
ASSOCIATION BETWEEN TOP MANAGEMENT TEAM (TMT) CHARACTERISTICS AND UTILIZATION OF INVESTMENT ANALYSIS PRACTICES

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ABSTRACT

This study aims to analyze an analysis of the relationship between the characteristics of the Top Management Team (TMT) and the use of investment analysis practices. The motivation of this research is in the collaboration in the gap between what the theory indicates and what is done in practice. It should also be noted that little is known about the factors that influence capital budget decision making, that is, what leads to a decision being more or less sophisticated. For data collection, a questionnaire was applied to the companies of Brasil, Bolsa, Balcão (B3), with 94 answers. For data analysis, an association between categorical variables by homogeneity (HOMALS) was used. Results indicate that traditional and sophisticated practices are used more as the average age of the management team increases. Women's participation in the management team is more closely associated with not using sophisticated investment analysis practices. Level education associations did not show a clearly defined trend for the trait. This study contributes to the literature of Upper Echelons Theory (UET) and investment analysis practices, providing new evidence on the association between the characteristics of senior managers and the use of practices.

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ASSOCIAÇÃO ENTRE CARACTERÍSTICAS DO TOP MANAGEMENT TEAM (TMT) E UTILIZAÇÃO DE PRÁTICAS DE ANÁLISE DE INVESTIMENTOS

RESUMO

Este estudo se destina a analisar a associação entre idade, participação de mulheres e nível educacional do Top Management Team (TMT) e utilização das práticas de análise de investimentos. Para a coleta dos dados, aplicou-se um questionário nas empresas da Brasil, Bolsa, Balcão (B3), com a obtenção de 94 respostas. Para a análise dos dados, utilizou-se associação entre variáveis categóricas por homogeneidade (HOMALS). Os resultados indicam que as práticas tradicionais e sofisticadas são mais utilizadas à medida que a idade média da equipe de gestão aumenta. A participação de mulheres na equipe de gestão tem maior associação com a não utilização das práticas sofisticadas de análise de investimento. As associações do nível educacional não apresentaram uma tendência claramente definida para a característica. Este estudo contribui para a literatura da Teoria dos Escalões Superiores (TES) e de práticas de análise de investimentos, fornecendo novas evidências sobre a associação entre as características dos gestores de alto escalão e a utilização das práticas.

Palavras-chave: Top Management Team. Orçamento de Capital. Análise de Investimentos. Brasil.

1 INTRODUCTION

The Upper Echelons Theory (UET), disseminated by Hambrick and Mason (1984), suggests that the results and strategic organizational processes are a function of the managerial characteristics of the top managers or the Top Management Team (TMT). The main basis of the Theory is that the strategic choices are more due to behavioral factors than to mechanical calculations for economic optimization. As a result, strategic choices generally have a large number of behavioral components and, to some extent, reflect the idiosyncrasies of decision makers (Chuang, Nakatani & Zhou, 2009).

TMT influences important strategic decisions related to activities such as investments in innovation, formation of strategic alliances and internationalization, each of which will impact performance (Wang, 2015; Xie, Wang & Qi, 2015; Cabrera-Suárez & Martín-Santana, 2013). In this sense, accounting and management tools, such as the capital budget, can be seen as an aspect of the organizational structure (Chenhall, 2003; Strauß & Zecher, 2013) and, in line with UET, your choice can be influenced by the characteristics of top managers.

Investment analysis practices are techniques and methodologies that assist managers in assessing the viability of long-term projects, as well as making capital budgeting decisions (Al-Mutairi, Naser & Saeid, 2018). It turns out that there are more sophisticated practices, which consider the value of money over time.

Despite this, there are managers who don't even use them (Egbide, Agbude & Uwuigbe, 2013).

Scholars recommend investigating the reason for choosing the practices used by managers in the capital budgeting (Souza, Schnorrenberger & Lunkes, 2016). For the time being, factors such as cognitive ability, preferences, profile, role, experience and training of managers also seem to influence investment decisions (e.g., Brijlal & Quesada, 2009; Egbide, Agbude & Uwuigbe, 2013).

Initial studies provide empirical evidence that the profile of managers appears as an aspect that impacts the use of investment analysis practices, by the level of formal education (Graham & Harvey, 2001; Hall & Millard, 2010; Tresierra-Tanaka & VegaAcuña, 2019), experience (Pruitt & Gitman, 1987; Andrés, Fuente & Martín, 2015) and function (Pike, 1988; Klammer, 1972). More qualified executives, both in terms of academic background and work experience, must make use of sophisticated investment analysis practices (Hall & Millard, 2010).

Despite research showing that younger financial officers and senior managers with business experience are associated with the use of more innovative and/or sophisticated accounting and control systems, for example, a range of promising opportunities for future research remains open (Hiebl, 2014; Menegazzo et al., 2017; Mendes et al., 2019). Valuable contributions may be made, addressing the effect of additional accounting and management control systems, in addition to higher-level characteristics and investigation of moderating variables (Hiebl, 2014). In this sense, this research aims to analyze the relationship between characteristics of the Top Management Team (TMT) and the use of investment analysis practices. However, the studies by Menegazzo et al. (2017) and Mendes et al. (2019) do not consider the problem of the capital budgeting, nor the reflection in the use of traditional and sophisticated practices.

The motivation for this research is to collaborate in the gap between what the Theory indicates and what is done in practice (Graham & Harvey, 2002; Egbide; Agbude & Uwuigbe, 2013). In fact, it is worth noting that little is known about the factors that influence capital budgeting decision-making, that is, what leads to a more or less sophisticated decision.

For data collection, a questionnaire was applied to companies in Brasil, Bolsa, Balcão (B3), with 94 responses. For data analysis, an association between categorical variables by homogeneity (HOMALS) was used. HOMALS is considered an extension of classical statistical techniques such as component analysis and regression analysis.

The results indicate that, over time, managers tend to use sophisticated practices, without abandoning traditional ones. This result was expected, since older managers tend to continue using simple traditional practices with which they are already familiar, in addition to incorporating practices that prove to be relevant and add value to decision making.

It is intended to contribute to the expansion and deepening of scientific knowledge about the relationship of the characteristics of the upper echelons in the use of capital budgeting practices. This work is a proposal for further research on the Upper Echelons Theory, considering the characteristics of the entire management team as opposed to an individual manager, such as the president or chief financial officer. In this way, we seek to create a broader view of the effect

of these characteristics of the upper echelon team on the use of capital budgeting practices.

In the business environment, this study can assist in recruitment, selection and incentive policies. In other words, it is possible to establish criteria and characteristics for nominating candidates for high-level positions. Likewise, it is possible to use the characteristics to benefit incentive projects in which certain management characteristics are used, since they are fundamental aspects for the success of investments.

2 LITERATURE REVIEW

2.1 Upper Echelons Theory (UET)

In the last few decades, the scientific interest in top management executives as the main decision makers of business organizations has constantly increased (Plöckinger et al., 2016). Organizations are a reflection of what their leaders think, feel, perceive and believe (Oppong, 2014). The experience and knowledge of top management teams create strategic resources and capabilities for the entire company, and these skills play a crucial role in the allocation of resources (Li, 2016; Hutzschenreuter & Horstkotte, 2013).

