all this is subjectivity when determining what is understood as excellence and what is not.

Of all the dimensions considered, perhaps the most objective is that of business survival (Audretsch, 1991). The relation between success and survival must be carefully analyzed. Moreover, the

correlation between failure and performance is never obvious: companies with low performance tend to disappear, but depending on the type of company, sector, environment, or other causes, this can be understood as part of the life cycle of the business, and it can be assumed that it is natural for the entrepreneur to create another company eventually (Moriano et al., 2006). In other words, there is no direct relation between success (or business performance) and survival of what has been created: sometimes, it may be in the entrepreneur's interest to close the company as soon as losses accumulate, to transfer the business or, as appropriate, even to go bankrupt (Cefis & Marsili, 2011).

This aspect shows that it is not easy to determine exactly the relationship between what is being analyzed and the variables included in the models. Finding relations that remain unchanged when the context changes is even more difficult. For instance, start-up companies have, percentage-wise, a higher disappearance rate compared to those already created, and this high rate is usually caused by a poor assessment of the business plan in preliminary phases (Nikolic et al., 2019). It is a cultural issue whether or not to re-attempt the entrepreneurial venture, regardless of the personal and financial consequences of 'failure', whereby lack of survival can be a consequence of lack of success, but closure does not always correspond to the same level of failure.

Many authors distinguish between companies that close due to insolvency and those that do so through voluntary closure; and some suggest that this could also be reflected in the reports by an additional nominal variable with only two categories (Headd, 2003). Nonetheless, using official data, it is virtually impossible know if a company has closed due to failure or for other reasons. According to Headd (2003), 66% of the companies that closed were unsuccessful, but the rest closed despite being successful. In most studies the same (or similar) determining factors for survival are found (Segura, 2020); however, the inferred causes of company closures (such as being a novice or lacking start-up capital) can imply either failure or success despite closing.

Finally, the difficulty remains in to define each variable correctly and make it easily measurable. For example, regarding the dates for determining the entry and exit of companies from the market, different alternatives have been considered in the literature, depending, above all, on whether the official registry of companies contains registration and deregistration data. Sometimes, the registration or deregistration of the entrepreneur is considered. Other times, the year prior to that of the workers and when adequate data are available, the registration or deregistration of the entrepreneur or the workers is usually considered (usually considering as registration the year prior to the first registration of a worker in the company and as deregistration the year of that of the last employee). Other authors estimate dates from a sample, from a panel of company data, or from official statistics (Strotmann, 2007). Unfortunately, the analysis of the previous variables differs according to the various characteristics of the country.

The following is a review of efforts to measure company success in an attempt to adapt the definitions to the case of entrepreneurship. Generally speaking, different stages or levels can be considered. In the present research, the most simplified classification is adopted, with only three levels: (i) failure or non-survival, (ii) marginal survival, and (iii) success or high growth (Cooper et al., 1989).

There are different methodologies for approaching the problem in a general way, and there is no agreement on which is the best way. For example, Morris et al. (2005) suggested groups of key issues for assessing a company's success: value creation, beneficiaries of value creation, competition, positioning, and growth plans. Another methodology consists of selecting a sample of successful and unsuccessful companies and separating them according to performance, growth, or survival. Subsequently, variance and correlation analysis would be used to obtain relations between the variables under study (Duchesneau & Gartner, 1990).

Summarizing, there are many possibilities in the literature for the conception of success; the following includes three fundamental approaches: positioning, expectations and evolution. In turn, these factors can be analyzed based on different characteristics (some objective and others subjective), which will be measured by quantitative or qualitative variables.

Competitive position of the entrepreneur (positioning)

The first approach refers to the entrepreneur's competitive position regarding other market players. One of the key aspects of entrepreneurial success lies in their ability to adapt their projects according to the activities and interests of the other agents involved in the same field (Brown et al., 2009).

Entrepreneurial competitiveness and competitive success have been defined by various authors (Kester & Luerhrman, 1989; Viedma, 1992; Álvarez & García, 1996; Camisón, 1999). Most see it as the ability to generate sustainable competitive advantages to produce goods and services that create value or to act against rival companies competing for the same market niche. Other definitions of competitiveness identify it as the ability to achieve a better competitive position, rivaling other companies, to obtain a higher performance than competitors (Aragón & Rubio, 2005). According to many authors, companies or entrepreneurs that carry out the same type of activity must be compared; however, according to Porter (1991), each strategy involves different skills and requirements for success, which do not depend only on the type of activity. In any case, the external framework constantly influences all phases of the life cycle of business and, consequently, the conception of success, with the moral support network being the factor most valued by entrepreneurs (Orti, 2003). Furthermore, the support network is also closely related to the ultimate goal of the present line of research, which justifies the great interest in assessing the performance of entrepreneurs: improving entrepreneurship support systems.

The objective aspects of the entrepreneur's success must be considered when trying to measure competitiveness rigorously, i.e., the approach based on facts and not only on the entrepreneur's opinion. In addition to business survival (already discussed), competitiveness is usually measured based on quantitative indicators, such as economic, financial, contextual and others (Amorós, 2011; Amorós, 2013; Espitia, 2017).

Among the economic indicators, the most commonly used for this purpose are economic profitability (Peters & Waterman, 1982; Schmalensee, 1985; Covin & Slevin, 1990; McGahan, 1990; Rumelt, 1991; Álvarez & García, 1996; Zornoza, 1997; Pelham, 1997; Galán & Vecino, 1997; McGahan & Porter, 1997; Gadenne, 1998; Mauri & Michaels, 1998; Camisón, 1999; Pelham, 2000; Camisón, 2001; Donrrosoro et al., 2001; Van Praag & Versloot, 2008; Ireland et al., 2009), sales volume (Hamilton, 2000), annual results (Hernández et al., 2005; Vergiú, J. & Bendezú, 2007; De Jaime, 2010; Varona et al., 2014), economic profitability, annual productivity (Álvarez & García, 1996; Zornoza, 1997; Marbella, 1998; Camisón, 2001; Almeida & Fernando, 2008), and investment/employment ratio (Germán, 2008).

Financial indicators include financial profitability and those that consider external financing (Covin & Slevin, 1990; Álvarez & García, 1996; Zornoza, 1997; Marbella, 1998; Camisón, 2001; Morillo, 2001). The most common context indicators are economic profitability, financial profitability, asset turnover, and debt (March, 1999).

Regarding other indicators, activity indicators (Peteraf, 1993; Zornoza, 1997; Camisón, 2001; Delmar & Davidsson, 2000), internationalization indicators (Dorrosoro et al., 2001), indicators of degree of innovation (Marbella, 1998), wealth or value creation indices (Kay, 1993; Westhead & Cowling, 1995; Almus, 2002) and Tobin's Q (Wernerfelt & Montgomery, 1988; McGahan, 1999) are very useful.

Qualitative indicators that measure innovation capacity (Peters & Waterman, 1982; Shepherd et al., 2000), socioeconomic contribution (Camisón, 2001; Paige & Littrel, 2002; Araujo de la Mata et al., 2008), or the company's competitive position (Álvarez & García, 1996; Camisón, 2001; Hult et al., 2005; Aragón & Rubio, 2005) are also used.

Expectations of the entrepreneur

Commonly, the expectation is a possibility that something will happen with a reasonable probability. According to this, to quantify the expectations of entrepreneurs, it would be convenient to consider the previous results of the variables that define success in their entrepreneurial segment (Orozco-Triana & Arraut-Camargo, 2017). Nonetheless, entrepreneurs' expectations can vary significantly concerning their investment intentions and expected profitability (March, 1999). The principles of social cognitive theory consider both expectations and the perception of success itself. The importante of this fact is often

indicated in the literature: sometimes as elements that foster the increase of internal learning systems and other times as drivers for the achievement of success itself (Albornoz et al., 2021). The above principles often help to define the future project initially; in particular, decisions to invest or not in a business can be predicted based on its survival expectations and future performance, which is closely related to the way entrepreneurs perceive risk and their aversion to it. Obviously, this perception of risk largely determines the role of public support, although the strategy assumed by the entrepreneur as a forerunner in the market or as a follower also plays a role (Shepherd, 1999).

