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How the Mission Internalization Works? An Empirical Research

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ABSTRACT

The objective of this paper is to analyse the process of the definition and deployment of a company's mission, to obtain a better understanding of the employees' role. On the basis of the literature investigating the dimensions of the internalization of a mission (leadership, importance, knowledge, co-workers' engagement and implication), the paper proposes a model that shows the cause and effect relationships among these dimensions. A survey addressed to Spaniards was launched, and 400 valid responses were received. The data was analysed using Structural Equation Modelling (SEM) for an initial model that shows the causal relations among the dimensions for the internalization of a mission. An array of Lagrange multiplier tests suggested modifications for refining the model and proposed one with acceptable fit indices, where the last dimension to be accomplished is "Implication". The findings show a direct effect between "Leadership" and "Implication", and double mediation. On the one hand, there is second order mediation through "Knowledge" and "Importance". On the other hand, there is mediation through "Co-workers' engagement". This sequencing among the five dimensions of the internalization of the

mission gives new clues and evidence for managers that will help them to define and implement a successful mission statement.

KEYWORDS

Mission internalization, Mission deployment, Leadership, Co-workers engagement implication.

1. Introduction

A mission statement is commonly recognized by academics and practitioners as the first step in strategic management (David, 1989). A mission statement provides a clear sense of what the organization stands for (Bates & Dillard, 1991; Campbell, 1989). Traditionally, it has been understood that the aim of a mission statement is to make a public declaration of the purpose, goals, products, markets, and philosophical views of the organization (Bart, Bontis, Taggar, Sufi, & Lyons, 2001; Campbell & Yeung, 1991; Ireland & Hitt, 1992; Klemm, Sanderson, & Luffman, 1991). In fact, (Bartkus, Glassman, & McAfee, 2000, p. 28) suggested that “the best mission statements simply define the company’s business and suggest a future goal”. The second step is the internalization of the mission (“IM”) by the employees, by which is meant providing a full sense of the mission that enables the employees to work in the confidence that their work fulfils their own personal objectives and at the same time is aligned with the organizational mission (Cardona & Rey, 2008).

Alegre et al. (2018) conducted a literature review on mission statement highlighting the importance of an effective implementation of an organization's mission. The benefits (financial and non-financial) that can be envisaged to arise from a consistent mission definition and a wise implementation are of paramount importance, and this is a good reason for understanding how the mission is defined (Baetz & Bart, 1996; Bart et al., 2001; Denton, 2001; Weiss & Piderit, 1999). Although “mission” is a wider concept than “mission statement”, there is no doubt that the effort of writing the mission statement is a key element of the definition of the mission (Ireland & Hitt, 1992). A useful mission statement that guides and orients the daily operations of the firm can only be created by following a process that guarantees its effective development (Mullane, 2002). Frequently cited as the benefits of a mission statement are: (i) the provision of a sense of direction and purpose for the organization (Bart et al., 2001; Ireland & Hitt, 1992); (ii) a focus on the allocation of organizational resources (Bartkus et al., 2000; Gibson, Newton, & Cochran, 1999); (iii) effective communication with internal and external stakeholders (Bartkus et al., 2000; Klemm et al., 1991) ; and (iv) a description of the values of the organization that will guide and inspire employees (Collins & Porras, 1996; Denison & Mishra, 1995; Ireland & Hitt, 1992).

Apart from research on the benefits, another stream of research analyses the components of mission statements (Baetz & Bart, 1996; Bart & Tabone, 1999; David, 1989; Davis, Ruhe, Lee, & Rajadhyaksha, 2007; Klemm et al., 1991). Since a mission statement is considered critical to an organization's performance, many studies have attempted to identify the main features of mission statement that have the most impact on a firm's output (Duygulu, Ozeren, İşıldar, & Appolloni, 2016; Macedo, Pinho, & Silva, 2016). Macedo et al. (2016) suggest a model to examine the mediating role of organizational commitment to explain the mission-performance relationship. Effectively, organizational commitment plays an important role in this link. Additionally, Desmidt (2016) studied how employees perceived mission statements and the effect of the mission. Although perceived mission statement quality and employee mission engagement are positively linked in the public sector, employees' mission acceptance differs depending on the message receiver, behavioural integrity and the mission ambiguity (Desmidt, 2016).

According to Quinn and Thakor (2018, p. 78) a corporate mission and purpose "reflects something more aspirational. It explains how people involved with an organization are making a difference, gives them a sense of meaning, and draws their support." Marimon et al. (2016) focus their analysis on the internalization of the mission, which they define as "the way in which employees assume the mission as their own and allow it to become part of their personal beliefs and values". Accordingly, it is not enough to have a solid and consistent mission, and neither is it enough to invite employees to join in the process of defining the mission. The next step that must be accomplished on this path is the internalization of the mission. This provides guarantees and evidence that the mission is not just a statement on the organization's website or in its brochure, but is a statement of value that has real meaning for the employees. In their recent publication, Marimon et al. (2016) distinguish five dimensions in the multifactorial mission internalization construct: leadership, knowledge, importance, co-workers' engagement and implication (see annex). However, although it has been proved to be a correlation among these factors and they have been grouped as second order factors, there is still no evidence about the sequence in which these dimensions have to be accomplished.

Because of this lack of knowledge, it is useful to study the path that must be followed to define, create and manage a mission statement that has a real impact on the success of a

company. Consequently, the main aim of this article is to propose a sequence of the dimensions of the internalization of the mission (leadership, knowledge, importance, co-worker's engagement and implication). In this sense, the main goal of this study is to assess a model of the process of the mission statement's internalization.