Hambrick and Mason (1984) published the perspectives of the upper echelons and argued that the strategic choices of managers help to explain the performance of an organization. In other words, the Upper Echelons Theory (UET) postulates that the values, experiences and personalities of the Top Management Team (TMT) interfere in the strategic choices of the organization, as well as in the success of those choices (Hambrick, 2007). Demographic characteristics, such as age, gender, education and functional experience, are indicative of underlying cognitive and affective managerial aspects that determine the decisions of management teams, and which subsequently affect the organization's performance (Bell et al., 2011).

Among the perspectives of that Theory, Hambrick (2007) states that teams of heterogeneous upper echelons, composed of managers with different skills and demographic profiles, can explain the differences in strategic choices, innovation and company performance. The cognitive basis and values of executives in the upper echelons are based on their observable characteristics such as age, time in office, education, gender, socioeconomic roots and financial situation. Consequently, organizational results are associated with the observable characteristics of these professionals (Carpenter, Geletkanycz & Sanders, 2004).

Theory has gained considerable attention from scholars in various disciplines of economics and business research (Plöckinger et al., 2016). However, early empirical research focused almost exclusively on associations between managerial characteristics and corporate strategic decisions or company performance, and not on accounting choices (Certo et al., 2006; Nielsen, 2010). The applications of UET to the fields of finance and accounting have been observed recently (Hiebl, 2014).

2.1.1 Age

The age of TMT as one of the characteristics was proposed to be associated with trends such as receptivity to change, willingness to adopt new ideas, search for novelty, risk-taking and flexibility. Such predispositions, in turn, are associated with strategic innovation, the extension of company diversification, the degree of international expansion and company growth. The underlying argument is that as the average age of TMT increases, the team becomes more resistant to risk taking and change (Acar, 2016).

Younger managers may be less committed to the status quo and, therefore, may be more willing to undertake new and unprecedented strategies (Hambrick & Mason, 1984). Due to the commitment to the status quo, older members may be more reluctant to try new ideas or take risks (Koufopoulos et al., 2008), on the other hand, it is likely that they have already established their social networks, lifestyles and planning careers and be averse to risk (Chuang, Nakatani & Zhou, 2009).

Capital budgeting forecasts can be affected by the age of managers. Older managers prefer simpler techniques (Graham & Harvey, 2001). On the other hand, younger managers are likely to emphasize a broader strategy, while older managers have a narrower strategic scope (Goll, Johnson & Rasheed, 2008).

2.1.2 Participation of Women

Research on demography and organizational leadership has indicated that TMT's gender composition plays an important role in internal organizational processes, which may include investment decision-making (Korac-Kakabadse, Korac-Kakabadse & Myers, 1998). Francoeur, Labelle and Sinclair-Desgagné (2007) examined whether women's participation in the company's board of directors and senior management improves financial performance. The results indicated that companies with a high proportion of women in their management and governance systems create enough value to keep up with normal stock market returns.

Faccio, Marchica and Mura (2016) investigated how the gender of the Chief Executive Officer (CEO) relates to corporate risk choices. They found that women-run companies tend to make less risky financing and investment choices than those of similar male-run firms. There was a positive association between the quality of investment opportunities and the level of investments for companies managed by male presidents, while this association is significantly weaker among companies managed by female managers. Thus, female CEOs do not appear to allocate capital as efficiently as male CEOs.

Thus, it is expected that teams with a greater participation of women will favor the use of more traditional practices and hinder the use of sophisticated practices in the evaluation of investment projects, when compared to teams with a greater participation of men.

2.1.3 Level Education

The level education of TMT has been studied by researchers at UET as an important demographic indicator that affects strategic choice and organizational

results (Hambrick & Mason, 1984). It is a demographic characteristic that refers to an individual's level education.

Managers with higher level educations have advanced knowledge and greater cognitive ability. This, in turn, can increase the ability to tolerate ambiguity, absorb new information and analyze, solve and implement solutions to complex problems (Chen, Hsu & Huang, 2010; Bany-Ariffin et al., 2014). Highly educated executives are able to make high quality decisions because they have cognitive skills to process and analyze information and execute more difficult decisions (Papadakis & Barwise, 2002). They can also better discriminate between a wide variety of alternatives to understand environmental and organizational problems (Herrmann & Datta, 2005) and, therefore, develop more appropriate responses in intense competition.

Properly qualified managers, both in terms of their academic background and work experience, must make informed and prudent applications of capital budgeting practices (Hall & Millard, 2010). Studies indicate that university-educated professionals are more likely to use discounted cash flow techniques as opposed to those without university education (Leon, Isa & Kester, 2008).

2.2 Investment Analysis Practices

The capital budgeting is a planning mechanism used by an organization to make assessment decisions on how to allocate resources between investment projects (Bojd & Koosha, 2018). Capital budgeting practices are techniques and methods that help to identify project feasibility (Al-Mutairi, Naser & Saeid, 2018).

The diversity of practices available for analyzing the investment budget has led researchers to investigate which are the most adopted by organizations. Studies on the subject had much simpler objectives of identifying which practice is used, seeking to explain which discount rates are used, how cash flows are measured and also which factors are important in the capital budgeting decision (Souza & Lunkes, 2016).

Over the past few decades, a paradigm shift in corporate investment practices has gained great popularity in numerous global surveys (Tresierra-Tanaka & Vega-Acuña, 2019; Batra & Verma, 2017). The central issue in this literature is to explore the most used techniques and the reason behind the use of some techniques more often than others (Arkovics, 2016).

More sophisticated investment analysis practices involve discounted cash flows and comprise, for example, Net Present Value (NPV), Internal Rate of Return (IRR) and Profitability Index (PI). In turn, traditional practices include the Payback Period (PP) and the Accounting Rate of Return (ARR). Despite the existence of sophisticated practices, many companies still employ the simplest ones in decision making (Tresierra-Tanaka & Vega-Acuña, 2019; Al-Mutairi, Naser & Saeid, 2018; Hermes, Smid & Yao, 2007; Ross, Westerfield and Jaffe, 2004).

Research shows that professionals with university degrees are more likely to use discounted cash flow techniques as opposed to those without university education (Leon, Isa & Kester, 2008). Managers with a background in the Master of Business Administration (MBA) or a master's in finance are more likely to use more sophisticated techniques, compared to those without these specialties (Graham & Harvey, 2001; Kengatharan & Nurullah, 2018).

Bertrand and Schoar (2003) describe that managers play a decisive role in investment policies, financial policies, organizational strategies and the company's operational performance. The findings of the investigation by Bertrand and Schoar (2003) reflect the argument of Hambrick and Mason (1984) on the operations and performance of companies, summarize the impacts of the characteristics of high-level managers, such as the level of education, professional experience and financial position.

In fact, the characteristics of the Top Management Team seem to impact the use of investment analysis practices. However, until then there is no evidence of which and how they can influence the choice of using one or the other technique.

3 METHODOLOGY

3.1 Sample and Data Collection

The unit of analysis of this research is the dominant coalition of a company, that is, its team of top executives. Although the president is often the most powerful actor in the organization, the leadership of a complex organization is an activity shared by an entire team of top managers (Hambrick, 2007). Thus, the company's senior management team is defined as the unit of analysis.