If expectations are to be understood and assessed, it is necessary to consider variables that capture in some way the motivations that can move entrepreneurs (Ynzunza & Izar, 2021). The most relevant motivation is achievement, understood as the tendency to seek success in tasks involving performance assessment. The second most decisive motivation is power: how one person exerts control over the behavior of another. The third motivation is affiliation: the interest in establishing, maintaining, or restoring a positive affective relation with one or several people (Montañés, 2002).

The entrepreneurs' expectations are particularly complex to assess because they are not objective (Charles-Leija et al., 2021). They are usually measured on two types of indicators. The first is contextual expectations indicators, which are calculated as average values at the start of their activity in companies in their business segment: economic profitability, financial profitability, asset turnover, indebtedness, a summary of contextual expectations, and business and employment prospects for the following year (Padilla-Martínez et al., 2017). The second group measures the fulfillment of the entrepreneur's objectives (Ucbasaran et al., 2001; García et al., 2010; González & Ruiz, 2015; Sánchez et al., 2016), as in the case of satisfaction or valuation indicators: of employees (Camisón, 2001), of customers (Covin & Slevin, 1990; Luk, 1996), of the company owner with results (Luk, 1996; Orti, 2003), of the company owner with sales growth (Luk, 1996; Orti, 2003), and of the company owner with employee growth (Zornoza, 1997; Camisón, 2001; Orti, 2003).

Evolution of variables that affect the sector and the entrepreneur's environment

As a complement to the two previous approaches (positioning and expectations), it is suggested to consider the trend and prospects of both the environment and the sector in which the entrepreneur is operating. To this end, it is necessary to review the evolution of the corresponding variables. Some of them correspond to economic indicators (economic and financial profitability, growth in turnover or employees) and others with context indicators (segment concentration, business dynamism, or the average survival probability of the companies in their segment). Consequently, the following indicators should be considered: of increase in investment (Cuesta, 2004; Sánchez, 2005; Hayter, 2015), of increase in the number of

employees (Cooper et al., 1989; Westhead & Cowling, 1995; Dorrosoro et al., 2001; Almus, 2002; Van Praag & Versloot, 2008), of sales growth (Clifford & Cavanagh, 1985; Covin & Slevin, 1990; Wijewardena & Cooray, 1995; Álvarez & García, 1996; Zornoza, 1997; Pelham, 2000; Camisón, 2001; Donrrosoro et al., 2001), of profit growth (Clifford & Cavanagh, 1985; Kalleberg & Leicht, 1991; Paige & Littrel, 2002), of growth of certain balance sheet items (Peters & Waterman, 1982; Ronstadt, 1989), of market share growth (Chang & Singh, 2000), of business segment evolution (what is measured is the growth in economic profitability or in financial profitability through average values of growth since the beginning of activity in companies of its business segment), of industry expectations (March, 1999; Weller, 2006; Padilla & Garrido, 2007; Rizzato, 2012; Orozco-Triana & Arraut-Camargo, 2017), and the evolution of economic indicators of the environment (probability of survival in environment, business segment dynamism, business segment concentration, or synthetic indicator of environment, among others) (Azócar et al., 2003; Covarrubias, 2003).

Procedures

Positioning, expectations and evolution are the crucial approaches in specifying the variables related to entrepreneurial success that help split the set of entrepreneurs into three separate groups: success, survival and failure.

So far, no indicator has proven sufficient to decide whether there has been success in a particular case of entrepreneurialism. This does not mean that success cannot be defined quantitatively. What does seem clear is that a multifactorial treatment is needed and the solution to this problem consists of resorting to a somewhat more complex procedure than calculating an indicator, since it is also necessary to incorporate a certain degree of subjectivity and non-numerical characteristics.

Database

A dataset for Andalusia —a region in southern Spain with the highest levels of unemployment and where all politicians consider it vital to promote entrepreneurship, seeking to alleviate the difficult situation, especially in the case of young people— is used to illustrate and test the model to be provided for the evaluation of success. Specifically, information is available from 2 221 entrepreneurs who have received advice or support from Andalucía-Emprende since 2010. Multiple variables are known for each of these entrepreneurs, related to the process of creating the company, as well as the monitoring that has been carried out (with the excuse of assessing them for the annual awards given to the best entrepreneurs in the region). To incorporate aspects of positioning, expectations, and evolution, both of each entrepreneur and

of the context in their sector, the variables related to the companies (from the Iberian Balance Sheet System) are complemented with those of a geographic database (from the Andalusian Municipal Information System). This aggregation is not strange to experts in business performance assessment: it is recommended to use subjective performance variables and environmental variables to assess SMEs and micro-SMEs (Covin & Slevin, 1991), which better capture the intangible factors that affect the first years of activity.

In a first step of the analysis of the large database, inconsistent information was eliminated and the set of variables (described in the next subsection) was determined. Later, useful thresholds were set to ensure success (as well as survival and failure). Subsequently, all the variables are integrated into a sequence of questions (listed in the Annex), which will be ordered by applying the decision tree technique.

Characteristics or factors

Since success is affected by numerous variables (tangible and intangible, qualitative and quantitative) that are intricately interrelated, a multidimensional definition is sought based on the three approaches defined above: positioning, expectations, and evolution. These approaches are used to obtain the variables that will make it possible to classify entrepreneurial projects into three groups: success, survival, and failure. These three groups are the possible values for the 'output' or 'dependent' variable.

As seen in the review of the literature, in order to measure success in small businesses, the most used indicators are survival and economic profitability; for this reason, they are incorporated as fundamental explanatory variables in the definition. It has also been convenient to consider other indicators (not so common), such as those that evaluate the sector and the region in which the company operates. With the information available, synthetic indicators are constructed to find out if the economic results presented by the entrepreneur are favorable or unfavorable compared to the average of the companies in their business segment. A list of the variables used and their corresponding definitions can be found in the Annex.

Decision trees

Decision trees appear, with different objectives, in Artificial Intelligence, Game Theory, and other fields of Economics. They help to categorize conditions that occur successively; therefore, they are especially useful for classifying elements of a set for which there is a variety of information (from different variables), although there may be missing data (sometimes they can even work when there is not the same type of information for all cases).

In this study, a categorical objective classification model is followed to construct the decision tree with three possible alternatives (success, survival, and failure) and a fourth one constituted by the unclassified elements. Typically, the prediction is based on the most frequent category for each node to which a record is assigned; that is, if the majority of entrepreneurs surveyed in a particular node of the tree is, for example, 'yes', then the prediction of the records assigned to that node would have a majority probability oriented to that answer.

The first algorithm chosen to determine the decision tree is Quest. The order of each question was obtained by studying the dependence and independence of the variables to obtain efficient estimates. Accordingly, the choice and logical order of variables for tree classification has been optimized, favoring the entries that allow fewer divisions (the input fields with the fewest number of categories or alternatives). To this end, the significance checks have been performed, assessing the input fields of a node and performing a single check for selection purposes, as opposed to what is obtained with algorithms such as C&RT or Chaid.

A procedure based on the C4.5 algorithm (Quinlan, 1993) —which is, in turn, an improvement of the ID3 algorithm— is also used to obtain the minimum set of questions with which it would be possible to classify the largest number of cases, based on the known variables. At each step of this algorithm, it is chosen the question that minimizes the diversity of the subsets resulting from the hypothetical division; then, such question is used to separate the entrepreneurs who succeed from those who survive or fail. The ID3 algorithm finds minima of the total number of nodes, but it usually guarantees only a local minimum, so successive heuristic attempts to achieve a global minimum are desirable. These heuristic estimations can be performed by hand when the answers to the questions are discrete and not continuous (as in this case, despite the presence of qualitative and quantitative data). Here, the risk of producing 'overtraining' is very small because in the end, almost all the entrepreneurs, or practically all possible combinations of values for the input variables are classified.