Results show that, on the one hand, there is a second order mediation through "Knowledge" and "Importance". On the other hand, there is mediation through "Co-workers' engagement". In addition, the model also proposes a direct effect from "Leadership" to "Implication". Our research will contribute to the understanding of the creation of a mission statement and will suggest the path that should be followed for the effective internalization of the mission within organizations.

Our study answers the need identified by Desmidt et al. (2011) for more research on how to create a successful mission statement. Along the same lines, Mullane (2002) proposes future research on how to use a mission statement as a common strategic tool. Managers and practitioners experience significant problems in creating and implementing their mission objectives, so this is not easy work (Bart, 2007). In this sense, our study contributes towards a theoretical contribution for the definition and implementation of mission statement, as well as, helping managers to understand how a mission statement is defined and implemented. Therefore, this research sheds light on the path towards a true internalization of the firm's mission by its employees. Globalization and environmental complexity create a need for effective mission statements.

The article is organized as follows: the next section presents the literature review and the proposed sequence, and then the methodology is described and the results of the analysis presented. Finally, the results are discussed and the theoretical and practical contributions of the paper are explained.

2. Literature review and proposed sequence

According to the holistic conceptualization of mission (Rey & Bastons, 2018) the development of a mission is structured in three interconnected dimensions: formal, dynamic and motivational. Mission as a dynamic practice considers that a mission statement is a formal exercise but you need some processes to take it to life. It is relevant achieve the extent to which the organization is doing what it states in its mission (Bart, 1997; Suh, Houston, Barney, & Kwon, 2011). The formulation and implementation of a company's mission is a

difficult task, and more research is needed to guide companies in this process to put the mission into practice (Lundberg, 1984; Macedo et al., 2016). In this sense, as mentioned above, Marimon et al. (2016) propose a measure with five dimensions to assess the internalization of the mission. First, the leadership dimension refers to the extent to which the managers of the company are committed to the mission. Their engagement with the mission can be seen through their daily actions and decisions. Second, the knowledge of the mission refers to the extent to which an employee knows what the mission is, and is able to explain, in his or her own words, the mission statement. Third, the dimension of the importance of the mission can be defined as the extent to which an employee feels that the mission is important in fulfilling his or her vital contribution to society. Fourth, co-worker's engagement is the extent to which an employee feels that his or her colleagues are committed to the mission. Finally, fifth, the implications dimension can be considered to be the extent to which an employee participates in conceptualizing and creating the mission of the company and how he or she thinks about it as time goes on.

In order to propose the sequence for how these five dimensions are used to internalize the mission, we review some previous studies in which different aspects of this process were considered.

Previous studies suggest that the understanding and commitment towards the corporate mission are higher at managerial levels than with non-managerial employees (Desmidt, 2016; Vandijck, Desmidt, & Buelens, 2007). Their hierarchical position will provide access to more and relevant mission information and a broad view of the company's purpose. For that reason, if the managers buy the mission and clearly communicate it through different means (in a formal and informal way), employees will better understand the core ideals of the mission.

In many companies, managers are responsible for communicating a clear and attractive mission statement to the employees. This is complicated work because it is very important, yet difficult, to transmit a compelling mission without ambiguity. Desmidt (2016) states that: "High levels of 'mission comprehension ambiguity' have a detrimental impact on the motivational power and perceived attractiveness of organizational goals". In this sense, managers have to identify and communicate the key concepts of the mission statement. A

positive attitude of top management towards the mission can be considered the first step towards achieving an effective mission internalisation. The management's commitment to the corporate mission should affect employees' understanding of the mission. Consequently, we hypothesize that:

H1: The attitude of top management and leaders towards the mission ("Leadership") has a positive impact on the understanding of the mission statement ("Knowledge").

Notwithstanding the above, the internalization of a mission is not simply to know the mission. One of the crucial aspects in mission fulfilment is the degree to which employees know and understand their corporate mission (Bart et al., 2001).

Following David (1989), developing and communicating a clear business mission is one of the most commonly neglected tasks in strategic management. Only a clear definition of the mission makes it possible to set realistic but motivating business objectives. On the same lines, Bart (1997) found that 92 per cent of the managers in his survey considered that their current mission statement was not fully clear or self-evident to the rest of the organization. This author considers that one possible cause for the lack of success with missions could be that many mission statements are not defined and communicated clearly. Therefore, it is important to communicate the mission clearly in a way that can be understood by every employee of the company. Employees must be able to explain and share with their colleagues or with external parties the content and the spirit of the corporate mission. One important dimension is the employees' ability to explain the mission statement in their own words (Wang, 2011). Good communication of the mission statement is essential to the effective dissemination of this knowledge within the company (Mullane, 2002).

Once the organizational members have shared in the knowledge and understanding of the corporate mission, they should consider their own importance in the sense of the need for them to be efficient and to be inspired to improve the organization and society (Collins & Porras, 1996; Wang, 2011). Once they have achieved this understanding, they can support the mission passionately (Bart, 2007). Therefore, we propose the following hypothesis:

H2: An understanding of the mission statement (“Knowledge”) has a positive impact on the assessment of the importance of the mission (“Importance”).

However, when creating a mission it is not enough to hang it on the wall (Mullane, 2002) or to put it on the website (Bart, Bontis, & Taggar, 2001) for it to be known by the employees. It is relevant to consider the importance of understanding the mission statement (Marimon et al., 2016). This is a deep process inside each employee, and each employee really has to live the mission, and not only in an external or formal way. It is necessary to provide employees with time to think about the purpose of the company. According to (Baetz & Bart, 1996), all stakeholders, especially employees, should be involved in creating and developing the mission statement. All employees should know the reasons that gave rise to the corporate mission, and why the mission is important for each of them, for the company and for society. This dimension is a subsequent and further step, and goes beyond a simple understanding of the importance of the mission. If the employees agree the purpose of the company, they will be aware of how they can participate in the process to define and work towards the fulfilment of the mission (Bart et al., 2001).