The population includes publicly traded companies listed on the Stock Exchange Brasil, Bolsa, Balcão (B3) on August 31, 2018, with the exception of companies classified as "Financial and others". B3 had 749 companies listed on August 31, 2018, of which 336 in the Financial and others sector are not part of the survey. The population consists of the managers of 413 companies, to whom questionnaires were sent.

The sending of questionnaires began in February 2019. Firstly, a request for participation in the survey was submitted to the 413 companies, through the websites. Of the total, it was possible to send 342 requests. Then, telephone contact and questionnaires were sent to the sector/manager responsible for the capital budgeting area. In the period from February to June 2019, 94 responses were obtained. The characteristics of the respondents are shown in Table 1.

Table 1
Main characteristics of respondents

Middle Age	Frequency
Under 50 years	32
Between 50 years and 60 years	44
More than 60 years	18
Participation of Women	Frequency
There are women in the TMT	70
There are no women on the TMT	24
Level Education	Frequency
Low Level	18
Middle Level	52
High Level	24

Source: Authors.

It appears that a large part of the teams have an average age between 50 and 60 years, have the participation of women and have an average level education, that is, they have specialization. Only 19.15% of the teams have an average age over 60 years and a low level education, that is, high school or graduation. Table 2 shows the correlation between said corresponding characteristics.

Table 2
Correlation – Characteristics of Respondents

	Middle Age	Participation of Women	Level Education
Middle Age	1	-0,16	-0,14
Participation of Women	-0,16	1	0,07
Level Education	-0,14	-0,16	1

Source: Authors.

Table 2 shows that the variables do not have multicollinearity. That is, there is no high correlation between them. Therefore, there is a distribution between the genders, ages and level educations of the sample managers.

3.2 Procedures for preparing the research instrument

The elaboration of the questionnaire was made from Souza and Lunkes (2016) and includes 2 groups of questions. The first involves identifying the respondent (age, participation of women and level education). The second comprises the use of investment analysis practices to make capital budgeting decisions.

Age is operationalized in years. The average age variable of the TMT is calculated as the average age of the team executives (Herrmann & Datta, 2005;

Bany-Arifin et al., 2014; Acar, 2016). Gender is made operational by the participation of women. The variable participation of women in the TMT is a dichotomous measure operationalized by the existence (= 1) or not (= 0) of women in the team (Korac-Kakabadse, Akabadse & Myers, 1998). The level education is obtained on a Likert scale (Bantel & Jackson 1989; Wally & Becerra, 2001; Chen, Hsu & Huang, 2010), being low (1 = medium level or graduation), medium (2 = specialization) and high (3 = master's or doctorate). The average level education variable of TMT is calculated as the average level education of team managers.

The second group is operationalized by the frequency of using sophisticated and traditional investment analysis practices to make decisions from 1 to 4, with 1 = No project; 2 = Few projects; 3 = Many projects; and 4 = All projects. The variables for using capital budgeting practices are obtained on a Likert scale (Khamees, Al-Fayoumi & AlThuneibat, 2010; Andrés, Fuente & Martin, 2015).

The information of age, gender and level education of the Top Management Team found on the B3 website, in the item Assembly and administration of the 2018 Reference Form of each company.

3.3 Data Analysis Technique

To analyze the interpellations between variables, homogeneity analysis (HOMALS) was used. According to Fávero et al. (2009), this is a procedure called Optimal Scaling that seeks to identify the association between categorical variables, providing presentation in two-dimensional graphs of possible associations. HOMALS is considered an extension of classical statistical techniques such as component analysis and regression analysis.

The study, in terms of Theory, has an exploratory character, which is why HOMALS was used. In this sense, there are no expected results or hypotheses, but theoretical assumptions in which there are unknown relationships between the related variables. The results can be useful for further studies in the formation of causal models.

The HOMALS output data generates the gauges, which indicate the amount of variance explained for each dimension. Engevalues vary between 0 and 1, and the closer to 1, the greater the explanatory power of the dimension. In addition, the FIT measure is presented, which indicates the level of total explained variance.

Two-dimensional maps were generated, relating the three variables to the characteristics of the Top Management Team with the use of four investment analysis techniques considered traditional and four considered sophisticated. They are:

- Characteristics of the Top Management Team: average age, participation of women and level education;
- Traditional: Payback Period (PP), Discounted Payback (DP), Accounting Rate of Return (ARR) and Cash Inflow (CI); and
- Sophisticated: Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI) and Real Options (RO).

4 RESULTS

4.1 Traditional Practices

Table 3 shows the frequency with which the 94 participants indicated to use investment practices considered traditional. It is noticed that Payback is the most used practice and Discounted Payback is the least used.

Table 3
Frequency – Traditional Practices

Traditional Practices (Frequency)	PP	DP	ARR	CI
Don't use	11	67	52	57
Little uses	28	13	13	5
Uses a lot	33	10	19	19
Uses all	22	4	8	12
Missing	0	0	2	1

Source: Authors.

There was also a correlation between traditional practices, as shown in Table 4.

Table 4
Correlation – Traditional Practices

Correlations			PP	DP	ARR	CI
Spearman's rho	PP	Correlation Coefficient	1,000	,309**	,548**	,384**
		Sig. (2-tailed)	.	,002	,000	,000
		N	94	94	94	94
	DP	Correlation Coefficient	,309**	1,000	,306**	,176
		Sig. (2-tailed)	,002	.	,003	,090
		N	94	94	94	94
	ARR	Correlation Coefficient	,548**	,306**	1,000	,227*
		Sig. (2-tailed)	,000	,003	.	,028
		N	94	94	94	94
	CI	Correlation Coefficient	,384**	,176	,227*	1,000
		Sig. (2-tailed)	,000	,090	,028	.
		N	94	94	94	94

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Source: Authors.

It is noticed that in general there is a significant correlation between the use of the four practices. All correlations were significant, except Discounted Payback with Cash Inflow.

a) Middle Age

Table 5 indicates the engevalue for the two dimensions of the Maps generated for the middle age and each of the practices considered traditional. The engevalue represents the explained variance and the fit of the interrelations (fit). In general, the results show a good fit without establishing a dimension priority. This means that the Map must be viewed with the approaches without the horizontal or vertical observation priority, see Figure 1.

Tabela 5

Engvalue – Middle Age and Traditional Practices

Middle Age Traditional Practices	PP	DP	ARR	CI
Engvalue – Dimension 1	0,601	0,605	0,630	0,617
Engvalue – Dimension 2	0,523	0,503	0,521	0,552
Fit	1,124	1,108	1,151	1,169

Source: Authors.

In general, the two-dimensional maps show that teams with an average of less than 50 years old tend to use little the practices considered traditional, as shown in Figure 1. In the case of Payback (Map 1), teams with an average of more than 60 years said they used it in all projects and teams under 50 years said they used little. For teams between 50 and 60 years old the association is not clear, however there seems to be an approximation with the use. For Discounted Payback (Map 2) the usage trend becomes clear with the increase in the average age. In Map 3, it can be seen that the Accounting Rate of Return is not used by teams with an average age below 50 years and fully used by teams with an average above 60 years. Finally, for the Cash Inflow (Map 4) it is possible to verify that teams with an average age below 50 years do not use this practice.