A quadratic discriminant analysis is performed on each split to determine the optimal split according to the target categories and to improve the speed of the exhaustive searches. The statistical checks performed are oriented to obtain exclusively in the final tree endings the four categories described above (the three desired categories and the one to be minimized).

For this research, the usual graphical representation of decision trees is not useful due to the large number of nodes it would present. Consequently, it was decided to resort to an alternative representation, specially developed by the authors for this type of tree. Figure 1 shows the questions on the vertical axis, represented by the nodes and starting at the top. The three categories into which entrepreneurs will be classified are at the bottom of the diagram. Up to three different arcs can come out of each node (always downward, to a subsequent question, or to the final classification), of which the

arrow pointing to the left will be the one corresponding to the affirmative answer, the arrow pointing to the right will be the negative answer and, if there are three, the arrow between the other two indicates lack of information to answer the question. The final nodes of each itinerary are linked to the category in which it should be classified. Exceptionally, there may be routes that do not culminate in any category. These itineraries, which correspond to rare cases, are not classified. In fact, it is possible to find some itineraries (i.e., some combinations of variable values) that are impossible in practice. To simplify the graph, the probabilities of response to each question are not presented in Figure 1 because they are not relevant to the present research.

Results

The proposed model aims to decide which are the ideal questions to classify entrepreneurs according to their level of success. In the example of applying the method to the sample composed of 2221 Andalusian entrepreneurs, the result is 29 questions (see Annex) —although the last one is not used to discriminate— and 60 cases (or possible scenarios). These questions are compatible both with previous research and with the variables also listed in the Annex. Similarly, the classification proposed in each case coincides with the perception of support services and experts. In this case, the maximum number of questions to classify an entrepreneur is 12.

Table 1 shows the first classification of the decision tree after analyzing the decision trees obtained throughout the process. This indicates the cumulative percentage error in the segmentation as the sum of the p-values of the independence tests between the different variables. It can also be seen how the initial questions refer to survival (before one year, in one year, or in more than one year), followed by the question of fulfillment of the goals set and those of results and profitability. This is consistent: these are the main basic indicators defined in the consulted literature and offer a first segmentation of the cases, obtaining the first results of entrepreneurs who have failed (given that they do not continue their activity or have obtained negative or unsatisfactory results in the first years) and, together with the following viability questions, allow classification into the proposed categories.

Once the first set of questions is completed, the next block that best performs the segmentation is that of productivity and performance indicators in terms of investment per employee, asset turnover, indebtedness, and number of employees. With this, what is mainly assessed (if the entrepreneur has not already been classified as a success or failure) is whether it is a case of business survival or presents positive indicators that verify its situation and performance (when compared to the average of companies in the environment and its sector).

Table 1
Indicators for defining the order of questions in the decision tree

	Question	segmentation error %
Positioning		
1. Business survival	P1, P2, and P3	0.00005
2. Sales volume	P5	0.00325
3. Results	P6 and P7	0.00127
4. Economic profitability	P9	0.00505
5. Financial profitability	P11	0.00595
6. Productivity per year	P14	0.00730
7. Investment/Employment	P26	0.01271
8. Third-party financing	P8	0.00460
9. Competitive position of the company	P18	0.00910
Expectations		
1. Expectation indicators in context	P19	0.00955
1.1. Economic profitability	P10	0.00550
1.2. Financial profitability	P12	0.00640
1.3. Asset turnover	P25	0.01226
1.4. Debt	P24	0.01181
1.5. Summary of context expectations	P13	0.00685
2. Business and employment prospects for the next year	P27	0.00865
3. Fulfillment of the objectives set	P4	0.00280
4. Satisfaction indicators	P15	0.00775
Evolution		
1. Increase in investment	P23	0.01136
2. Increase in the number of employees	P16	0.00820
3. Business segment evolution indicators		
3.1. Growth in economic profitability	P17 and P29	0.01316
3.2. Growth in financial profitability	P21	0.01046
4. Evolution of growth in revenues and employees	P20	0.01000
5. Indicator of sector expectations	P22	0.01091
6. Evolution of economic indicators of the environment	P28	0.01361

Source: created by the authors

Finally, the next block of variables (arranged in the form of questions) is applied to entrepreneurs who at the time of the assessment could not be classified by their results, by their performance, or after comparison with potential competition. These questions are related to expectations: the evolution of the sector and the expected prospects, as well as the economic context concerning their business. This environment analysis is essential to know whether, with the entrepreneur's results, performance, and economic and financial structure, they have the necessary resources and strengths to face their future performance.

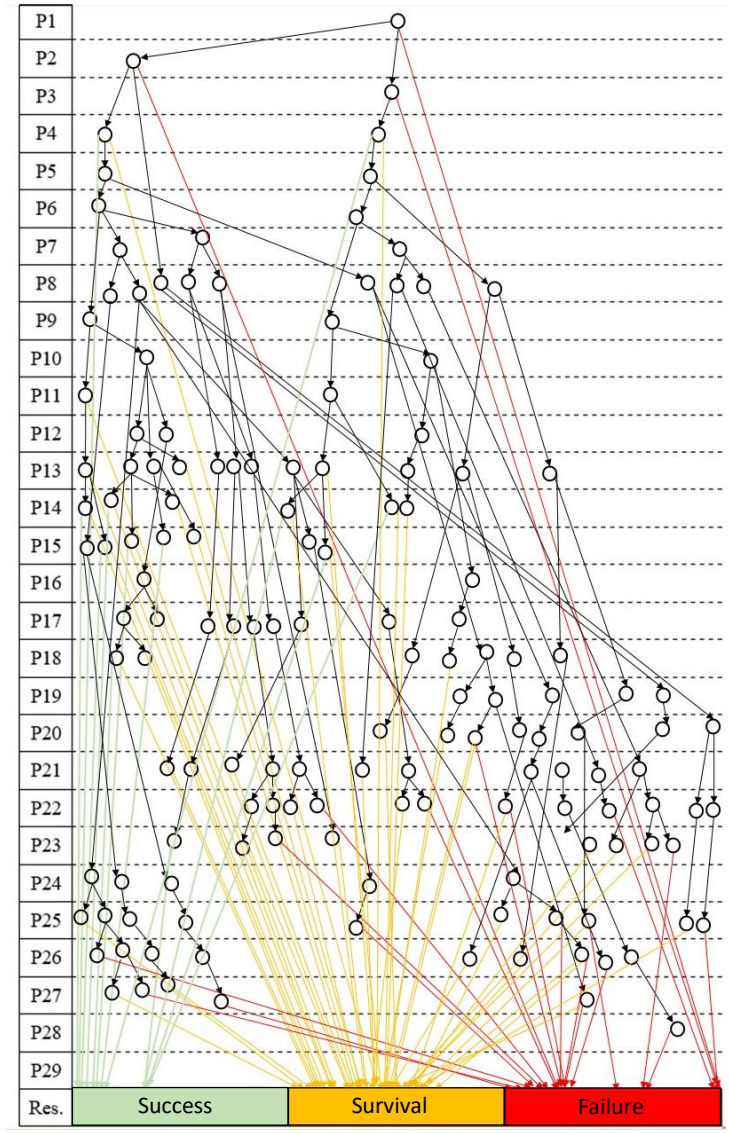

Figure 1. Decision tree to classify Andalusian entrepreneurs
Source: created by the authors

Figure 1 shows the decision tree from applying the methodology to the case study. It is a schema of classifiable cases, since the cases in which the result is not known are not shown. For example, in the sample analyzed, the 29th question is not useful for classifying any project, although it is decided to keep it in the graph because it might be needed if the process were replicated with a different sample.

The arrows pointing down and left indicate that the question is fulfilled, while those pointing down and right mean the opposite; sometimes, there is a third arrow (between the other two) denoting no data. The color of the final arrows and the area of the graph to which they point indicate the final classification of the case that corresponds to that pathway.