Once they have realised its importance, employees can think reflectively, plan carefully and work towards the mission (Williams, Morrell, & Mullane, 2014). Based on previous research, the following hypothesis can be put forward:

H3: An assessment of the importance of the mission (“Importance”) has a positive impact on whether the employees work on the basis of and according to the mission (“Implication”).

As we have said before, the top management support towards the mission plays an important role in the process of communicating and deployment the mission (Baetz & Bart, 1996). The dearth of management commitment in the mission implementation could clarify some of the dissatisfaction in mission statements.

According to Desmidt (2016), the effective communication of a corporate mission could be considered as a function of their ability to impact on the employees’ beliefs, assumptions and behaviours. As suggested by Desmidt (2016), higher levels of perceived mission statement

quality are positively related with employee mission engagement. One of the antecedents of perceived mission quality is behavioural integrity. Leaders must look on ways to transcend their own decisions (Paarlberg & Lavigna, 2010). In this sense, managers must encourage employees to fulfil the corporate mission in order to succeed in the market. Moreover, consequently, employees look for the commitment of their colleagues to reinforce their application of the mission. The employee knowledge regarding the mission statement disseminator (usually managers) could influence the motivations towards the mission at all employees' levels.

Top management commitment must involve the full process of defining, communicating and developing the mission statement (Mullane, 2002). In addition, employees must participate in this process. Babnik et al. (2014, p. 623) suggest that "in the process of mission formulation, employees should be included and not only the top management". The mission will orient the employees' daily work and decision, and in this context, it will be synergies between employees' mission engagement.

Previous research affirms that the provision of top-down communications is not enough to achieve a uniform perception of a mission (Desmidt, 2016). All hierarchical levels of companies must share the mission principles. All different managerial levels and staff members must be involved in developing objectives that are resultant from the mission statement (Mullane, 2002). In this vein, the commitment of leaders towards the corporate mission could influence the engagement with the mission by employees' colleagues, and finally, affecting towards the mission internalization for all. Thus, we propose the following hypothesis:

H4: The attitude of top management and leaders towards the mission ("Leadership") has a positive impact on the engagement with the mission by employees' colleagues ("Co-workers' engagement").

Many authors have suggested that employees must be involved in the process of practising the mission statement (Babnik, Breznik, Dermol, & Širca, 2014; Williams et al., 2014). All the organizational members must be involved if there is to be a guarantee that the mission statement will have a positive impact on the firm (Mullane, 2002). The involvement of all

employees, not just the commitment of the top management, is crucial in implementing the mission statement (Wang, 2011). To maintain the motivation to work with and accomplish the mission statement over a long period of time, it is necessary for the whole department to work in the same direction. The impact of the engagement of co-workers is relevant to whether their colleagues really commit to the mission. When the majority of individuals are engaged and motivated by the mission statement, the degree of participation by the employees is greater. The involvement with and internalization of the mission in the daily activities of colleagues could influence employees' behaviour. For this reason, we propose the following hypothesis:

H5: The engagement with the mission by employees' colleagues ("Co-workers' engagement") has a positive impact on the way in which the employees will work in line with the mission ("Implication")

One reason for creating a mission statement is to assert leadership (Klemm et al., 1991). The commitment of top management influences the performance-related actions and decisions of employees (Williams et al., 2014). The involvement of leaders in the mission statement, and the strategic role of the mission statement in communications, are important and are powerful mechanisms for implementing and strengthening the mission (Ireland & Hitt, 1992). It is crucial for leaders to disseminate the purpose of the firm in order to establish a good understanding and integration of this purpose in the daily work of the employees (Hirota, Kubo, Miyajima, Hong, & Won Park, 2010). A lack of top management involvement in the process of creating and deploying the mission could be a reason for its failure (Baetz & Bart, 1996). Strong participation by the senior supervisors is therefore recommended for effective mission development (Bart & Baetz, 1998). Lundberg (1984) suggests that managers' commitment to the mission is a common and essential element for mission formulation.

Some previous studies, such as that of (Ireland & Hitt, 1992), suggest that a mission statement should be formed only when the top-level managers have made the philosophical and operational commitment required to focus the organization's resources on the accomplishment of the mission. Williams et al. (2014) suggested that commitment by the top management to the mission statement moderates the mission's impact on firm performance

by: (i) identifying and communicating the key concepts; (ii) involving all management levels and functional areas; (iii) setting specific targets related to the mission statement; and (iv) periodically reviewing and revising the mission. This means that it is not only the clarity of the content of the mission that is related to performance, but also the commitment to the mission by the leaders of the company. When managers show by example how to take into account the mission in their decisions and strategies, and how they can translate the mission statement into their daily procedures, employees are truly inspired, and this is a key antecedent to achieving full participation by the employees in the mission. Based on the foregoing, we suggest that:

H6: The attitude of top management and leaders towards the mission (“Leadership”) has a positive impact on the way in which the employees work on the mission (“Implication”)

The proposed model is shown in Figure 1. According to previous literature, the starting point is the commitment by the leadership to the mission that will impact on the participation by the employees in working in line with the mission (implication). One mediation relationship is based on knowing and understanding the importance of the mission statement. Another mediation relationship is the co-worker’s engagement with the mission.

