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Investment decisions in the context of SMEs: A non-financial factor approach

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Abstract

This study empirically examines the non-financial factors approach to making investment decisions and supports this significant activity in the context of SMEs, based on 16 investment projects and a proposal for a new way to manage non-financial factors. For small and medium-sized enterprises, focusing on non-financial factors in investment decision-making might identify fewer tangible advantages than in financial analysis, but there is not enough information on such factors. That is why the objective of this research is to propose a way to make investment decisions by paying attention to non-financial indicators. This study produces three basic findings. First, nonfinancial measures are widely used in capital budgeting, but nonfinancial measures appear to serve as a partial substitute when there is a lack of information or knowledge to develop other techniques, mainly in the context of SMEs. Second, a proposal method to analyze non-financial factors facilitates a decision to accept or reject an investment project. Third, entrepreneurs very often make blind decisions regarding the investments they should make, either due to a lack of time, information, or knowledge to do so. The way of analyzing the potential impact of investment projects generates the opportunity to position them based on two dimensions that emerge from the combination of the nonfinancial factors used. Additionally, the present study succeeds in presenting and evaluating 16 investment projects, pointing to those that can have a better impact on businesses.

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1. Introduction

Investment decision-making is an area of interest to many researchers (Bas, 2013; Ben-Horin & Kroll, 2017; Elgebeily, Guermat, & Vendrame, 2021; Jiang & Hu, 2021; Magni & Marchioni, 2020; Marchioni & Magni, 2018; Mellichamp, 2019; Patil & Bagodi, 2021; Vučina, Lozina, & Vlak, 2010). Investment decisions are often made by small and medium entrepreneurs, both in the initial phases of the business and its development. Making optimal selections is essential for a business owner to survive and remain competitive (Fehrenbacher, Kaplan, & Moulang, 2020; Jiang & Hu, 2021; Siziba & Hall, 2021).

Usually, businesses use capital budgeting techniques to identify which investment projects are worth engaging in; Payback Period (PBP), Net Present Value (NPV), Internal Rate of Return (IRR) are the most

used techniques (Kim, Lee, Park, & Waggle, 2021; Siziba & Hall, 2021). Literature review shows that larger organizations have more resources at their disposal and have more sophisticated capital budgeting techniques than smaller ones that are less likely to use the considered "best practices" (Batra & Verma, 2017; Chittenden & Derregia, 2015; Kim et al., 2021; Nawaiseh, Al-nawaiseh, Attar, & Al-nidawy, 2018; Tresierra-Tanaka & Vega-Acuña, 2019). Lack of time, non-information, or excessive confidence about having precise human capital without knowledge and skills conspire against small businesses to apply 'rules of thumb' in capital budgeting and the most convenient decision to accept or reject an investment project (Elgebeily et al., 2021; Jiang & Hu, 2021; Tresierra-Tanaka & Vega-Acuña, 2019).

While recognizing the importance of financial factors to evaluate an investment project, many authors have highlighted the role played by non-financial criteria as a complementary way to evaluate an investment project (Batra & Verma, 2017, 2018; Cooremans, 2011; Turner & Coote, 2018). There are alternative proposals in the literature that try to treat financial criteria differently and others that introduce non-financial factors (Abdel-Kader & Dugdale, 2001; Jiang & Hu, 2021; Magni & Marchioni, 2020; Mellichamp, 2019; Vučina et al., 2010), but ultimately they all end up using the same financial measures. Some scholars recognize that using non-financial aspects in project evaluation would allow recognizing competitive advantages in a project that financial techniques fail to capture (Batra & Verma, 2018; Cooremans, 2011; Jiang & Hu, 2021; Turner & Coote, 2018).

Knowing that,

(1) The traditional methods and rules to make wise investment decisions are difficult to use by small and medium entrepreneurs (Fehrenbacher et al., 2020; Kim et al., 2021; Magni & Marchioni, 2020; Tresierra-Tanaka & Vega-Acuña, 2019).
(2) The economic reliability of well-known measures of financial efficiency is not strongly consistent (Brincks, Haddad, Lotfaliei, & Trombley, 2020; Magni & Marchioni, 2020; Marchioni & Magni, 2018; Sureka, Kumar, Colombage, & Abedin, 2022; Tresierra-Tanaka & Vega-Acuña, 2019).
(3) Basing an investment decision only on financial criteria may result in inadequate decisions (Abdel-Kader & Dugdale, 2001; Batra & Verma, 2018; Chen, 2008; Cooremans, 2011; Elgebeily et al., 2021; Turner & Coote, 2018).
(4) The literature available on the role of non-financial factors in investment project evaluation is not abundant, as far as is known, and even the existing literature continues to devote significant weight to financial criteria.