In total, the decision tree technique classified 130 cases of success (5.85% of the total), 1 002 of survival (45.11%), 1 058 of failure (47.64%) and 31 could not be classified due to lack of information (1.40%). It should be noted that there is a small percentage of successful entrepreneurs in Andalusia in the period analyzed. The three most frequent combinations in the database are: (i) P1 yes; P2 no; failure: 301 entrepreneurs, 14.12% of the database. (ii) P1 yes; P2 yes; P4 dn/na; P5 yes; P6 yes; P9 no; P10 yes; P12 yes; P13 yes; P14 no; survival: 236 entrepreneurs, 11.07% of the database. (iii) P1 yes; P2 yes; P4 dn/na; P5 yes; P6 yes; P9 yes; P11 no; survival: 220 entrepreneurs, 10.32% of the database.

Discussion

Entrepreneurship has always existed, although it seems to have gained special relevance in recent times, perhaps due to the economic crises of the 21st century. Society invites entrepreneurship, especially for those without a place in the labor market (Ynzunza & Izar, 2021). There are multiple ways in which entrepreneurship can be influenced. On the one hand, the creation of new companies can be encouraged; thus, for example: (i) Sandoval and Bado (2022) use a structural equation model to test the usefulness of entrepreneurship training to foster entrepreneurial attitudes; (ii) Benner (2021) proves that the phenomenon of entrepreneurship depends on the geographical environment in which it takes place, and León (2022) tests the importance of the macroeconomic context in entrepreneurship (in the rate of company creation); (iii) many other authors analyze which variables have this same motivating effect.

On the other hand (which is the ultimate justification for this research), the success of entrepreneurs can be promoted by improving support services and advice for entrepreneurs. Nevertheless, this objective requires prior knowledge of the variables that influence not only the formation of new companies, but also the success of these entrepreneurial projects. Thus, for example: (i) Benner (2021) explains that the geographic environment also influences the probability of success of entrepreneurs and not only their emergence; (ii) Ríos Martínez et al. (2022) study how technological experience and access to financing affect entrepreneurial performance (specifically, in micro-entrepreneurs in Celaya, Mexico); (iii) Rita et al. (2022) explore the influence of access to finance on SMEs in Indonesia and verify (among other things) through a structural equation model that entrepreneurship-oriented finance conditions the influence between business prospects, entrepreneurial orientation, and government support policies; (iv) there are even studies that explain success in specific groups and through unusual variables, as when Xie

and Wu (2022) test the positive influence of women entrepreneurs focusing their project on sustainable development. This paper on Andalusian entrepreneurs also proves the existence of a complex relation between the multiple and diverse variables that favor entrepreneurial success, that the region in which the study is carried out is very relevant, and that some cases behave significantly differently from other similar cases.

The case of Andalusia is strongly conditioned by the high unemployment rates that the region has historically suffered. This is a favorable environment for the emergence of multiple entrepreneurial projects, but also a situation in which the entrepreneurial vocation is much less important than the need to prosper, which can hinder the successful development of projects. Compared to other regions with similar unemployment rates, it can be stated that there is little success in Andalusia and it does not seem that entrepreneurship is sufficiently improving employment. Sandoval and Bado (2022) analyze the case of Costa Rica, where, partially due to entrepreneurship, the unemployment rate went from 24.4% in 2020 to 13.3% in 2022 (in Andalusia, according to official government data, this rate was still 18.7% in 2022).

Returning to improving support services, it is necessary to assess entrepreneurial performance to know which measures help or favor and which harm or hinder. According to the literature review, the estimation of entrepreneurial success is usually based on accounting information available in the registry. This is because companies are often reluctant to provide data (Covin & Slevin, 1990; Pelham, 1997), and in many cases such data are not entirely reliable. The data came from an official and public source in the case study. Nevertheless, a possible answer to each question is ‘data not available’ (or ‘doesn’t know/no answer’: ‘dn/na’); this is evidence that the method classifies correctly despite the considerable amount of missing data. If the diagnosis and entrepreneurship policies carried out for the unemployed or students (Oliver et al., 2016; Diez & Guevara, 2020) are considered, where the culture of entrepreneurship is encouraged from early stages, a contrasted and detailed definition of entrepreneurial success, as has been done in this research, would facilitate proper orientation and mentoring of entrepreneurs.

The general objective of institutions that support entrepreneurialism should be to minimize failure, if possible, while maximizing success. Such institutions must acknowledge that the definition of success depends on the idea that each entrepreneur has and is able to compare the level achieved with that which corresponds to the target. Consequently, recognizing success is critical to providing personalized and accurate advice and support to each entrepreneur. As such, personal competencies are the key in the perception of opportunities and therefore in the demand for support by entrepreneurs (Bargsted, 2017).

From a different point of view, it is also necessary to know whether or not users of these services have achieved the success they were aiming for to assess the support services provided to entrepreneurs. Morris et al. (2005), for example, implicitly identify the success of entrepreneurs with the amount of money they can generate. Nevertheless, the point here is not only to measure the economic performance

of an entrepreneur, since it has already been implied that it is more subjective and cannot be measured only through financial variables. The point is how successful the business is, but that is not all.

In summary, it can be confirmed that it does not make sense to measure the performance of entrepreneurs through a single indicator (Wach et al., 2016). In fact, the variables that influence the performance of entrepreneurs are closely related to each other (Arango, 2022; Rita et al., 2022), which makes the use of a single synthetic indicator impractical. For instance, the age of entrepreneurs influences entrepreneurial success (Zhao et al., 2021), but the relation is not direct; rather, changes in this variable condition the effect of other aspects on the output variable.

The situation is even more complex than expected due to the interrelation of factors and the fact that not all explanatory variables are objective. For example, Li et al. (2021) consider variables that measure the well-being of the entrepreneur's family to be relevant. In this paper, supported by the literature consulted, it has been considered essential to introduce several questions that consider the opinion of entrepreneurs about their own performance.

As the decision tree of this study is designed and refined, the first questions that appear refer to the survival of the projects, the fulfillment of the objectives set, and the results and profitability. This is not surprising because these are the variables that are mostly used by other authors. Productivity and performance indicators and their comparison with other companies in the environment appear next in the segmentation. Finally, the variables related to expectations are used.

The order of the previous paragraph gives an idea of the relative importance of the variables used for ranking in terms of their usefulness for that purpose. If inference is accepted, it must be recognized that project survival is the primary measure for assessing project success. However, as is obvious from the fact that different categories have been considered for 'success' and 'survival', it is not enough to know whether companies survive. Consequently, Arango (2022) applies a structural equation model to prove that business consolidation (understood as survival, but without specifying how many years) is explained by several characteristics of the entrepreneur, the business project and the environment. Previously, Chaves-Maza et al. (2018) analyzed a database of Andalusian entrepreneurs (although not as extensive as that of the present research) to deduce through decision trees that support services for entrepreneurs have a great influence on the survival of the projects: access to a pre-incubation process, receiving public incentives, and the number of support services were relevant, as were the type of legal form of the company or the geographical location of the business.

Decision trees have been used on several occasions in the study of entrepreneurship. For example, Sánchez-García et al. (2022) also use a decision tree to analyze the motivations to become an entrepreneur in Spain. In their case, they use the 'answer tree' technique to analyze the survey responses and find other conditioning factors, such as vocation, unemployment, the need for an income or the desire

for independence, and previous studies, among others. Arango (2022) also uses graphs not for predictive purposes but to analyze the relations between the causes of entrepreneurial consolidation.

The most interesting potential of decision trees is their ability to help in predictions. This predictive value, both of entrepreneurs' success and of their projects' survival, has been scarcely exploited to date. Chaves and Fedriani (2020) prove that support services for entrepreneurs can use computer tools (based on Artificial Intelligence) to guide entrepreneurs much more efficiently than before. To do this, they develop a way to predict the survival or success of entrepreneurs based on information known before starting the entrepreneurial project. Specifically, they use two artificial neural networks: a self-organizing map to classify entrepreneurs into more homogeneous groups and a multilayer perceptron to predict their probability of survival or success. The variables used are similar to those considered in this paper. Incorporating decision trees in this methodology would facilitate the estimation work and probably improve the results.