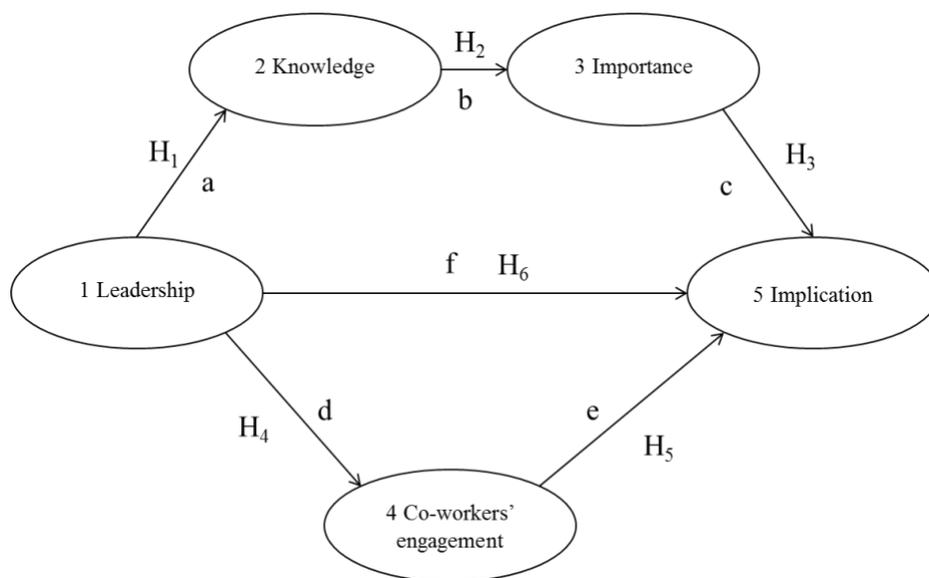


Figure 1. Research model.

3. Methodology

To proceed with the research on the chronological sequence for the accomplishment of the five IM dimensions, we generated a survey of 257 Spanish residents, which was administered April 2015. The target of the questionnaire was the whole Spanish population and it was pre-established a ratio of respondents for the groups of gender and age in order to avoid bias. A specialized company was required to conduct the survey to obtain the sample. Table 1 shows the demographic characteristics of the sample. The questionnaire consisted of the 18 items of the IM scale and some additional information related to the socio-demographic profile of the respondent.

	Number	%
Gender		
Male	131	51.0%
Female	126	49.0%
Total	257	100%
Age		
Between 25 and 34 years	77	30,0%
Between 35 and 44 years	76	29,6%
Between 45 and 54 years	72	28,0%
Between 55 and 64 years	32	12,5%
Total	257	100,0%
Working status		
Working full time	208	80.9%
Working part time	39	15.2%
School and work	10	3.9%
Total	257	100%
Annual income (in euros)		
< 10,000 euros	43	16.7%

Between 10,000 and 30,000	129	50.2%
Between 30,000 and 40,000	33	12.8%
> 40,000 euros	5	1.9%
No answer	47	18.3%
Total	257	100%
Education		
Basic studies	16	6.2%
High school diploma	64	24.9%
Vocational qualification	50	19.5%
University degree	127	49.4%
Total	257	100%

Table 1. Demographic characteristics of the sample.

The scale used the terms that were established by Marimon et al. (2016). It consists of 18 items arranged in five dimensions. The first step was to confirm the internal reliability of the dimensions and their internal consistency, and to perform a discriminant analysis. Once this had been done, the cause–effect model was developed, in order to explain the “Implication” construct. The model was tested using Structural Equation Modelling (SEM) in order to find out the sequence of how the IM dimensions were accomplished. The research model (Figure 1) was drawn from the review of the previous literature.

4. Results

4.1. Reliability and validity analysis for the scale

To examine the dimensionality of the five IM dimensions, five Confirmatory Factor Analysis (CFA) were conducted, using EQS 6.2 software. The last objective of a CFA is to validate whether the data fits a hypothesized research model. The five analyses each extracted only one factor. Table 2 shows the statistics for reliability and convergent validity. The reliability of these five factors was then assessed. Cronbach's alpha is a measure of internal consistency among all items used. In every case Cronbach's alpha coefficient and the composite reliability exceeded the threshold value of 0.7 for internal consistency. Nunnally and

Bernstein (1994) established 0.7 to be an acceptable reliability coefficient. In addition, the variance extracted for each factor was greater than 0.5. Also, to validate a construct is important to assess the convergent validity to confirm that measures that should be related are in reality related (Hair et al., 2015). Convergent validity was confirmed for all the factors, where all of the items were shown to have significant loads ($t > 2.58$).

Leadership		Knowledge		Importance		Co-worker engagement		Implication	
Lead 4	0.924 (23.698)	Know 6	0.903 (-)	Imp 11	0.892 (16.226)	Co-w 12	0.927 (-)	Impl 18	0.879 (12.201)
Lead 3	0.909 (25.250)	Know 7	0.878 (14.178)	Imp 9	0.981 (-)	Co-w 13	0.921 (9.687)	Impl 16	0.841 (12.274)
Lead 2	0.909 (25.059)	Know 8	0.854 (13.700)	Imp 10	0.889 (15.075)	Co-w 14	0.915 (8.921)	Impl 15	0.783 (-)
Lead 1	0.904 (-)							Impl 17	0.782 (11.580)
Lead 5	0.849 (20.733)								

(*) In each cell the standardized load and in parenthesis the associated p-value.

The cell without p-value were those factors that were forced to one in the CFA.

Alpha Cronbach	0.941	0.851	0.869	0.910	0.840
Range of Cronbach's alpha if one item is removed	0.920-0.939	0.749-0.829	0.813-818	0.863-0.881	0.757-0.820

Range of correlations between items and total corrected scale	0.770-0.854	0.680-0.768	0.748-0.752	0.809-0.832	0.619-0.759
Composite Reliability	0.955	0.910	0.920	0.944	0.893
Average Variance Extracted	0.809	0.772	0.793	0.848	0.676

Table 2. Loads of the five CFAs and statistics for their reliability analyses.