Finance theory holds that economic returns are the basis for capital budgeting decisions. Capital projects showing more positive and higher returns should be prioritized or selected over those with lower or negative returns (Addico, Amewu, & Owusu-Ansah, 2022; Fehrenbacher et al., 2020; Warren & Jack, 2018). The result of capital decisions involves significant financial outlays committed over many years, significantly affecting the long-term performance of an organization (Fehrenbacher et al., 2020; Siziba & Hall, 2021; Tresierra-Tanaka & Vega-Acuña, 2019). Those decisions are critical to the future performance of any organization for two reasons: (1) the significant investment is often irreversible due to the sunk costs involved, and (2) the changes can produce in the organization's structure and its relation to the market (Sureka et al., 2022; Warren & Jack, 2018).

Many factors affect the decision-making of investment and help in understanding the investment decision behavior of small and medium entrepreneurs (Patil & Bagodi, 2021; Tresierra-Tanaka & Vega-Acuña, 2019). In this context, investment projects under uncertainty are difficult to appraise. The economic analysis may be impossible, owing to possible nonexistence data, perturbation multiplicity in the input data, as well as possible future shifts of those same data(Magni & Marchioni, 2020).

When entrepreneurs obtain information to make investment decisions, they tend to overrate the precision of their forecasts or misjudge the risk of the project (Elgebeily et al., 2021). In addition, the literature shows studies in which there is no evidence of project risk assessment through a formal method (Batra & Verma, 2017; Brincks et al., 2020; Tresierra-Tanaka & Vega-Acuña, 2019). The above means that a halo of overstated optimism permeates the decision-making process (Elgebeily et al., 2021; Fehrenbacher et al., 2020; Tresierra-Tanaka & Vega-Acuña, 2019).

Particularly at the evaluation and selection project stage, some previous studies have also emphasized that the investment analysis and decision-making process must pay attention to financial but also non-financial aspects, both quantitative and qualitative factors (Abdel-Kader & Dugdale, 2001; Adler, 2006; Batra & Verma, 2017, 2018; Cooremans, 2011; Elgebeily et al., 2021; Fehrenbacher et al., 2020; Hoepner, Majoch, & Zhou, 2021; Suto & Takehara, 2018; Turner & Coote, 2018). For small and medium-sized entrepreneurs, focusing on non-financial factors in investment decision-making could make it possible to identify fewer tangible advantages than in financial analysis, for which there is sometimes no information (Mukosolu Okobo, Onuoha Ugwoke, & Etim Akpan, 2022).

On the other hand, there is little consensus in the literature regarding which non-financial factors to use in the decision-making process to evaluate and select an investment project (Batra & Verma, 2018; Turner & Coote, 2018). An analysis of the literature allowed for identifying non-financial factors and grouping them

according to their similarity (Abdel-Kader & Dugdale, 2001; Batra & Verma, 2017, 2018; Chen, 2008; Cooremans, 2011; Masini & Menichetti, 2013; Turner & Coote, 2018). Figure 1 shows the result obtained.