Conclusions

The evaluation of business performance has been a topic of interest in recent decades. This paper has tried to adapt the most common indicators to the specific case of entrepreneurship, which is much less studied. It provides a basic tool in Artificial Intelligence (the decision tree) that can be used to analyze the success factors and even to estimate the probability of success, making it a very useful tool to complement other analyses. Based on the formulae for calculating this probability, it would be reasonable to propose in the future a more precise definition of the success of each entrepreneur, which would ease the assessment of the measures that favor entrepreneurs. In turn, this will help with a final objective of undoubted economic and business interest: improving support systems for entrepreneurs.

A definition of entrepreneurial success has been proposed with three categories (success, survival, and failure). This definition was designed by using a decision tree (expert system) and taking advantage of all the variables previously presented, which, in turn, come from the literature consulted and from the recommendations of the experts (the list of variables can be found in the Annex, ordered according to their belonging to one of the three blocks studied: positioning, environment, and evolution). All this has made it possible to establish a more precise measure of success than those introduced by other authors, especially for the typology of the entrepreneurs who are the subject of this research.

The classification appears to be consistent and high quality. In the analyzed case, more than 98% of the entrepreneurs (all classifiable) are correctly classified (with the combination of questions used), according to the information available (from 'Andalucía-Emprende'). Moreover, it is similar to the classification provided by experts on the same database, and the most influential variables are those that

explain survival and the achievement of the objectives set, coinciding with the majority of authors who study this subject.

The classification of entrepreneurs is based on those factors that, when ranked, represent the best way to reveal success, survival, or failure. Thanks to this, it could help any organization supporting entrepreneurship that wishes to mark the schemas organized according to priorities that the objectives, strategies, plans, and actions of the entrepreneurs should follow, as well as to establish a set of indicators that can optimally measure the evolution of the projects, in order to control and monitor them.

It is considered that a method adaptable to other similar situations and with the potential to classify individuals according to multidimensional and subjective characteristics has been provided. Nonetheless, an alternative way to graphically represent decision trees with a large number of nodes has also been proposed, which could be useful to simplify representations in other lines of research. The method has also been generalized to classify other hypothetical cases (with combinations of values not present in the sample). What has not yet been tested is if the methodology allows for simple adaptations that can be used to evaluate other types of companies. This uncertainty and the suspicion that the analysis of another region with very different socioeconomic characteristics would produce very different classification systems constitute the main limitation.

Lastly, the applicability of the decision tree technique for predictive purposes is proposed, either by taking advantage of its a priori classification capacity or by accompanying other methodologies based on Artificial Intelligence, such as artificial neural networks.

References

Albornoz, N., Contreras, J. C., Espinosa, J. F., & Sotelo Barrios, M. E. (2021). Capacidades emprendedoras en población de la base de la pirámide en Cúcuta, Colombia. Contaduría y Administración, 66(1), 1-23. http://dx.doi.org/10.22201/fca.24488410e.2020.2188

Almeida, S. & Fernando, M. (2008). Survival strategies and characteristics of start-ups: An empirical study from the New Zealand IT industry, Technovation, 28, 161-169. https://doi.org/10.1016/j.technovation.2007.04.004

Almus, M. (2002). What characterizes a fast-growing firm? Applied Economics, 34, 1497-1508. https://doi.org/10.1080/00036840110105010

Álvarez, J. C. & García, E. (1996). Factores de éxito y riesgo en la pyme: Diseño e implantación de un modelo para la mejora de la competitividad. Economía Industrial, 310, 149-161.

Amorós, J. E. (2011). El proyecto Global Entrepreneurship Monitor (GEM): una aproximación desde el contexto latinoamericano. Academia. Revista Latinoamericana de Administración, 46, 1-15. Consulted: 12/06/2024. Disponible en: https://www.redalyc.org/articulo.oa?id=71617238002

Amorós, J. E. (2013). Global Entrepreneurship Monitor: aspiraciones de los emprendedores en Chile y el mundo 2012. Consulted: 12/06/2024. Available: http://hdl.handle.net/11447/670

Aragón, A. & Rubio, A. (2005). Factores explicativos del éxito competitivo: el caso de las pymes del estado de Veracruz. Contaduría y Administración: Revista Internacional, 21, 35-69. https://doi.org/10.22201/fca.24488410e.2005.568

Arango, J.J. (2022). Factores determinantes de la consolidación empresarial: un enfoque integrador desde el emprendedor, la empresa y el entorno. Contaduría y Administración, 67(2), 91-117. http://dx.doi.org/10.22201/fca.24488410e.2022.2981

Araujo de la Mata, A., Barrutia Guenaga, J., & Retolaza Ávalos, J. L. (2008). Nuevo enfoque en los modelos de creación de empresas. En: Estableciendo puentes en una economía global, Escuela Superior de Gestión Comercial y Marketing, ESIC, pp. 101. Consulted: 13/06/2024. Available: https://dialnet.unirioja.es/servlet/articulo?codigo=2732456

Audretsch, D. (1991). New firm Survival and the Technological Regime. Review of Economics and Statistics, 73, 441-450. https://doi.org/10.2307/2109568

Azócar, G., Sanhueza, R., & Henríquez, C. (2003). Cambio en los patrones de crecimiento en una ciudad intermedia: el caso de Chillán en Chile Central. EURE (Santiago), 29(87), 79-82. https://doi.org/10.4067/s0250-71612003008700006

Bargsted, M. (2017). Impact of personal competencies and market value of type of occupation over objective employability and perceived career opportunities of young professionals. Revista de Psicología del Trabajo y de las Organizaciones, 33(2), 115-123. https://doi.org/10.1016/j.rpto.2017.02.003

Benner, M. (2021). Retheorizing industrial–institutional coevolution: a multidimensional perspective. Regional Studies, 56(9), 1524-1537. https://doi.org/10.1080/00343404.2021.1949441

Brown, H.S., De Jong, M., & Lessidrenska, T. (2009). The rise of the global reporting initiative: a case of institutional entrepreneurship. Environmental Politics, 18(2), 182-200. https://doi.org/10.1080/09644010802682551

Camisón, C. (1999). Sobre cómo medir las competencias distintivas: un examen empírico de la fiabilidad y validez de los modelos multi-item para la medición de los activos intangibles. En: First International Conference of the Iberoamerican Academy of Management: Management Related Theory and Research: An Iberoamerican Perspective (pp. 9-11).

Camisón, C. (2001). La investigación sobre la PYME y su competitividad. Balance del estado de la cuestión desde las perspectivas narrativa y meta-analítica. Papeles de Economía Española, 89-90, 43-86. Consulted: 12/06/2024. Available: https://www.funcas.es/wp-content/uploads/Migracion/Articulos/FUNCAS_PEE/089art04.pdf

Cefis, E. & Marsili, O. (2011). Born to flip. Exit decisions of entrepreneurial firms in high-tech and lowtech industries. Journal of Evolutionary Economics, 21, 473-498. https://doi.org/10.1007/s00191-010-0210-4

Chang, S. J. & Singh, H. (2000). Corporate and industry effects on business unit competitive position. Strategic Management Journal, 21(2), 739-752. https://doi.org/10.1002/1097-0266(200007)21:7%3C739::AID-SMJ117%3E3.0.CO;2-Q

Charles-Leija, H., Aguirre, J., & Sánchez, R. (2021). Satisfacción laboral de los emprendedores en México, retos y beneficios. Contaduría y Administración, 66(3), 1-21. http://dx.doi.org/10.22201/fca.24488410e.2021.2524

Chaves-Maza, M., Fedriani, E.M., & Ordaz-Sanz, J.A. (2018). Factores relevantes para optimizar los servicios públicos de apoyo a los emprendedores y la tasa de supervivencia de las empresas. Innovar, 28(69), 9-24. https://doi.org/10.15446/innovar.v28n69.71693

Chaves-Maza, M. & Fedriani, E. M. (2020). Entrepreneurship support ways after the COVID-19 crisis. Entrepreneurship and Sustainability Issues, 8(2), 662-681. https://doi.org/10.9770/jesi.2020.8.2(40)

Clifford, D. K. & Cavanagh, R. E. (1985). The winning performance. New York: Bantam Books.