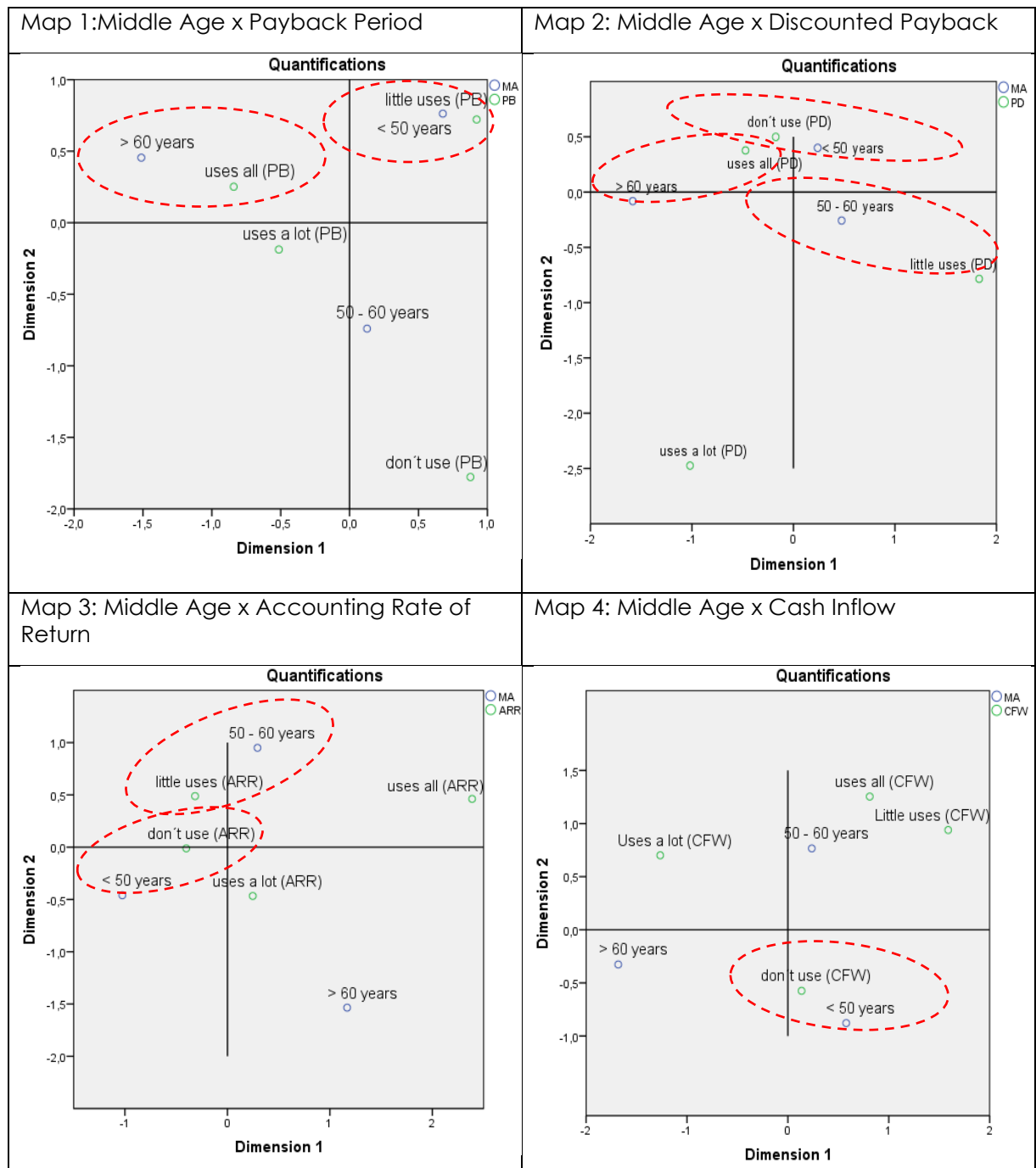


Figure 1 – Two-dimensional Maps (HOMALS) – Middle Age x Traditional Practices
Source: Authors.

b) Participation of Women

Table 6 indicates the engevalue for the two dimensions of the Maps generated for the participation of women in the management team and each of the practices considered traditional.

Table 6

Engevalue – Participation of Women and Traditional Practices

Participation of Women Traditional Practices	PP	DP	ARR	CI
Engevalue – Dimension 1	0,560	0,644	0,579	0,554
Engevalue – Dimension 2	0,500	0,500	0,500	0,500
Fit	1,060	1,144	1,079	1,054

Source: Authors.

It means the explained variance and the fit of the interrelations (fit). It implies that both dimensions were useful and fit for interpretations of proximity. It is understood that there was no nullity of dimensions. However, there is no objective indication of adjustment.

For the participation of women in the management team, it is necessary to check each of the traditional practices separately, according to Figure 2. For Payback Period (Map 1), teams with women are more associated with not using this practice, while teams that do not have women said they used it more strongly in all projects. As for Discounted Payback (Map 2), although most respondents said they use this practice little, teams with women use a little more.