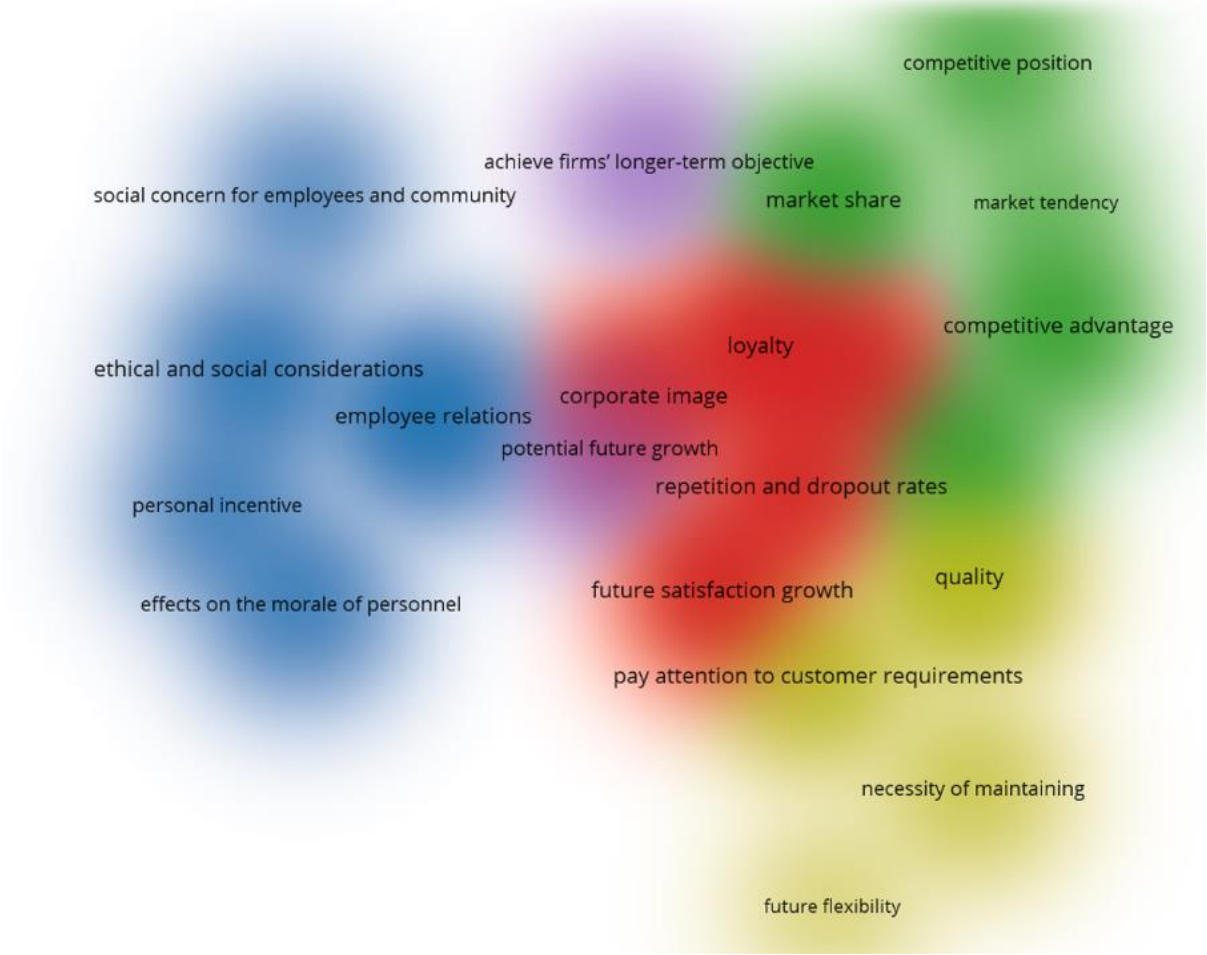

Figure 1. Grouping non-financial factors.

From the figure, it is possible to identify five large groups of non-financial factors. The environmental factor cuts across all groups. Although it is not explicitly stated, it will be included in the analysis because many scholars pay attention to it. Table 1 shows the non-financial factors that will be included in the analysis.

Table 1. Dimensions and its non-financial factors.

No.	Non-financial factor	Sub-elements
1	Market	Competitive position, market tendency, market share, competitive advantage
2	Customer	Future satisfaction growth, perceived quality, loyalty, repetition and dropout rates, corporate image
3	Economic	Potential future growth, achieve firms' longer-term objective
5	Technical	Quality, future flexibility, pay attention to customer requirements
6	Social	Ethical and social considerations, social concern for employees and community, personal incentive, effects on the morale of personnel, employee relations
6	Environment	Environmental impact

A factor analysis allowed us to find two dimensions among the non-financial factors identified, as shown in Table 2. The first dimension is internal (component 1) and groups the project factors that account for the impact on the business economy and how it will technically contribute to the satisfaction of the client and the employees involved. The second dimension is external (component 2), and it groups the project factors that account for the impact on the future position of the business in the market, the behavior of customers, and the environmental impact (less impact is better). The following section examines how the identified dimensions and factors could be used in the evaluation and selection of an investment project.

Table 2. Rotated component matrix out of the factor analysis.

Non-financial factor	Components	
	1	2
Economic	0.935	0.012
Technical	0.925	-0.246
Social	0.901	-0.365
Customer	-0.414	0.792
Market	-0.386	0.789
Environment	-0.089	-0.745

Note: Extraction method: Principal component analysis; Rotation method: Varimax with kaiser normalization.
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.759; Sig. bartlett's test of sphericity = 0.000; Total variance explained = 81.193 %.

With all these findings, this article aims to contribute to the current debate on investment project evaluation and selection decisions by introducing a new perspective to facilitate decision-making in uncertain and complex situations where information is insufficient or absent. The proposal involves the evaluation of multiple non-financial attributes that allow choosing the alternative that optimizes the desired solution.

2. Methods

Based on the research presented in previous section, two dimensions were found to be relevant to investment project selection and evaluation: impact on the business´s economy and impact on the business´s future position. Table 3shows the indicators for calculating the commented dimensions.

Table 3. Dimension indicators.