Cooper, A. C., Woo, C. Y., & Dunkelberg, W. C. (1989). Entrepreneurship and the initial size of firms. Journal of Business Venturing, 4, 317-332. https://doi.org/10.1016/0883-9026(89)90004-9

Covarrubias, I. (2003). Emprendedores y Empresarios: un enfoque Institucional. Revista Contribuciones a la Economía. Disponible en: http://www.eumed.net/ce/icm-emp.htm. Consulted: 27/12/2021

Covin, J. G. & Slevin, D. P. (1990). New venture strategic posture, structure, and performance: An industry life cycle analysis. Journal of Business Venturing, 5(2), 123-135. https://doi.org/10.1016/0883-9026(90)90004-d

Covin, J. G. & Slevin, D. P. (1991). A conceptual model of entrepreneurship as firm behavior. Entrepreneurship Theory and Practice, 16(1), 7-26. https://doi.org/10.1177/104225879101600102

Cuesta, P. (2004). La franquicia: una fórmula comercial con éxito en pleno crecimiento. Distribución y Consumo, 78, 5-13. Consulted: 12/06/2024. Available: https://www.mercasa.es/wp-content/uploads/2022/10/franquicia.pdf

De Jaime, J. (2010). Las claves del análisis económico-financiero de la empresa. Madrid: ESIC Editorial.

Delmar, F. & Davidsson, P. (2000). Where do they come from? Prevalence and characteristics of nascent entrepreneurs. Entrepreneurship and Regional Development, 12, 1-23. https://doi.org/10.1080/089856200283063

Diez, S. & Guevara, R. (2020). Incidencia de la actitud conductual en las intenciones emprendedoras en estudiantes universitarios. Contaduría y Administración, 65(2), 1-26. http://dx.doi.org/10.22201/fca.24488410e.2019.2074

Donrrosoro, I., García, C., González, M., Lezámiz, M., Matey, J., Moso, M., & Unzuela, M. (2001). El modelo de gestión de las PyMEs vascas de éxito. Bilbao: Clúster del Conocimiento.

Duchesneau, D. A. & Gartner, W. B. (1990). A profile of new venture success and failure in an emerging industry. Journal of Business Venturing, 5, pp. 297-312. https://doi.org/10.1016/0883-9026(90)90007-g

Espitia, D. M. (2017). Desarrollo de indicadores de gestión, como medio para el aumento de la productividad en una pyme del sector de desarrollo tecnológico. Bachelor's Thesis, Universidad Militar Nueva Granada. Consulted: 12/06/2024. Available: http://hdl.handle.net/10654/15836

Gadenne, D. (1998). Critical success factors for small business: An inter-industry comparison. International Small Business Journal, 17(1), 36-56. https://doi.org/10.1177/0266242698171002

Galán, J. L. & Vecino, J. (1997). Las fuentes de rentabilidad de las empresas. Revista Europea de Dirección y Economía de la Empresa, 6(1), 21-36. Consulted: 12/06/2024. Available: https://hdl.handle.net/11441/76248

García, C., Martínez, A., & Fernández, R. (2010). Características del emprendedor influyentes en el proceso de creación empresarial y en el éxito esperado. Revista Europea de Dirección y Economía de la Empresa, 19(2), 31-47. Consulted: 12/06/2024. Available: https://dialnet.unirioja.es/servlet/articulo?codigo=3185118

Germán, V. (2008). El stock de capital industrial medido a través de la relación inversión empleo: estimaciones para los estados mexicanos. Ensayos Revista de Economía, 27(1), 53-80. https://doi.org/10.29105/ensayos27.1-3

Gómez, J., Llonch, J., & Rialp, J. (2018). Orientación estratégica, innovación y resultados en PYMEs de nueva creación: el rol del marketing. Cuadernos de Gestión, 10(3), 85-110. https://doi.org/10.5295/cdg.100190jg

Gómez-Gómez, J., Martínez-Costa, M., & Martínez-Lorente, Á.R. (2016). Weighting the dimensions in models of excellence a critical review from a business perspective. Measuring Business Excellence, 20(3), 79-90. https://doi.org/10.1108/MBE-01-2016-0007

González, S. & Ruiz, M. I. (2015). Valores de éxito y emprendimiento. International Journal of Developmental and Educational Psychology. Revista INFAD de Psicología, 1(2), 171-184. https://doi.org/10.17060/ijodaep.2015.n2.v1.333

Hamilton, B. H. (2000). Does entrepreneurship pay? An empirical analysis of the returns to selfemployment. Journal of Political Economy, 108(3), 604-631. https://doi.org/10.1086/262131

Harms, R., Kraus, S., & Reschke, C. H. (2007). Configurations of new ventures in entrepreneurship research: contributions and research gaps. Management Research News, 30, 661-673. https://doi.org/10.1108/01409170710779971

Hayter, C. S. (2015). Social Networks and the Success of University Spin-offs Toward an Agenda for Regional Growth. Economic Development Quarterly, https://doi.org/10.1177/0891242414566451

Headd, B. (2003). Redefining business success: Distinguishing between closure and failure. Small Business Economics, 21(1), 51-61. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/40229277

Hernández, L., Meneses, L. Á., & Benavides, J. (2005). Desarrollo de una metodología propia de análisis de crédito empresarial en una entidad financiera. Estudios Gerenciales, 21(97), 129-165. Consulted: 12/06/2024. Available: http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0123-59232005000400007&lng=en&nrm=iso

Hult, G. T. M., Ketchen, D. J., & Slater, S. F. (2005). Market orientation and performance: an integration of disparate approaches. Strategic Management Journal, 26, 1173-1181. https://doi.org/10.1002/smj.494

Ireland, R. D., Covin, J. G., & Kuratko, D. F. (2009). Conceptualizing corporate entrepreneurship strategy. Entrepreneurship Theory and Practice, 33, 19-46. https://doi.org/10.1111/j.1540-6520.2008.00279.x

Kalleberg, A. L., & Leicht, K. T. (1991). Gender and organizational performance: Determinants of small business survival and success. Academy of Management Journal, 34(1), 136–161. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/256305

Kay, J. (1993). Foundations of corporate success: how business strategies add value. Oxford: Oxford University Press.

Kester, W. C. & Luehrman, T. A. (1989). Are we feeling more competitive yet? The ex-change rate gambit. The International Executive, 31(3), 40-43. https://doi.org/10.1002/tie.5060310312

León, J.C. (2022). Influencia del entorno macroeconómico en la creación de empresas en Perú. Contaduría y Administración, 67(4), 341-364. http://dx.doi.org/10.22201/fca.24488410e.2022.3242

Li, Q., Zhang, H., Wu, M.-Y., Wall, G., & Ying, T. (2022). Family Matters: Dual Network Embeddedness, Resource Acquisition, and Entrepreneurial Success of Small Tourism Firms in Rural China. Journal of Travel Research, 61(8), 1757-1773. https://doi.org/10.1177/00472875211047275

Luk, T. K. (1996). Success in Hong Kong: Factors self-reported by successful small business owners. Journal of Small Business Management, 34(3), 68-74.

Marbella, F. (1998). Competitividad de las empresas Castellano-Leonesas: Análisis de algunos factores relevantes. En: Sexto Congreso de Economía Regional de Castilla y León, Zamora.