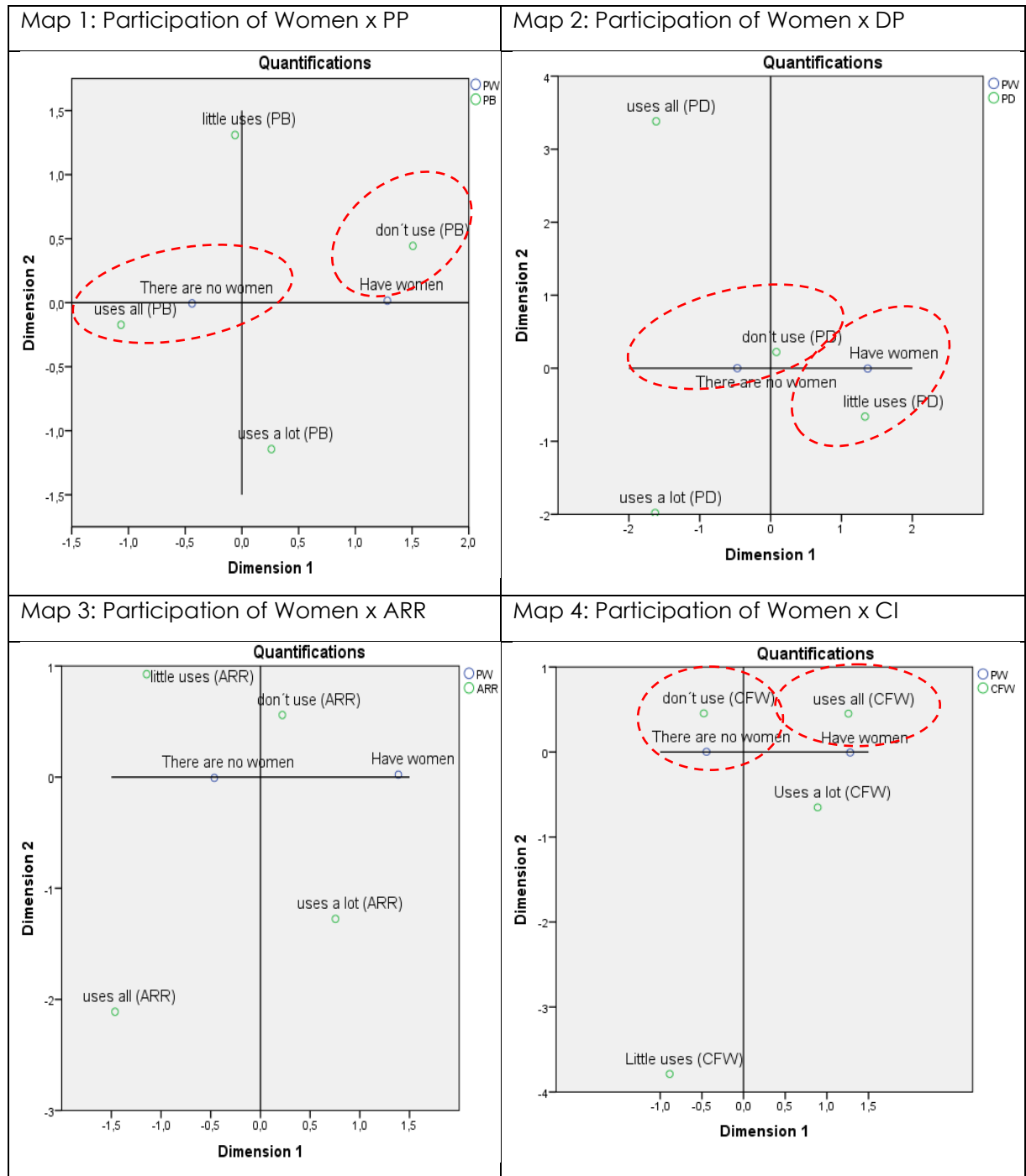


Figure 2 – Two-dimensional Maps (HOMALS) – Participation of Women x Traditional Practices
Source: Authors.

For the Accounting Rate of Return (Map 3) it is not possible to define any type of association. It means saying that whether or not women participate in the team is not a factor that is associated with whether or not to use this practice for investment analysis. For the use of the Cash Inflow (Map 4) there seems to be a strong association of use with the fact of having women on the team.

c) Level Education

Table 7, based on engevalue and fit, again indicates a good adjustment of the maps and allows associations between level education and traditional practices.

Table 7
Engevalue – Level Education and Traditional Practices

Level Education Traditional Practices	PP	DP	ARR	CI
Engevalue – Dimension 1	0,636	0,625	0,659	0,637
Engevalue – Dimension 2	0,589	0,526	0,620	0,557
Fit	1,225	1,151	1,279	1,194

Source: Authors.

Regarding practices considered traditional, it can be said that there is a tendency to reduce use when the level education increases (Fig. 3), with some differences between the practices. For example, for Payback Period (Map 1) it is noticed that a high level education uses little, while an average level education uses a lot. However, for the low level, there is no better defined trend. For the Discounted Payback (Map 2), although the level education presents a greater tendency of non-use, it is noticed that the non-use distances itself from the lowest level education (low) and also approaches the high level, which shows the trend of non-use with increased level education. It also occurs with the Accounting Rate of Return (Map 3), and if the average and high level education is perceived, it does not use or uses this practice little. In contrast, a low level education uses a lot.

For Cash Inflow (Map 4), the trend is the same, considering the lowest level education (low) with a lot of use and the high level education does not use it. However, for an average level education it is not possible to determine a trend, as respondents are divided into not using or using it in all projects.

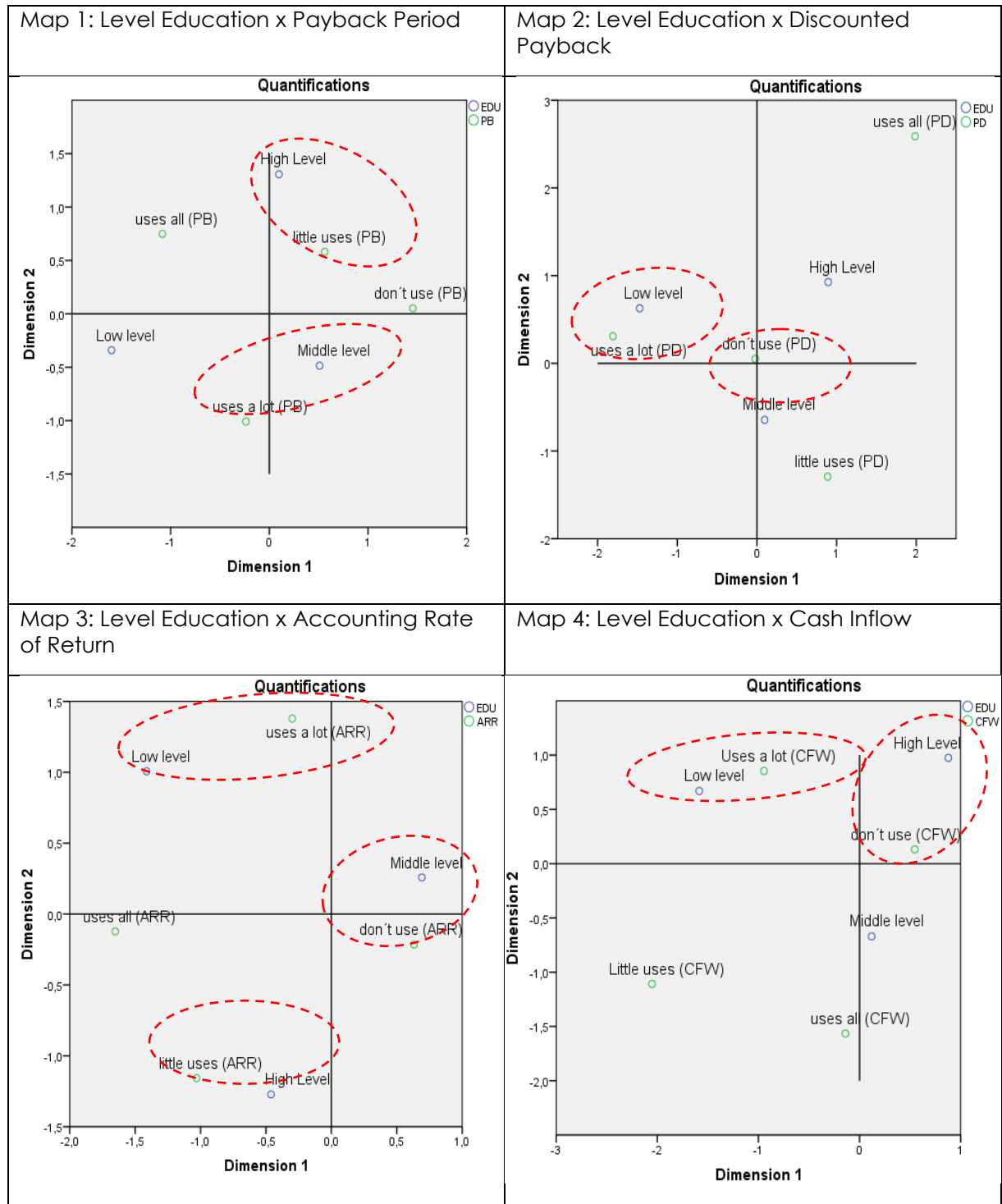


Figure 3 – Two-dimensional Maps (HOMALS) – Level Education x Traditional Practices
Source: Authors.