Impact on business´s future economy	Impact on business´s future position
$Ibe = I_{scale} - \sum_{j=1}^{n} \sqrt{\frac{d_e}{m}}(w_c)$ (1)	$Ifp = I_{scale} - \sum_{j=1}^{n} \sqrt{\frac{d_e}{m}}(w_c)$ (2)
Where: I_{scale}: Ideal level of the non-financial factors associated with the impact on business´s economy (5 for the purposes of this research). m: experts w_c: Weight of non-financial factors (business´s future economy)	Where: I_{scale}: Ideal level of the non-financial factor's "c" associated with the impact on business´s future position (5 for the purposes of this research). m: experts w_c: Weight of non-financial factors (business´s future position)
$d_e(r_c, I_{scale}) = \sum_{c=1}^{m}(r_c - I_{scale})^2$ (3)	$d_e(r_c, I_{scale}) = \sum_{c=1}^{m}(r_c - I_{scale})^2$ (4)
Where: $d_e(r_c, I_{scale})$: Euclidean distance rc: Score of characteristic "c".	Where: $d_e(r_c, I_{scale})$: Euclidean distance rc: Score of characteristic "c".

A research instrument consisting of a Likert scale (1 strongly disagree to 5 strongly agree) was constructed to measure each of the sub-elements. The internal consistency of the items was tested using Cronbach's alpha, and it was found to be 0,867, a value that allows the instrument to be considered reliable. The content validity of the research instrument was carried out based on the analysis and suggestions of experts.

For the required weightings, the Fuller's triangle method will be used (Cárdenas Gutiérrez, Delgado Valencia, Silva Calambas, & Serna Ospina, 2019; Kralik, Jasek, & Zacek, 2018; Leyva Ferreiro, 2018; Sablón Cossío et al., 2018). The determination of the weights is based on a pair wise comparison between sub-elements (Kralik et al., 2018; Stejskal, Kuvíková, & Meričková, 2018) where the most significant sub-element is awarded one point. The points awarded to the criteria are added together and the sums represent their weighting factors (Agarski, Hadzistevic, Budak, Moraca, & Vukelic, 2019; Ondrejka Harbulakova, Zelenakova, Purcz, & Olejnik, 2018; Stejskal et al., 2018). Due to the pairwise comparison, the number of comparisons is equal to:

$$N = \frac{k(k-1)}{2} \quad (5)$$

Where:

k: Number of sub-elements.

N: Number of comparisons.

The weight of the sub-element is calculated as:

$$w_{se} = \frac{n_{se}}{N}; se = 1,2,\dots,k \quad (6)$$

Where:

n_{se}: Number of times a sub-element is selected.

This procedure allows the calculation of the weights of the sub-elements within each non-financial factor. Similarly, it is used to weigh up the non-financial factors. The interpretation of the results of the proposed indicators is carried out by calculating intervals based on the measurement scale used. The mathematical expression for these purposes is as follows:

$$I = \frac{Max_{scale} - Min_{scale}}{ni} \qquad (7)$$

Where:

I: Interval

Max_{scale}: Maximum scale value

Min_{scale}: Minimum scale value

ni: Desired number of intervals

In this research, five intervals will be used to interpret the proposed indicators (Table 4):

Table 4. Classification levels.

Intervals of indicator	Qualitative categories
1 ≤ indicator< 1.8	Very low level
1.8 ≤ indicator< 2.6	Low level
2.6 ≤ indicator< 3.4	Medium level
3.4 ≤ indicator 4.2	High level
4.2 ≤ indicator ≤ 5	Very high level

This classification allows the decision to be made about accepting or rejecting a project. The representation of the proposed indicators on a coordinate axis permits the decision-making, placing the impact on a business's future position on the ordinate axis and the impact on a business's economy on the abscissa axis. The representation presents four decision zones (Figure 2).

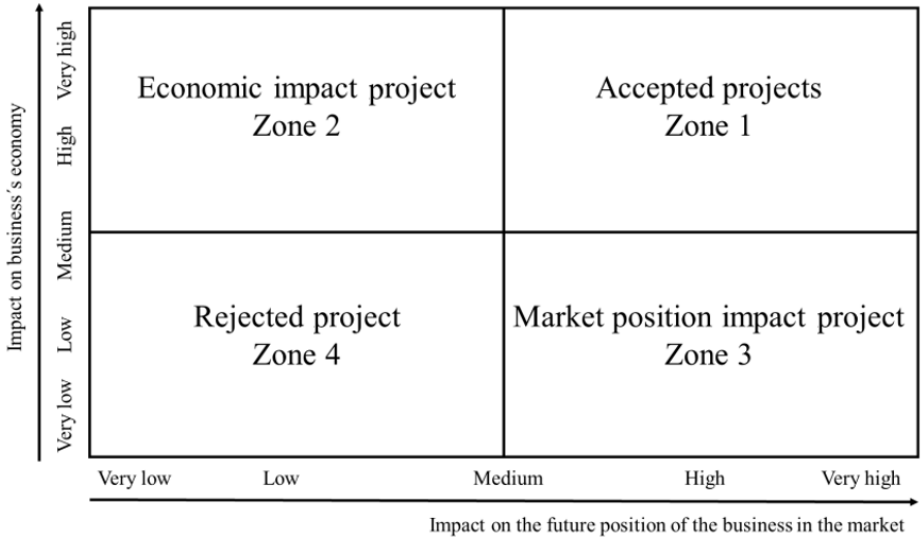

Figure 2. Four decision zones.