Discriminant validity shows that two measures that are not supposed to be related are in fact, unrelated (Hair et al., 2015). Table 3 provides the results for the analysis of discriminant validity, which was carried out using linear correlations or standardized covariances between latent factors, by examining whether the inter-factor correlations were less than the square root of the average variance extracted (AVE). Table 3 shows that the square roots of each AVE were greater than the off-diagonal elements. Discriminant validity was confirmed.

	1	2	3	4	5
Knowledge	0.899				
Importance	0.496*	0.879			
Leadership	0.588*	0.675*	0.891		
Co-workers' engagement	0.683*	0.667*	0.699*	0.921	
Implication	0.613*	0.554*	0.634*	0.658*	0.822

(*) Correlation significant at the 0.01 level (bilateral)

Diagonal elements are the square roots of the average variance extracted (AVE).

Table 3. Correlation matrix of latent factors.

4.2. Cause–effect model

The model was estimated using the robust maximum likelihood method from the asymptotic variance-covariance matrix (Bentler & Satorra, 2001). The procedure suggested by Bentler and Satorra (2001) was followed, which is based on robust maximum likelihood estimation, and according to Curran et al. (1996), this method behaves extremely well in nearly every condition across sample size, distribution and model specification.

The fit indices obtained in the measurement model estimation showed that the variables did not converge toward the structure established in the model. χ^2 Satorra–Bentler was 283.03, with 129 degrees of freedom and a p-value of 0.000. χ^2/df was 2.19, which is below the acceptable limit of 5. The Root Mean-Square Error of Approximation (RMSEA) was 0.068 and the Comparative Fit Index (CFI) was 0.948. RMSEA and CFI are two of the most recommended indexes to assess the global fit of the research model (Hu & Bentler, 1999). Therefore, the global fit of the proposed model was acceptable, and it is proposed as a predictor of “Implication”.

“Implications” was regressed on “Leadership”, resulting in an acceptable global fit providing a total effect of 0.684 and an associated t-value of 4.54. In order to analyse the composition of this total effect, the standardized solution of research model is provided in Table 4.

Coefficient	Standardized solution	t-value	Results
(a) Leadership → Knowledge	0.625	8.45	Accepted
(b) Knowledge → Importance	0.823	12.14	Accepted
(c) Importance → Implication	0.375	5.97	Accepted
(d) Leadership → Co-workers’ engagement	0.751	12.70	Accepted
(e) Co-workers’ engagement → Implication	0.315	3.43	Accepted
(f) Leadership → Implication	0.255	2.24	Accepted
Analysis of decomposition effects.			
Indirect effect (a*b*c)	0.193 (28.18% of total effect)		
Indirect effect (d*e)	0.237 (34.56% of total effect)		
Total indirect effects (a*b*c) + (b*d)	0.429 (62.74% of total effect)		
Direct effect (f)	0.255 (37.26% of total effect)		
Total effect	0.684 (t-value = 4.54)		

1.- Note that each letter (from “a” to “f”) before each coefficients corresponds to the original hypothesis in the research model.

Table 4. Standardized coefficients of the research model Direct and indirect effects of “Leadership” on “Implication”

Table 4 shows the direct effects between the model constructs with the letters from “a” to “f”. Hence, each letter corresponds to one hypothesis of the research model. The second section of the table provides the indirect effects according to the model. The calculations are shown in each line of this second section table. Results indicated that the direct and positive effect of “Leadership” on “Implication” is 0.255 (37.26% of the total effect). This means that commitment by the top management to the mission statement influences the likelihood that employees will work on the mission statement process. However, there is an important indirect effect originating in two mediated paths. First, the understanding of the mission (“Knowledge”) and the estimation of how important it is to have the right mission for the company (“Importance”) have an indirect effect. This indirect effect has

a significant impact on “Implication”, at 0.193 (23.18% of the total effect). Second, the other mediation is the relevance of the engagement and commitment of the co-workers towards the fulfilment of the mission (“Co-workers’ engagement”). This second mediation has an impact on “Implication” of 0.237 (34.56% of the total effect). Therefore, the total of the indirect effects is 0.429 (62.74% of the total effect). To sum up, there is a direct effect and a double mediation from “Leadership” to “Implications” that explains the steps that must be followed for the mission to be created and internalized by employees.

5. Discussion and theoretical and managerial implications

The paper provides clues and evidence for explaining the sequence of attaining the different dimensions of the internalization of a company’s mission. While Marimon et al. (2016) propose the components of the mission internalization construct, we analyse the precedents to the accomplishment of these dimensions. There are some paths that can be performed and achieved simultaneously, but there are other dimensions that have a pre-established sequence, and this order must be respected (Macedo et al., 2016; Williams et al., 2014). Respecting this *tempus* is of paramount importance when managers are defining the mission and the implementation process.

This relationship from “Leadership” to “Implication” is directly (37.26% of the total effect) and indirect (62.74% of the total effect). First, regarding the direct effect, the findings suggest that the managers’ commitment and leadership have a positive influence on the deployment and management of the mission within the company, as suggested by Ireland and Hitt (1992) and Williams et al. (2014). Therefore, top-level managers must accept responsibility for articulating a mission in ways that are meaningful for each stakeholder group. If the leadership is oriented in line with mission statement, this has a significant influence on the participation by the employees in the process of defining and managing the mission within the company. The supervisors’ role and whether they orient their daily decisions in a manner that is coherent with the mission is a key point in engaging the employees to live the mission of the company. If the managers encourage the development of the mission, the employees will participate more and better. These results are consistent with the assertion that leadership is a critical success factor in other fields such as Balanced Scorecard (Heras-Saizarbitoria, Marimon, & Casadesús, 2012; Kaplan & Norton, 1992) or Knowledge Management (Hung, Huang, Lin, & Tsai, 2005; Jennex, Smolnik, & Croasdell, 2007; Machuca & Costa, 2012).