March, I. (1999). Las claves del éxito en nuevas compañías innovadoras según los propios emprendedores. Dirección y Organización: Revista de Ingeniería de Organización, 21, 167-176. https://doi.org/10.37610/dyo.v0i21.303

Mauri, A. J. & Michaels, M. P. (1998). Firm and industry effects within strategic management: An empirical examination. Strategic Management Journal, 211-219. https://doi.org/10.1002/(SICI)1097-0266(199803)19:3%3C211::AID-SMJ947%3E3.0.CO;2-T

McGahan, A. M. (1990). The Effect of Incomplete Information About Demand on Entry Deterrence. Cambridge (MA): Division of Research, Harvard Business School.

McGahan, A. M. (1999). The performance of US corporations: 1981–1994. The Journal of Industrial Economics, 47(4), 373-398. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/117538

McGahan, A. M. & Porter, M. E. (1997). How much does industry matter, really? Strategic Management Journal, 15-30. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/3088208

Montañés, M. C. (2002). El proceso motivacional. Valencia: Universidad de Valencia.

Moriano, J. A., Palací, F. J., & Morales, J. F. (2006). El perfil psicosocial del emprendedor universitario. Revista de Psicología del Trabajo y de las Organizaciones, 22(1). Consulted: 12/06/2024. Available: https://journals.copmadrid.org/jwop/art/210f760a89db30aa72ca258a3483cc7f

Morillo, M. (2001). Rentabilidad financiera y reducción de costos. Actualidad Contable FACES, 4(4), 35-48. Consulted: 12/06/2024. Available: https://www.redalyc.org/pdf/257/25700404.pdf

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. Journal of Business Research, 58(6), 726-735. https://doi.org/10.1016/j.jbusres.2003.11.001

Nikolic, N., Jovanovic, I., Nikolic, D., Mihajlovic, I., & Schulte, P. (2019). Investigation of the factors influencing SME failure as a function of its prevention and fast recovery after failure. Entrepreneurship Research Journal, 9(3), 1-21. https://doi.org/10.1515/erj-2017-0030

Oliver, A., Galiana, L., & Gutiérrez-Benet, M. (2016). Diagnóstico y políticas de promoción del emprendimiento en estudiantes. Anales de Psicología, 32(1), 183-189. https://doi.org/10.6018/analesps.32.1.186681

Orozco-Triana, J. A. & Arraut-Camargo, L. C. (2017). Los emprendedores con altas expectativas de crecimiento y el crecimiento económico. Dimensión Empresarial, 16(2), 85-98. http://dx.doi.org/10.15665/rde.v15i1+E1.828

Orti, A. M. (2003). Fomento de la iniciativa emprendedora en el estudiante universitario: la autoeficacia percibida emprendedora. Tesis Doctoral, Universidad de Sevilla. Consulted: 12/06/2024. Available: http://hdl.handle.net/11441/15575

Padilla, A. & Garrido, A. (2007). Estrategias CRM en empresas hoteleras: estado de la investigación y definición de un modelo de éxito integrador. Revista de Análisis Turístico, 3, 45-60.

Padilla-Martínez, M. P., Quispe-Otacoma, A. L., Nogueira-Rivera, D., & Hernández-Nariño, A. (2017). Diagnóstico y perspectivas de fomento del emprendimiento como instrumento de desarrollo/The entrepreneurship as business management for sustainable development. Ingeniería Industrial, 37(1), 91-103. Consulted: 12/06/2024. Available: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1815-59362016000100010&lng=es&nrm=iso

Paige, R. C. & Littrell, M. A. (2002). Craft retailers' criteria for success and associated business strategies. Journal of Small Business Management, 40(4), 314-331. https://doi.org/10.1111/1540-627x.00060

Pelham, A. M. (1997). Mediating influences on the relations between market orientation and profitability in small industrial firms. Journal of Marketing Theory and Practice, 5(3), 55-76. https://doi.org/10.1080/10696679.1997.11501771

Pelham, A. M. (2000). Market orientation and other potential influences on performance in small and medium-sized manufacturing firms. Journal of Small Business Management, 38(1), 48.

Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. Strategic Management Journal, 14, 179-191. https://doi.org/10.1002/smj.4250140303

Peters, T. J. & Waterman, R. H. (1982). In search of excellence: Lessons from America's best-run companies. London: Collings.

Porter, M. E. (1991). La ventaja competitiva de las naciones. Buenos Aires: Vergara.

Quinlan, J. R. (1993). C4.5: Programs for machine learning. San Mateo, CA: Morgan Kaufmann Publishers.

Ríos Manríquez, M., Pérez Rendón, L., Del Río Rama, M.C., & Sánchez Fernández, M.D. (2022). Entrepreneurship and technological innovation: The micro-entrepreneur in Mexico. Contaduría y Administración, 67(3), 54-84. http://dx.doi.org/10.22201/fca.24488410e.2022.4561

Rita, M.R., Wahyudi, S., Muharam, H., Thren, A.T., & Robiyanto, R. (2022). The role of entrepreneurship oriented finance in improving MSME performance: The demand side of the entrepreneurial finance perspective. Contaduría y Administración, 67(3), 24-53. http://dx.doi.org/10.22201/fca.24488410e.2022.3217

Rizzato, S. C. C. (2012). Dimensiones de personalidad, motivación de logro y expectativas de control en jóvenes emprendedores brasileños. Tesis Doctoral. Universidad de León. Consulted: 12/06/2024. Available: https://buleria.unileon.es/bitstream/handle/10612/2173/tesis_39b2ea.PDF?sequence=1

Ronstadt, R. (1989). The corridor principle. Journal of Business Venturing, 3, pp. 31-40. https://doi.org/10.1016/0883-9026(88)90028-6

Rumelt, R. P. (1991). How much does industry matter? Strategic Management Journal, 12(3), 167-185. https://doi.org/10.1002/smj.4250120302

Sánchez, J. M. (2005). Influencia de la gestión universitaria en el clima organizacional: un estudio comparativo de tres universidades. Tesis Doctoral. Universidad Nacional Mayor de San Marcos. Lima (Perú). Consulted: 12/06/2024. Available: https://cybertesis.unmsm.edu.pe/item/986eb45e-df26-418f-9603-06781f2f6baf

Sánchez, J., Vélez, M. L., & Araújo, P. (2016). Balanced scorecard para emprendedores: desde el modelo canvas al cuadro de mando integral. Revista Facultad de Ciencias Económicas: Investigación y Reflexión, 24(1). https://doi.org/10.18359/rfce.1620

Sánchez-García, M.F., Suárez-Ortega, M, & Fernández-García, A. (2022). Motivational profiles, sociodemographic and conditioning factors in the professional careers of entrepreneurs. Contaduría y Administración, 67(4), 204-228. http://dx.doi.org/10.22201/fca.24488410e.2022.3208

Sandoval, C. & Bado, G. (2022). Impacto de la formación educativa emprendedora en la intención emprendedora: un enfoque cognitivo. Contaduría y Administración, 67(4), 1-27. http://dx.doi.org/10.22201/fca.24488410e.2022.3269

Schmalensee, R. (1985). Do markets differ much? The American Economic Review, 75(3), 341-351. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/1814804

Segura, F. J. (2020). El perfil emprendedor y la intensidad competitiva del mercado como predictores de supervivencia en microempresas mexicanas. Contaduría y Administración, 65(3), 1-27. http://dx.doi.org/10.22201/fca.24488410e.2020.2121

Shepherd, D. A. (1999). Venture capitalists' assessment of new venture survival. Management Science, 45, 621-632. https://doi.org/10.1287/mnsc.45.5.621

Shepherd, D. A., Douglas, E. J., & Shanley, M. (2000). New venture survival: Ignorance, external shocks, and risk reduction strategies. Journal of Business Venturing, 15, 393-410. https://doi.org/10.1016/S0883-9026(98)00032-9

Strotmann, H. (2007). Entrepreneurial Survival. Small Business Economics, 28, 87-104. https://doi.org/10.1007/s11187-005-8859-z

Ucbasaran, D., Westhead, P., & Wright, M. (2001). The focus of entrepreneurial research: contextual and process issues. Entrepreneurship Theory and Practice, 25(4), 57-80. https://doi.org/10.1177/104225870102500405

Van Praag, M. & Versloot, P. H. (2008). The economic benefits and costs of entrepreneurship: A review of the research. Foundations and Trends in Entrepreneurship, 4(2), 65-154. https://doi.org/10.1561/0300000012

Varona, L., Gismera, L., & Gimeno, R. (2014). Supervivencia de las empresas según indicadores empresariales. Modelo lineal mixto con datos de panel, período 2004 al 2008, caso de España. Documentos de Trabajo de la Asociación Peruana de Economía, 13 (No. 2014-13). Consulted: 12/06/2024. Available: http://perueconomics.org/wp-content/uploads/2014/01/WP-13.pdf

Vergiú, J. & Bendezú, C. (2007). Los indicadores financieros y el Valor Económico Agregado (EVA) en la creación de valor. Ind. Data, 10, 1. https://doi.org/10.15381/idata.v10i1.6220

Viedma, J. M. (1992). La excelencia empresarial. Madrid: McGraw Hill.