The dividing axes that allow the separation of the projects in the four decision zones are at the arithmetic mean between the minimum and maximum values that the indicators can obtain.

The sample selection was by judgment, and it was possible to collect information from 16 entrepreneurs involved in an investment project. Judgment sampling is considered valid for this study because the researchers have prior knowledge about the population and can use this knowledge to select a sample that is convenient for the study, taking into account the resources and time available.

3. Results

In this section, we intend to demonstrate the validity of the proposed method with an illustrative example.

3.1. Case Description

What is presented here was carried out following the method described for 16 investment projects. In order to synthesize the results, (1) the detailed process for one of the projects and (2) the summary results of the 16 projects are presented. For the first investment project, 10 experts were involved in its evaluation, which included the owner of the business, family members with responsibilities in the company, employees, and the authors of the research who acted as advisors.

Table 5 shows the evaluation given by the experts to each of the criteria that contribute to the impact on a business's future economy (economic, technical and social) and those that contribute to the impact on a business's future position (customers, market, and environment). This evaluation was compiled with the instrument designed for these purposes and commented on in the methods section.

Table 5. Expert judgment.

Experts	Impact on business´s future economy			Impact on business´s future position		
	Economic	Technical	Social	Customers	Market	Environment
1	5	3	4	5	3	5
2	5	3	5	5	2	5
3	5	3	4	5	5	2
4	4	4	5	5	2	3
5	5	4	4	5	2	5
6	5	3	4	5	2	5
7	4	4	5	5	4	5
8	4	4	4	5	5	2
9	4	4	5	5	5	2
10	4	3	5	5	2	4
$d_e(r_a I_{scale})$	5	25	5	0	50	32

The data correspond to the evaluation of the first project, which allows calculating the Euclidean distance by applying Equation 3 (see Table 5, last row). Having the Euclidean distance requires determining the weight of non-financial factors. The calculation for N is as follows:

$$N = \frac{3(3-1)}{2} = 3(8)$$

The weights applying the Fuller's triangle method to calculate the impact on a business's future economy are shown as follows (only the opinion of an expert is shown):

Table 6. Fuller´s triangle evaluation.

Dimensions		n_{se}	w_{se}
1*	1*	2	0.667
2	3	0	0.000
	2*	1	0.333
	3	0	0.000

Table 6 reflects the expert assessment of the dimensions related to the impact on a business's future economy. 1 is the economic dimension, 2 is the technical dimension, and 3 is the social dimension. These dimensions are evaluated in comparisons 1 with 2 and 1 with 3. In this case, the expert selected in both cases dimension 1 over 2. Then dimension 2 is compared with dimension 3, and the expert selects dimension 2. The numbers marked with (*) represent the criterion selected between the pairs of dimensions compared. This result made it possible to calculate the weight of the dimension. In the case of the economic dimension, it received 2 selections among the 3 dimensions that make up the impact on business's future economy, allowing the weight of the dimension to be calculated, which is 0.667.

Similarly, the rest of the experts calculate the weights to determine the impact on the business's future position. Table 7 shows the summary of the results obtained.

Table 7. Weight calculation.

Dimensions	1	2	3	4	5	6	7	8	9	10	Average
Economic	0.667	0.333	0.000	0.333	0.333	0.667	0.667	0.667	0.667	0.667	0.5000
Technical	0.333	0.333	0.333	0.667	0.000	0.333	0.333	0.333	0.333	0.333	0.3333
Social	0.000	0.333	0.667	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.1667
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Customers	0.333	0.667	0.333	0.333	0.000	0.333	0.333	0.333	0.333	0.333	0.3333
Market	0.333	0.333	0.000	0.667	0.333	0.667	0.667	0.000	0.667	0.667	0.4333
Environment	0.333	0.000	0.667	0.000	0.667	0.000	0.000	0.667	0.000	0.000	0.2333
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

The calculated weights allow for obtaining the evaluations of the impact on the business's future economy and the impact on the business's future position (See Table 8).

Table 8. Dimension indicators calculation.

Project	Economic		Technical		Social		Ibe	Classification levels
	De	W	De	W	De	W		
P1	5	0.50	25	0.3333	5	0.1667	4.00	High
	Customers		Market		Environment			
	De	W	De	W	De	W	Ifp	
	5	0.3333	25	0.4333	5	0.2333	3.61	High

Graphically, Figure 3shows the analyzed project.