Second, understanding these indirect effects (higher than the direct effect) is a cornerstone for academics and managers to know how to foster and reinforce this link. In this sense, the findings suggest a double mediation to explain the relationship between leadership and employees' participation. The first mediation is through "Knowledge" and "Importance". It is also very important to consider the key role of understanding and identifying the creation of the mission statement and its definition, as this is a critical success factor in obtaining sustainable competitive advantage and a clear position in the market. The first step is that employees can explain the main sense of the mission of the company. The reality of many mission statements is that they are not known and understood by several organizational members. However, it is not enough to know the mission; employees must also understand its importance, and the assessment of the importance is a consequence of the knowledge of the mission. On the path towards employees becoming part of the mission, first comes knowing the mission, and after that, consequently, they can assess its importance. Both steps must be taken and in this order. If one of them is not accomplished, this way to participation is closed. This mediation is a crucial point in whether the employees will create and think about the mission. So, it is relevant that managers communicate the mission and its importance, as previous authors have stated (Bart, 1997; David, 1989).

On the other hand, the second mediation is related to co-worker's engagement. This mediation has stronger weight than the other (34.54% of the total effect). Our results suggest that it is relevant to create a general atmosphere in the company in which all the employees work in the same direction, because this has an impact on the inclination of employees to commit to the mission. One can identify that a powerful aspect in working on the mission is to see that one's colleagues think of it as a light that helps them to orient their decisions and actions. The mission must impregnate the culture and values of the company (Williams et al., 2014). The effectiveness of the mission depends on the atmosphere within the company. In this way, when a new employee is recruited, he or she will be inspired by the commitment of his or her colleagues. Therefore, we advise that the degree to which the behaviour of the employees is consistent with the company's mission should be incorporated into climate surveys. With this information, managers will know specifically the extent to which employees are engaged by the mission and can propose actions to foster and align their commitment to it.

Understanding the path that follows the dimensions of the internalization of the mission statement within a company is very relevant to propose an effective process. Managers

define a mission statement to achieve that employees feel that the mission is important to fulfilling. To obtain that ideal situation, there are different paths but all of them related to employees. Indeed, employees accept a company's mission because they are aligned with it and there is a pro-social motivation to work on it. According to Ireland and Hitt (1992), a mission statement is intended to provide motivation, general direction or an attitude through which actions are guided. The alignment between personal and organizational mission is an effective aspect to be considered here. The consideration that the mission of the company is important is related to the employees' value scales.

To sum up, our findings suggest that, in order to obtain true agreement by the employee to work on the mission, the commitment of the leadership is necessary. This impact is mediated by the consideration of the understanding and the importance of the mission for each employee, and also the influence of the co-worker's engagement. All these factors have an impact on the participation with the mission.

This area of research is particularly valuable for both academicians and managers. First, our study could serve to reinforce the discussion on the mission statement's definition and communication. The process of the internalization of the mission from the top management leader to the employee's implication is a new source to strengthen. From a theoretical view, there is a need to think about the firm's mission and purpose. Canals (2010, p. 203) states in his final thought that "The notion and purpose of the firm that we have outlined here highlights the unique nature of companies as institutions made up of people who seek economic efficiency, but also organizations led and developed by people with motivations that go beyond pure financial aspirations. As important as profit is the final outcome of a management process; board members and senior executives should look at the process that leads that outcome". In this sense, the proposed mediated effects have solid theoretical backing and should be a first attempt to in exploring these relationships. We offered empirical support to clarify the sequence of the dimensions of the internalization of the mission. From a theoretical perspective our results propose a contribution to current knowledge.

Second, our research will contribute with some practical implications. The challenge facing managers today is to have a thorough understanding of the process from the definition of the mission to the true internalization of the mission statement, and to learn what factors or conditions influence this. We hope that our article sheds light on this and

contributes to the knowledge about the creation, internalization and implementation of the mission within a company.

Our study is focused on the process of the definition, creation and internalization of the mission by employees. Communicating the corporate mission is one thing, but achieving a truly internalization of its meaning is another. Nevertheless, more research is needed to try to assess the impact of this sequence on the performance of the company (economic and non-economic). There are no conclusive arguments about the relationship between a mission statement and performance (Baetz & Bart, 1996; Bart et al., 2001; Peyrefitte & David, 2006). For this reason, future research is needed to assess this relationship.

Annex - Scale to assess internalization of the mission proposed by Marimon et al. (2016)

Dimension	Code	Item
1 Leadership	Lead 1	The managers' behaviour is consistent with the company's mission.
	Lead 2	The managers are committed to the mission.
	Lead 3	Through their example, the managers give visible signs of their commitment to the mission.
	Lead 4	The managers encourage the development of the mission.
	Lead 5	The decisions made by the company are consistent with the mission.
2 Knowledge	Know 6	I am able to explain my company's mission in my own words.
	Know 7	I could explain my company's mission to people outside the organization if I were asked to.
	Know 8	I understand my company's mission.
3 Importance	Imp 9	I believe that the mission is important to society.
	Imp 10	I accept my company's mission because it is aligned with my individual values.
	Imp 11	I think that the company's mission is important to me.
4 Co-workers' engagement	Co-w 12	The behaviour of my colleagues is consistent with the company's mission.
	Co-w 13	My colleagues push the development of the mission.
	Co-w 14	In general, people who work with me are committed to the mission.
5 Implication	Impl 15	I am in a working group at the company where we work on the mission.
	Impl 16	I have participated in the process of defining and reviewing the mission.
	Impl 17	During the year, I spend time reflecting on the company's mission.
	Impl 18	I participate in activities where I can give my own opinion about the mission.