4.2 Sophisticated Practices

Table 8 shows the frequency with which the 94 participants said they use investment practices considered sophisticated. It is noticed that NPV and IRR are more used than PI and RO.

Table 8
Frequency – Sophisticated Practices

Sophisticated Practices (Frequency)	NPV	IRR	PI	RO
Not Use	19	19	43	54
Uses little	16	15	18	16
Uses a lot	28	28	21	19
Uses all	30	32	10	3
Missing	1	0	2	2

Source: Authors.

There was also a correlation between sophisticated practices, as shown in Table 9. It is noticed that in general there is a significant correlation between the use between the practices, except for the Profitability Index, which did not present a significant relationship with any of the practices.

Table 9
Correlation – Sophisticated Practices

Correlations			NPV	IRR	PI	RO
Spearman's rho	NPV	Correlation Coefficient	1,000	,819**	,075	,578**
		Sig. (2-tailed)	.	,000	,470	,000
		N	94	94	94	94
	IRR	Correlation Coefficient	,819**	1,000	,081	,585**
		Sig. (2-tailed)	,000	.	,439	,000
		N	94	94	94	94
	PI	Correlation Coefficient	,075	,081	1,000	,129
		Sig. (2-tailed)	,470	,439	.	,214
		N	94	94	94	94
	RO	Correlation Coefficient	,578**	,585**	,129	1,000
		Sig. (2-tailed)	,000	,000	,214	.
		N	94	94	94	94

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Authors.

a) Middle Age

Table 10, based on engevalue and fit, again indicates a good adjustment of the maps, allowing associations between the middle age and sophisticated practices.

Table 10

Engevalue – Middle Age and Sophisticated Practices

Middle Age Sophisticated Practices	NPV	IRR	PI	RO
Engevalue – Dimension 1	0,614	0,697	0,614	0,669
Engevalue – Dimension 2	0,517	0,545	0,532	0,601
Fit	1,131	1,242	1,146	1,270

Source: Authors.

For management teams with an average age of less than 50 years, NPV, IRR and PI are little used, as shown in Figure 4. However, Map 4 indicates that Real Options are more used by teams with a lower average age. For teams with an average between 50 and 60 years, Maps 1 and 2 indicate that there is a tendency to use NPV and IRR in all projects. On the other hand, for the Profitability Index and Real Options practices (Maps 3 and 4) it is not possible to clearly define an association. For teams with an average age greater than 60 years, Map 2 indicates a trend of a lot of use of IRR, and by Map 1 it is not possible to identify an association with the use of NPV. Map 4 indicates little use of the practice of Real Options, and by Map 3 it is not possible to define an association regarding the use of the Profitability index.

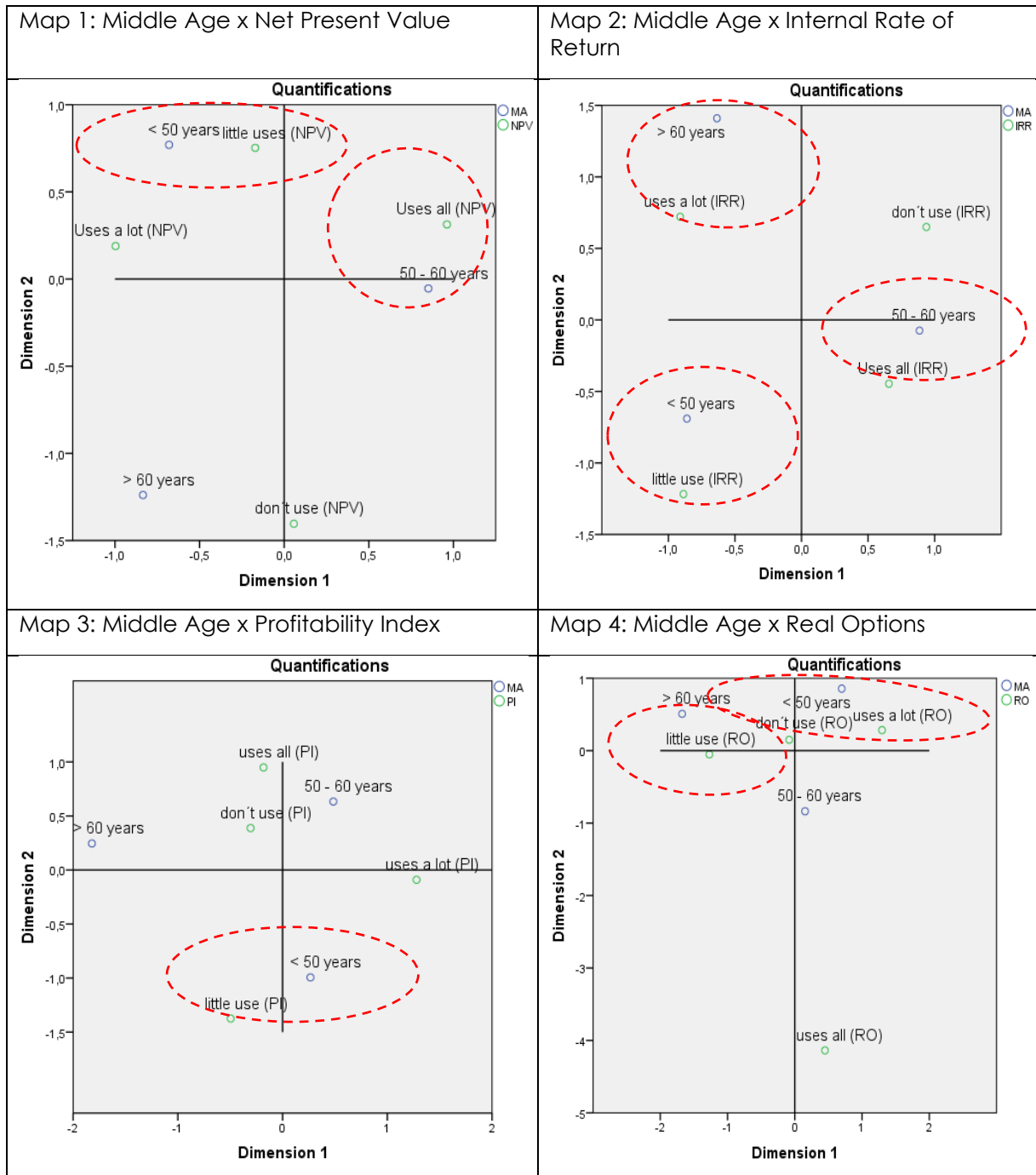


Figure 4 – Two-dimensional Maps (HOMALS) – Middle Age x Sophisticated Practices
Source: Authors.

b) Participation of Women

Table 11, based on engevalue and fit, again indicates a good adjustment of the maps, allowing associations between the participation of women in the management team and sophisticated practices.

Table 11

Engevalue – Participation of Women and Sophisticated Practices

Participation of Women Sophisticated Practices	NPV	IRR	PI	RO
Engevalue – Dimension 1	0,579	0,584	0,547	0,636
Engevalue – Dimension 2	0,500	0,500	0,500	0,500
Fit	1,079	1,084	1,047	1,136

Source: Authors.

For practices considered sophisticated, on Map 1 (Fig. 5) it is not possible to make a clear association regarding the use of NPV with the participation of women in the management team. On the other hand, teams that do not have women more associated with the use of IRR (Map 2), while teams with women seem to be more associated with not using it. A similar situation occurs with the PI (Map 3), where teams that have women are more associated with little use, while teams that do not have women seem to use them in all projects.