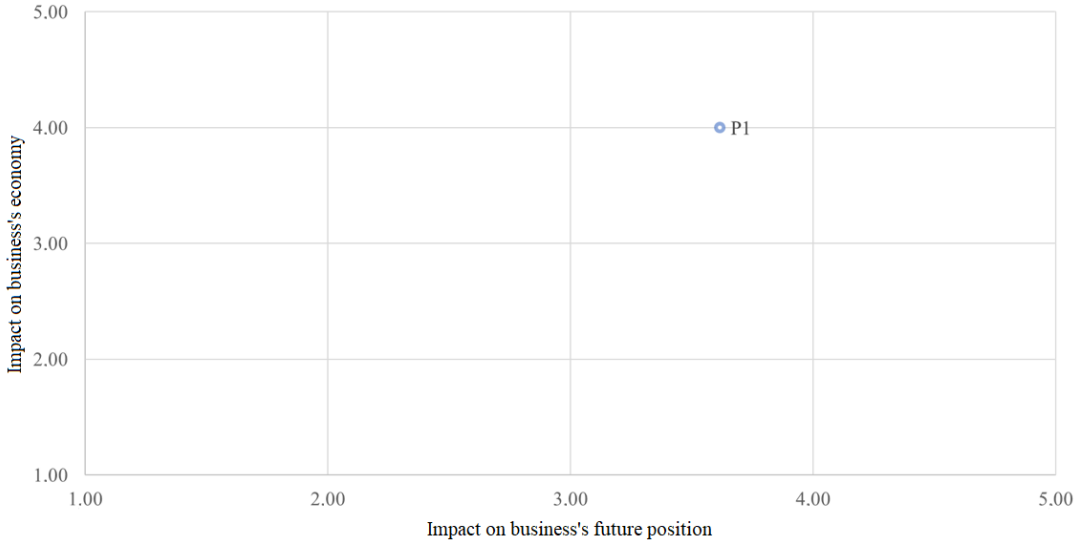

Figure 3. Position of project 1.

The analyses presented above lead to the conclusion that project one must be accepted and its execution must proceed. That is so since it will contribute to the business´s economic performance and its future position in the market. The work on the remaining 15 projects was similar. Table 9 shows the calculation of the dimension indicators for these projects.

Figure 4 shows these results. From Figure 4, it is possible to see that there are projects that must be accepted, such as P1, P10, and P4; others must be rejected, such as P3, P12, P13, and P5. Others could contribute to a future position at the market while affecting the economic situation of the organization (P2, P11, P8, P9, P7, P6) or could benefit from the economic point of view without making a great contribution to the improvement of the market position (P16, P15, P14).

Table 9. Results of dimension indicators.

Projects	Ibe	Classification	Ifp	Classification
P1	4.12	High	3.61	High
P2	1.45	Verylow	3.98	High
P3	1.69	Verylow	2.19	Low
P4	3.57	High	4.15	High
P5	2.43	Low	2.53	Low
P6	2.88	Medium	3.12	Medium
P7	2.47	Low	3.07	Medium
P8	1.93	Low	3.24	Medium
P9	2.02	Low	3.34	Medium
P10	3.63	High	4.00	High
P11	1.51	Very low	3.59	High
P12	1.16	Very low	2.16	Low
P13	2.00	Low	2.52	Low
P14	3.05	Medium	2.65	Medium
P15	4.00	High	2.23	Low
P16	4.73	Very high	2.53	Low

The results presented need validation if the proposed methodology is to be a useful tool. The validation of the results considered that the smaller the distance that separates the real value reached by the non-financial factors evaluated from the established ideal value (5 points), the higher the dimension's indicators must reach. Figures 5 and 6demonstrate this principle, which serves as validation of the achieved results.