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Women with STEM qualifications on supervisory boards. Does a high women quota in supervisory boards influence firm success?

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ABSTRACT

Many large companies in Europe include mainly men in supervisory boards and the women quota is often lower than 20 %. In Germany an optional women quota of 30 % in supervisory boards was proposed for capital market oriented companies in 2016. Some assume that without a gender quota the earnings of enterprises would shrink as male and female members in supervisory teams do not work in such a harmonized and structured way. Others think that a women quota in supervisory boards should be requested by law and should not remain optional. In this context, conducting research and analyzing the impact of the women's presence in supervisory boards on the success of companies appear as a necessary topic. The present article looks at the companies of EURO STOXX 50 in the year 2015 and their success and tries to establish whether this success can be related to the percentage of female members in supervisory positions. It replicates in this way the study of Binder, Alonso-Almeida and Bremser (2016) which analyzed the relationship between female's representation in the management board (executive board) and firm performance (measured by earnings before taxes - EBT) of the EURO STOXX 50 companies in 2014. It is in the same time an extension of the original study as the supervisory board is brought under scrutiny and a closer look at women qualifications, and especially women with STEM qualifications is provided.

KEYWORDS

EURO STOXX 50, STEM qualifications, Key performance indicators, Firm performance.

1. Introduction

Many large companies in Europe include mainly men in supervisory boards and the women quota is often lower than 20 %. In Germany an optional women quota of 30 % in supervisory boards was proposed for capital market oriented companies in 2016. The present article looks at the companies of EURO STOXX 50 in the year 2015 and their success and tries to establish whether this success can be related to the percentage of female members in supervisory positions. It replicates in this way the study of Binder *et al.* (2016) which analyzed the relationship between female's representation in the management board (executive board) and firm performance (measured by earnings before taxes - EBT) of the EURO STOXX 50 companies in 2014. It is in the same time an extension of the original study as the supervisory board is brought under scrutiny and more details about the number of women in supervisory boards, the STEM qualifications of women (STEM stands for science, technology, engineering, and mathematics), the women quotas and the reasons behind are examined.

This article contributes to the literature in the field of Key Performance Indicators (KPIs) as success factors e.g. the EBT. It offers an insight into the relationship between the economic success of 50 European companies and the gender balance on supervisory boards. A special focus lies on women with STEM qualifications in supervisory boards to show if this situation is satisfying or whether it can be improved. For this purpose the article builds upon existing literature in the field of KPIs, diversity management, supervisory boards, and women quota, etc. The paper is structured as follows: the next section presents the literature review and introduces the hypothesis. Section three contains the research methodology. In section four the findings are discussed. Finally, section five develops insights for investors and owners and shows the limitations of the study and offers suggestions for future lines of research.

2. Literature Review

A controversial issue during the past decades was women's presence in supervisory boards. The underrepresentation of women in decision-making position is a known problem in the business world and if an implementation of ethical principles might be difficult, "by passing the legal regulations it is possible to set the rules of behaviour" (Grbac and Lončarić, 2009: 145), in this case by imposing a gender quota for corporate

boards. This paper argues that images such as the “white, heterosexual, western, middle/upper class, able man” (Zanoni *et al.*, 2010: 13) ought to be challenged in international business and it considers that companies which avoid appointing women in top position are “unaware of new sources of value, and consequently, are sub-optimizing both the economic value of the firm and value to society” (Mohammed, 2014: 243). Nevertheless, women are still the exception in German supervisory boards, even though their representation increased gradually (Holst and Kirsch, 2014). In Northern Europe more women are present in supervisory boards (e.g. Norway, Iceland, Latvia, Finland and Sweden to mention the top 5 countries with the highest women quota). It depends on the examined countries if a study can find a significant link between firm performance and the women quota in supervisory boards. On the one hand, it was shown e.g. for Denmark that a higher women quota in supervisory boards can determine a better company performance (Lückerath-Rovers, 2011) but on the other hand, this finding could not be verified for the same country by other studies (Rose, 2007).

Beaufort and Summers (2013) identified at European level a 1.5% change of women representation in mainly male supervisory boards between 2009 and 2013. If women were already member in a supervisory board, the women quota was likely to increase further. When one woman was a board member, the women quota stood at 3.2%; by already 3 women in the supervisory board, the women quota increased to 3.7%. According to the above study the average women quota in supervisory boards in Europe in 2013 was 7.9%. France stood out as a positive example with a women quota of 28.1% in 2013.

Another study on women in European listed companies suggests positive effects of diverse boards on corporate governance and even on firm performance (Buchwald and Hottenrott, 2014). A similar result was registered by a Catalyst study which examines the relationship between women on corporate boards and their companies’ financial performance in the United States (Catalyst, 2007). The study “Women matter. Gender diversity, a corporate performance driver” shows that companies with a higher proportion of women in top management perform better (McKinsey, 2007). Other authors signal rather the lack of evidence that female representation in supervisory boards improves profitability (Ferreira, 2014). It is suggested that rather benefits for the society should be measured when women occupy supervisory board positions. In a study with 108 German large corporations which

took place between 2009 and 2013, there was not enough evidence to indicate a significant relationship between gender diversity and firms' financial performance (Dick, 2015).