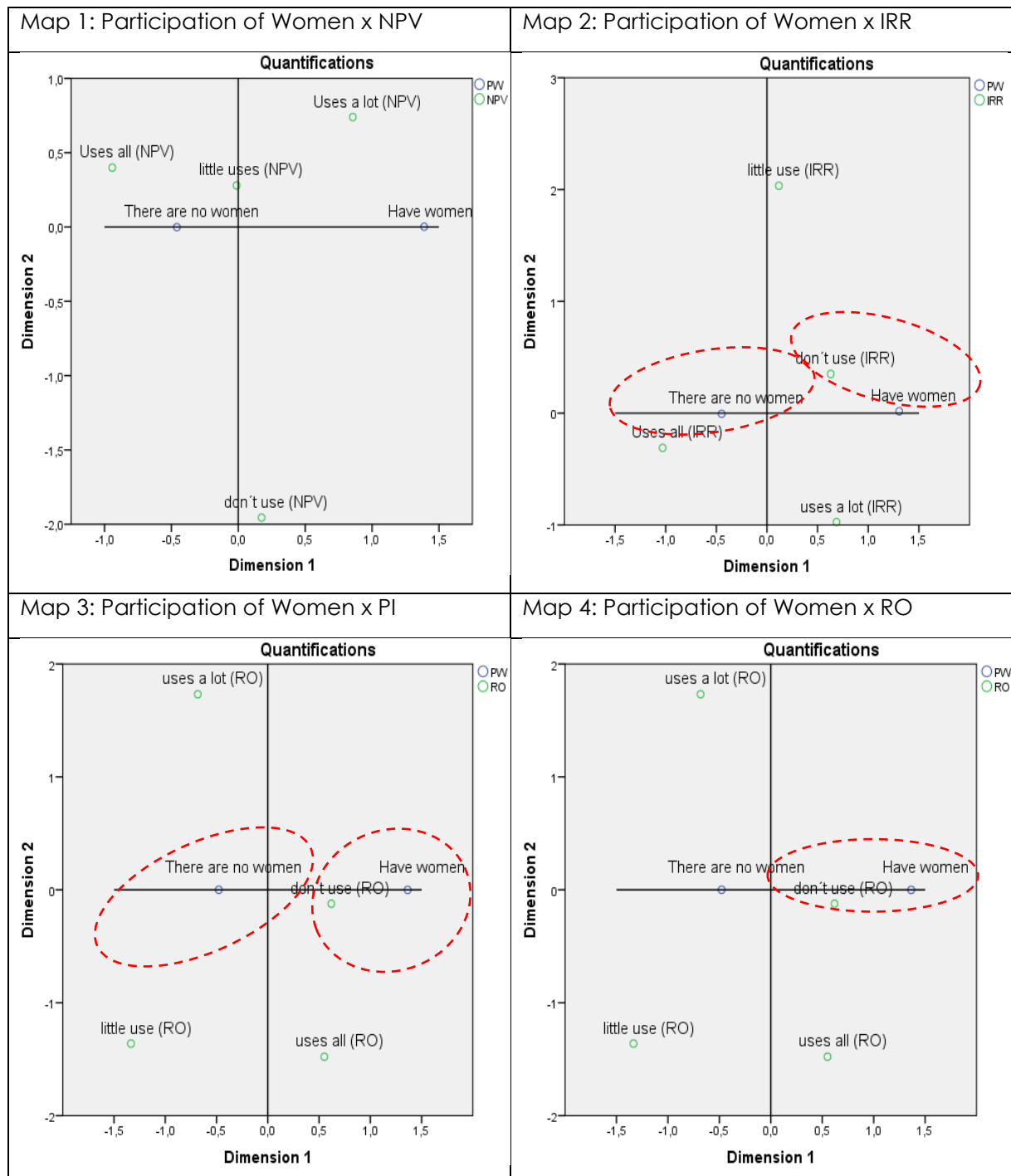


Figure 5 – Two-dimensional Maps (HOMALS) – Participation of Women x Sophisticated Practices
Source: Authors.

As for the practice of Real Options (Map 4), the fact of having women on the team seems to be more associated with not using it. However, it is not possible to establish any type of association with teams that have women.

c) Level Education

Table 12, based on engevalue and fit, again indicates a good adjustment of the maps, allowing associations between level education and sophisticated

practices.

Table 12

Engevalue – level education and Sophisticated Practices

level education Sophisticated Practices	NPV	IRR	PI	RO
Engevalue – Dimension 1	0,664	0,630	0,672	0,690
Engevalue – Dimension 2	0,555	0,609	0,608	0,581
Fit	1,219	1,239	1,280	1,271

Source: Authors.

Regarding the practices considered sophisticated, it is also necessary to analyze each one separately. For the NPV (Fig. 6; Map 1), a team with an average level education is more strongly associated with the level of high utilization.