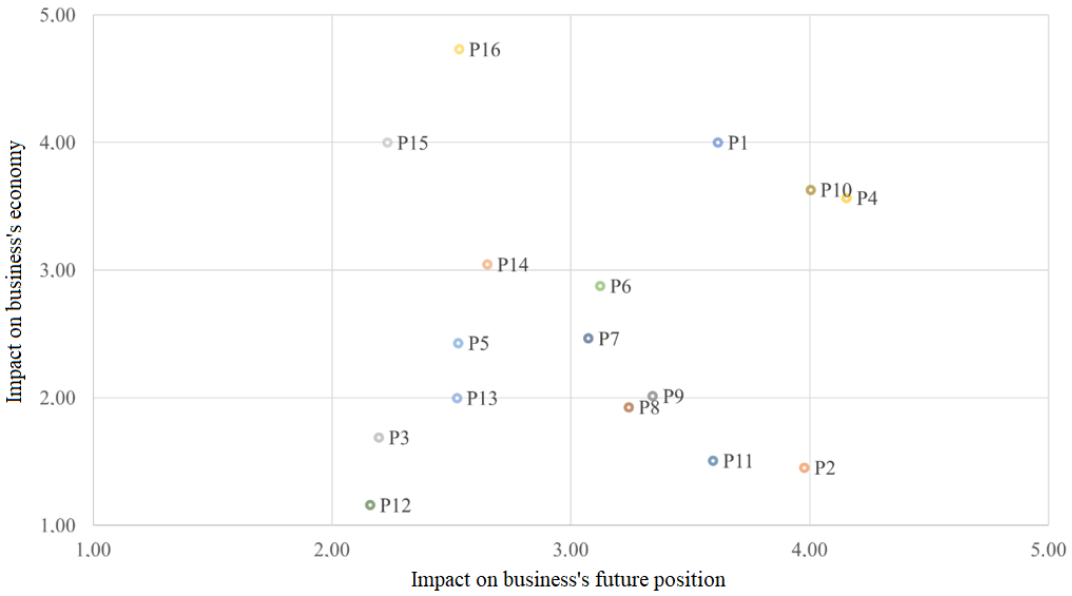

Figure 4. Map of all projects.

The value of the impact on a business's future economy index increases to the same extent that the distance between the real value of the economic, technical, and social factors and the ideal value established according to the scale used decreases.

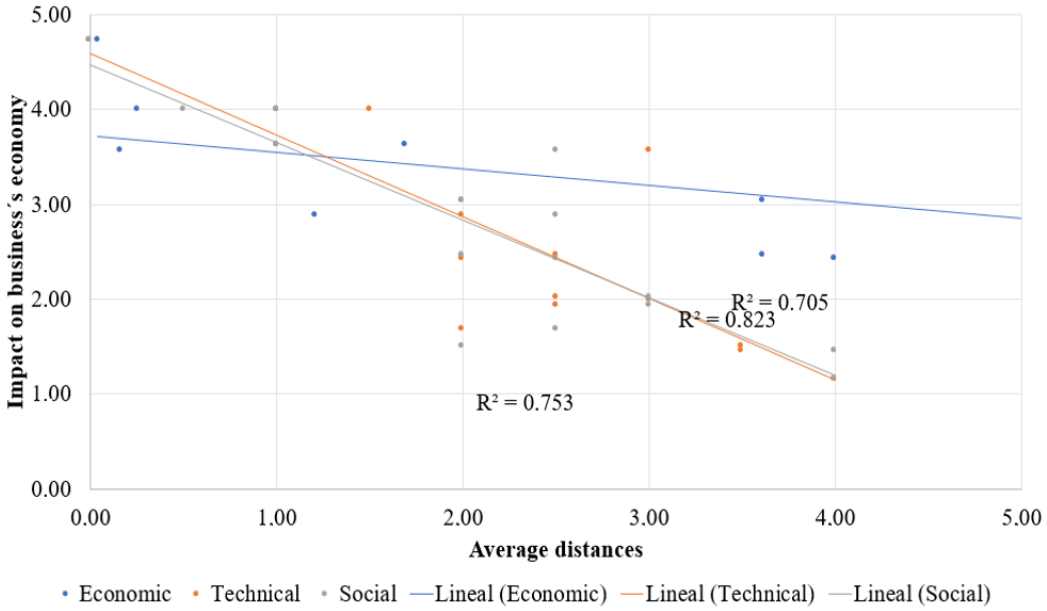

Figure 5. Relationship between impact on a business's future economy index and non-financial factors.

Similarly, the value of the impact on the business's future position index increases to the same extent that the distance between the real value of the client, market, and environmental factors and the ideal value established according to the scale used decreases (5).

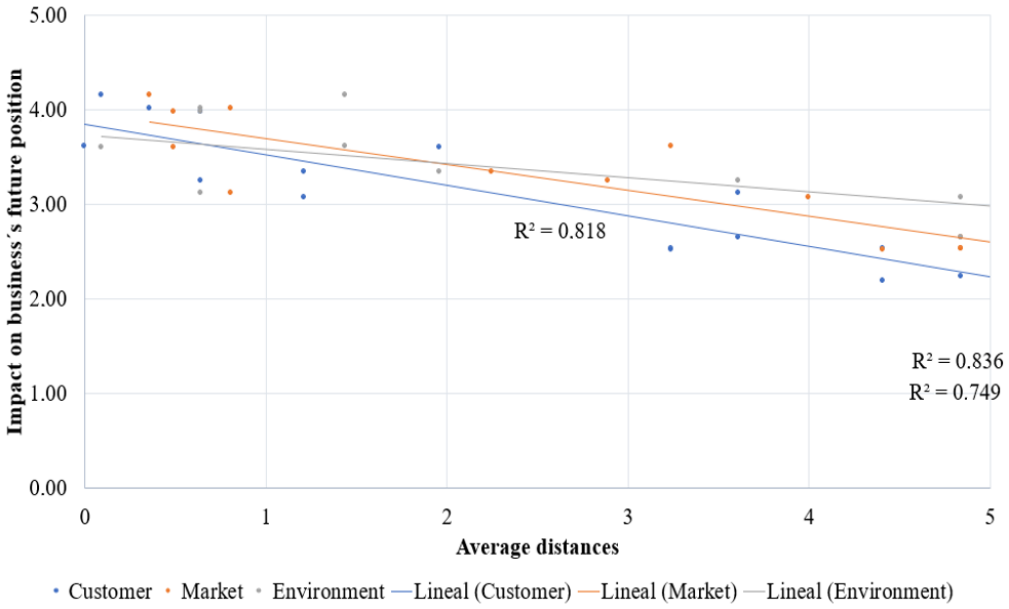

Figure 6. Relationship between impact on the business's future position index and non-financial factors.