Wach, D., Stephan, U., & Gorgievski, M. (2016). More than money: Developing an integrative multifactorial measure of entrepreneurial success. International Small Business Journal, 34(8), 1098- 1121. https://doi.org/10.1177/0266242615608469

Weller, J. (2006). Inserción laboral de jóvenes: expectativas, demanda laboral y trayectorias. Boletín RedEtis, 5, 1-6. Consulted: 12/06/2024. Available: https://www2.congreso.gob.pe/sicr/cendocbib/con4_uibd.nsf/305C6343C282696505257DB300598A36/$FILE/200709250008_4_2_0.pdf

Wernerfelt, B. & Montgomery, C. A. (1988). Tobin's Q and the importance of focus in firm performance. The American Economic Review, 78(1), 246-250. Consulted: 12/06/2024. Available: https://www.jstor.org/stable/1814713

Westhead, P. & Cowling, M. (1995). Employment change in independent owner-managed hightechnology firms in Great Britain. Small Business Economics, 7(2), 111-140. https://doi.org/10.1007/bf01108686

Wijewardena, H. & Cooray, S. (1995). Determinants of growth in small Japanese manufacturing firms: Survey evidence from Kobe. Journal of Small Business Management, 33(4), 87.

Xie, X. & Wu, Y. (2022). Doing well and doing good: How responsible entrepreneurship shapes female entrepreneurial success. Journal of Business Ethics, 178, 803-828. https://doi.org/10.1007/s10551-021-04799-z

Ynzunza, C. B. & Izar, J. M. (2021). Las motivaciones, competencias y factores de éxito para el emprendimiento y su impacto en el desempeño empresarial. Un análisis en las MIPyMES en el estado de Querétaro, México. Contaduría y Administración, 66(1), 1-26. http://dx.doi.org/10.22201/fca.24488410e.2021.2327

Zhao, H., O'Connor, G., Wu, J., & Lumpkin, G.T. (2021). Age and entrepreneurial career success: A review and meta-analysis. Journal of Business Venturing, 36(1), 106007. https://doi.org/10.1016/j.jbusvent.2020.106007

Zornoza, C. C. (1997). La competitividad de la pyme industrial española: estrategia y competencia distintivas. Madrid: Civitas.

Annex

Variables related to positioning

1. Business survival: the action and effect of a company's survival after a certain time from its creation and depending on whether or not it is registered, considering the necessary legal and administrative procedures; in the case of entrepreneurs, this variable has an inverse and very strong correlation with failure.
2. Sales volume: volume of the company's exchange of goods and services (measured in euros).
3. Results: represents the balance remaining in the company when total operating expenses are deducted from total revenues from its own operating activities (after deducting interest and taxes).
4. Relative economic profitability: ratio between net income and total assets, compared to the average of companies in the same business segment with the same National Code of Economic Activities 'CNAE' (Spanish: *Código Nacional de Actividades Económicas*).
5. Relative financial profitability: ratio between net income (that is, profit or loss after interest and taxes) and shareholders' equity, compared to the average of companies in the sector with the same CNAE.

6. Productivity: operating income divided by the number of employees.
7. Investment/employment: volume invested per employee.
8. Third-party financing: percentage of external financing with respect to the company's total capital.
9. Competitive position of the company: this is a multidimensional or vectorial indicator that compares the company's indicators with the averages of the companies in their business segment of the same CNAE in: economic profitability, financial profitability, asset turnover, and debt.

Variables related to expectations

1. Context expectations: ratio between the entrepreneur's values and those of the context on economic profitability, such as financial profitability, asset turnover, debt, and summary. They are calculated from the average values at the start of their activity in companies of their business segment.
2. Business and employment prospects for the following year: (subjective) opinion of entrepreneurs on the prospects of their business and on their ability to hire more employees for the following year.
3. Fulfillment of the objectives set: (subjective) assessment of the entrepreneur on the fulfillment of the objectives set at the beginning of the business activity.
4. Satisfaction indicators: satisfaction of the different agents related to the company (employees, customers, owner of the company; of the latter, with respect to results, sales growth, and employee growth).

Variables related to evolution

1. Increase in investment: indicates whether the activity has required new investments in addition to the initial one (it is a binary or dichotomous variable).
2. Increase in the number of employees: indicates whether the company has more employees than at the beginning of its activity.
3. Evolution of the business segment: growth of the main economic and financial profitability indicators of the companies in the business segment with the same CNAE as the entrepreneur.

It is calculated from the average growth values since the start of activity in companies of the same business segment.

4. Evolution of growth in sales and employees: increase in sales and employee variables from the beginning of the activity to the present; in fact, it is a vector variable with two components, the first taking three values ('has increased', 'has remained the same' or 'has decreased') and the second four (adding 'had no workers hired').
5. Sector expectations: qualitative synthesis of the values of indicator 9 that refer to positioning; if all the indicators are favorable, its value is 'positive'; otherwise, it is 'negative'.
6. Evolution and expectations of the business segment: qualitative indicator that synthesizes indicators 1 for positioning and 3 for evolution; if the indicators are all favorable, its value is 'positive'; otherwise, it is 'negative'.
7. Economic indicators of the environment: probability of survival, dynamism of the business segment, and concentration of the business segment of the companies in the municipality where the entrepreneur carries out his/her activity.

Questions derived from previous variables that were efficient for classification

P1: Has your company survived more than a year?

P2: Has your company survived for more than two years?

P3: Has your company survived during the first year?

P4: Have you fulfilled the purpose for which you created your company?

P5: Does your company have a positive balance sheet?

P6: Does your company have positive results?

P7: Does your company have zero operating results?

P8: Does your company have more than 75% third-party financing?

P9: Is your company's economic profitability higher than the economic profitability of the average of companies in your business segment according to your CNAE code?

P10: Is your company's economic profitability higher than 10%?

P11: Is your company's financial profitability higher than that of the average of companies in your business segment according to your CNAE code?

P12: Is your company's financial profitability higher than 10%?

P13: Do you have positive expectations for the future of your project?

P14: Do you have a productivity higher than the minimum interprofessional wage?

P15: Does your company have positive satisfaction indicators?

P16: Have you increased the number of employees since the beginning of your company?

P17: Does your company show a positive evolution?

P18: Are the indicators of the local environment in which your company operates positive?

P19: Are there positive expectations about the business context in which your company operates?

P20: Has your business segment grown since you started your company?

P21: Has your company evolved positively since its beginnings and does it currently present positive expectations?

P22: Has your environment had positive growth and expectations since the beginning of your activity?

P23: Have you significantly increased your investment since your company's beginning?

P24: Does your company have a higher relative debt than the average of companies in your business segment?

P25: Does your company have a higher turnover than the average of companies in the same business segment?

P26: Is your company's investment per employee higher than the (annual) minimum interprofessional wage?

P27: Do you have positive prospects for your company and the possibility of increasing the number of employees in the next year?

P28: Does your company have a monthly revenue per employee that is higher than the monthly minimum interprofessional wage?

P29: Are the evolution indicators positive?