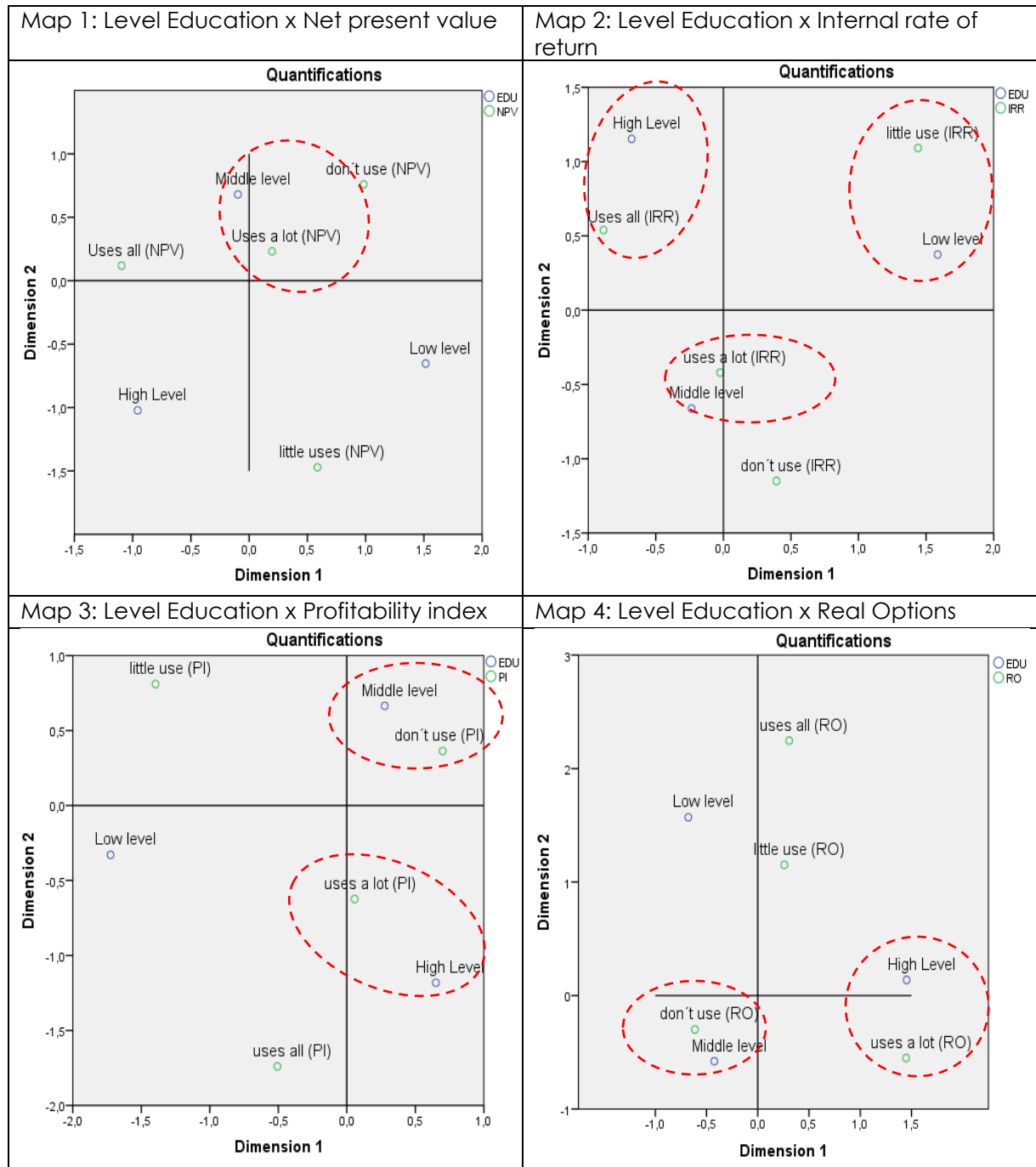


Figure 6 – Two-dimensional Maps (HOMALS) – Level Education x Sophisticated Practices
Source: Authors.

However, it is not possible to define an association for lower and higher levels of education in Figure 6. For the IRR (Map 2), the associations seem well defined in that the higher the level education, the use will be greater. For PI and RO (Maps 3 and 4), it can be seen that a high level education uses a lot and an average level education does not. A low level education showed no clear association with the categories used.

4.3 Discussions

The results indicate that, in general, both traditional and sophisticated practices are more used as the average age of the management team increases. This result was expected, since previous literature indicates that managers are more resistant and careful with new investments when they get older (Hambrick & Mason, 1984; Koufopoulos et al., 2008). However, Graham and Harvey (2001) indicate that older managers tend to seek simpler techniques. The results of the present research corroborate this statement, since the use of traditional practices is greater in teams with an average age over 60 years. For sophisticated practices, however, there is no clarity of greater use, except for the Internal Rate of Return.

Regarding the participation of women in the management team, the results indicate a greater association with the non-use of sophisticated investment analysis practices. However, it is not possible to define this trend for all practices. For example, for Cash Inflow, teams that have women are more associated with the use of this practice, than teams that do not have women. It is possible that the fact that women are resistant to riskier investments (Faccio, Marchica & Mura, 2016), points to the divergence of association between practices.

As for the level education, the associations also did not show a clearly defined trend. For practices considered traditional, a lower level education (low) is perceived, which is more associated with the Accounting Return Rate and the Cash Inflow. Likewise, practices considered sophisticated do not show the same pattern of association with level education. It means to say that some practices, sophisticated or not, are better known and used by a certain level education. This is an important variable that future studies could deepen. The lack of a pattern of association between level education and use of traditional and sophisticated practices, perhaps can be analyzed taking into account that managers with a higher level education develop greater cognitive capacity (Papadakis & Barwise, 2002) and, therefore, seek to make decisions based on also in non-financial indicators.

The study brings as scientific contribution the understanding of the choice of practices used by managers in the capital budgeting, as suggested by Souza, Schnorrenberger and Lunkes (2016). It appears that over the years, managers prefer to accumulate various practices and results, not abandon traditional techniques and continue to use them as a complement to the results obtained by the most theoretically appropriate (Arnold & Hatzopoulos, 2000; Brijlal & Quesada, 2009; Andrés; Fuente & Martín, 2015).

For the practice of companies, the results indicate the need for the team involved in investment decisions to conduct training courses in the financial area to increase knowledge about the practices in the literature. It is suggested that companies provide constant and specific training for managers and analysts with the intention of ensuring that robust procedures for capital budgeting in general and discounted cash flow techniques in particular are applied (Lazaridis, 2004; Khamees, Al -Fayoumi and AlThuneibat, 2010). The application of sophisticated techniques is also related to the new functions of the controller in companies (Lunkes, Schnorrenberger & Rosa, 2013), as this professional plays an important role in the analysis of investments in modern companies.

5 CONCLUSION

This study aims to analyze the association between age, participation of women and level education of the Top Management Team (TMT) and use of investment analysis practices. For data collection, a questionnaire was applied to companies listed on the Stock Exchange in Brasil, Bolsa, Balcão (B3), with 94 responses. From the evaluation of two-dimensional maps generated by the homogeneity analysis (HOMALS), it was possible to verify the associations between the characteristics of the teams and the use of traditional and sophisticated investment analysis practices.

In general, the results indicate that over the years, managers tend to use both traditional and sophisticated practices. This result was expected, since older managers tend to continue using simple traditional practices with which they are already familiar, in addition to incorporating practices that prove to be relevant and add value to decision making.

Regarding the participation of women in the TMT, the results indicate a greater association with the non-use of sophisticated investment analysis practices. However, it was not possible to define this trend for all practices. Thus, there is an opportunity to investigate the role of women in making investment decisions, in order to understand and weigh the use of prioritized financial and non-financial criteria in decision making.

Associations for the level education did not show a clearly defined trend. This is also an opportunity to be explored by researchers. The absence of a pattern in the association between level education and the use of traditional and sophisticated practices, must be evaluated taking into account that managers the financial and non-financial indicators weighted by the teams in decision making.

The study contributes to the management and strategic literature in the sense of showing that the characteristics of high-ranking teams will influence the decision making of the capital budgeting, especially the use of sophisticated and traditional practices. These relationships can be useful to benefit incentive projects in which certain management characteristics are used, since they are fundamental aspects for the success of investments.

The objective was to verify interrelationships between the variables age, participation of women and level education, therefore, it is not a cause and effect model. We opted for the use of HOMALS, which has the same characteristics as Correspondence Analysis, but with the possibility of analyzing more variables. Thus, the results of the analysis of the interrelations are useful for the formation of causal models in subsequent works.

This research has limitations. The association technique used is considered exploratory and should not be interpreted as exhaustive for analysis of cause and effect. Subsequent studies may, based on the suggested associations, seek further explanations, such as the reason for preferring one or another practice in a given decision.

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Contributions	Paula de Souza Michelin	Alcindo Cipriano Argolo Mendes	Rogério João Lunkes	Antonio Cezar Bornia
1. Idealization and conception of the research subject and theme	✓	✓	✓	✓
2. Definition of the research problem	✓		✓	✓
3. Development of Theoretical Platform	✓			
4. Design of the research methodological approach	✓	✓		
5. Data collection	✓			
6. Analyses and interpretations of collected data	✓			
7. Research conclusions	✓			
8. Critical review of the manuscript		✓	✓	✓
9. Final writing of the manuscript, according to the rules established by the Journal.	✓			
10. Research supervision		✓	✓	✓