The coefficient of determination R2 enables us to explain the percentage of dependent variable's overall variation that the variation of the used factors explains. It ranges from 0 to 1, with higher values indicating a better fit of the model to the data. Values greater than 0.70 in all cases demonstrate the precision of the results obtained.

4. Discussion and Conclusions

This study demonstrates that non-financial factors are increasingly important to evaluate when making investment decisions. These factors can have a significant impact on a company's long-term performance because of promising investment decisions. As such, incorporating non-financial factors into investment analysis can provide a more comprehensive assessment of a project's potential risks and returns.

The authors are aware of the importance of financial aspects and recognize that non-financial aspects should be used as a means when precise information is not available or as a partial substitute for financial analysis. The literature analyzed (Abdel-Kader & Dugdale, 2001; Addico et al., 2022; Sureka et al., 2022) considered that the ideal would be to complement and integrate non-financial considerations as an alternative when the firm cannot adequately implement the traditional analysis in the valuation of investment projects.

It was possible to corroborate in practice, as the literature acknowledges (Chen, 2008; Cooremans, 2011; Haka, 2006; Masini & Menichetti, 2013), that most entrepreneurs encounter some difficulties in applying the traditional capital budget techniques, which allow the introduction of non-financial considerations in capital budgeting. This document adds to other methodological contributions found in the literature that aim to fill this gap and present a new perspective on investment decisions (Al-Jalahma, 2022; Batra & Verma, 2017, 2018; Turner & Coote, 2018).

The successful introduction of non-financial factors to evaluate investment projects allowed deciding on the acceptance or rejection of the studied projects, this is consistent with other applications that involve non-financial considerations in this type of decision (Batra & Verma, 2018; Turner & Coote, 2018).

In light of the results, the entrepreneurs have a more comprehensive picture of the potential performance of their investments by considering the impact on the business´s future position and the business´s future economy. The results allow entrepreneurs to make decisions that no longer rely solely on traditional financial metrics such as return on investment and net present value. What was expressed before corroborates previous studies that, from different perspectives, also introduce the nonfinancial factor to evaluate investment projects (Al-Jalahma, 2022; Batra & Verma, 2017, 2018; Turner & Coote, 2018).

This article aims to propose a methodological approach that facilitates the assessment of non-financial factors in investment project evaluation. To achieve this objective, the nonfinancial factors most commonly used in the literature were identified, and a way of measuring and processing them was proposed in order to make decisions based on their evaluation.

The application of the proposed methodological approach was developed in the context of investment projects that Ecuadorian entrepreneurs wanted to carry out. The introduction of nonfinancial factors into investment decision-making has led to interesting conclusions. One is that it has led to a greater focus on sustainability and responsible investing, as investors consider the long-term impact of their investments on economic, technical, social, customer, market, and environmental aspects.

Another is that it has led to increased consciousness among entrepreneurs to use an alternative way to make decisions concerning investment projects. The methodological proposal offers this alternative, presenting an approach to paying attention to nonfinancial factors when lacking financial information. This way of analyzing the potential impact of investment projects generates the opportunity to position them based on two dimensions that emerge from the combination of the nonfinancial factors used. Additionally, the present study succeeds in presenting and evaluating 16 investment projects, pointing to those that can have a better impact on businesses.

A multivariate principal component analysis allows the identification of the nonfinancial factors. To measure these factors, a reliable Likert scale was used. The Fuller's triangle was used to reveal the weights of these factors according to the perceptions of the entrepreneurs. All these methods support the results of this study.

The results obtained in this study have important implications for entrepreneurs. The proposed methodology would help small entrepreneurs to alleviate the lack of information and the lack of preparation that are sometimes the causes of developing investment projects without knowing the impact on the future of the business.

While this study presents new evidence using non-financial considerations in capital budgeting methods, some methodological limitations should be noted when evaluating the findings of this study, some of which offer directions for future research. First, consider the relative importance of experts' subjective opinions. Second, measurement errors inherent in survey studies cannot be ruled out. There is no direct control over whether respondents interpret the survey questions in the manner intended. It was not possible to monitor the development of the accepted projects in practice to validate their success.

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