There are however, institutional factors driving gender quotas in supervisory boards such as e.g. welfare provision for state-owned enterprises, political coalitions and a legacy of initiatives (Terjesen *et al.*, 2015). It is more likely to establish a high gender quota in supervisory board with left-leaning governments. In a survey of 201 Norwegian firms the positive effect of the women quota in supervisory boards is seen in increased board development activities and in a decreased level of conflict (Nielsen, 2010). Another exhaustive study, in which 2.360 companies from the Morgan Stanley Capital International All Country World Index (MSCI ACWI) were observed over a period of 6 years by the Credit Suisse Research Institute (2012) shows as a result a better mix of leadership skills, a wider pool of talent and a better risk aversion, the higher the women quota in supervisory boards in the companies is (Kersley and O'Sullivan, 2012). Many studies (e.g. Bilimoria, 2006, Terjesen *et al.*, 2009) suggest also a positive relationship between female supervisory board members and the number of women officers in management.

What needs to be acknowledged is the fact that gender balance became a priority and diversifying corporate supervisory boards often represent a target to be achieved. Small improvements can be seen with a law instituted quota for women in supervisory boards (Corkery and Taylor, 2012). In Norway, Italy, France, Spain and starting with 2016 also in Germany binding gender quota exist (Sullivan, 2015). Norway was the first country to legislate board quotas in 2004 and many countries followed with law determined or optional women quotas in supervisory boards, however, less than 10 % of the board members consist of women (Dizik, 2015). Moreover, men in supervisory boards have often better networks and for this reason the male supervisory board managers often recruit male followers which minimizes the women quota in supervisory boards on the long run (Terjesen *et al.*, 2015). Rosa *et al.*, (1996) analysed the impact of gender on small business performance in the United Kingdom (UK) and concluded that there are "some considerable differences by sex in quantitative economic and financial performance measures" (p. 476). Kalleberg and Leicht (1991) examined organizational performance in terms of survival and success and according to the results of their study, companies that

have a high women quota in supervisory boards are not more likely to go bankrupt than those with a high male quota, because both men and women are equally successful with regard to earnings growth.

Another study with reversed causality shows that in over 3,876 public companies the presence of independent female directors is necessary in supervisory boards to contribute best to the firms' performance (Terjesen *et al.*, 2015). This means that, when no women are included as supervisory board members, the companies' results are lower (measured by Tobin's Q and shown by the Return on assets ROA). Finally, another study with reversed causality about 151 of the capital market listed German firms shows that only after a critical mass of about 30% (e.g. 3 women in absolute positions) is attained, then a higher firm performance can be reached (Joecks *et al.*, 2012).

The present research focuses on the companies of the EURO STOXX 50 index, and aims at exploring whether there is a link between the EBT of these successful European companies and the number of women in supervisory boards. Britzelmaier *et al.*, (2013) focused on the same index while examining the remuneration of management in 2009, during the financial crisis. It has to be noted that the relationship between the EBT and the women quota in management boards was analysed thoroughly by Binder *et al.*, (2016), however, the focus of this article lies on the supervisory board and especially on the link between firms' performance measured by EBT and the proportion of women on the supervisory boards with a STEM-educational background. The following hypothesis is formulated and will be tackled in the following sections:

H1: Enterprises which have a higher gender quota in supervisory boards are more successful and achieve a higher EBT.

3. Methodology

The EURO STOXX 50 Index was selected to represent the performance of the 50 largest companies among 19 supersectors in the year 2015. There are enterprises of seven Eurozone countries which are integrated in this index. This index has a fixed number of components and is part of the STOXX blue-chip index family. The current study looks at the number of women in supervisory boards and lists their names as presented in the 2015 annual reports (see table 1). The data regarding the EBT of each of the fifty companies

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was collected via financial websites. It should be taken into account that women in supervisory boards listed below are sometimes member in more than just one supervisory board.

No.	Company name	Country	women quota in supervisory board	STEAM women quota in supervisory board	Name of women on board
1	Air Liquide	FR	41,7%	16,7%	Geneviève Berger, Sin-Leng Low, Siân Herbert-Jones, Annette Winkler, Karen Katen
2	AIRBUS GROUP SE	FR	16,7%	8,3%	Anne Lauvergeon, María Amparo Moraleda Martínez
3	ALLIANZ	DE	30,8%	0,0%	Christine Bosse, Gabriele Burkhardt-Berg, Ira Gloe-Semler, Renate Köcher
4	ANHEUSER-BUSCH INBEV	BE	14,3%	0,0%	Maria Asuncion Aramburuzabala, Michele Burns
5	ASML HLDG	NL	33,3%	0,0%	Pauline F.M. van der Meer Mohr, Clara (Carla) M.S. Smits-Nusteling
6	ASSICURAZIONI GENERALI	IT	40,0%	0,0%	Alberta Figari, Ornella Barra, Sabrina Pucci, Paola Sapienza
7	AXA	FR	35,7%	7,1%	Isabelle Kocher, Suet Fern Lee, Deanna Oppenheimer, Doina Palici-Chehab, Dominique Reiniche
8	BASF	DE	25,0%	8,3%	Dame Alison Carnwath, Anke Schäferkordt, Denise Schellemans
9	BAYER	DE	20,0%	10,0%	Simone Bagel-Trah, Petra Kronen, Sue H. Rataj, Petra Reinbold-Knape
10	BCO BILBAO VIZCAYA ARGENTARIA	ES	25,0%	8,3%	Belén Garijo López, Lourdes Máiz Carro, Susana Rodríguez Vidarte
11	BCO SANTANDER	ES	36,4%	0,0%	SoI Daurella Comadrán, Esther Giménez-Salinas i Colomer, Belén Romana García, Isabel Tocino Biscarolasaga
12	BMW	DE	30,0%	0,0%	Christiane Benner, Susanne Klatten, Renate Köcher, Simone Menne, Dominique Mohabeer, Brigitte Rödig
13	BNP PARIBAS	FR	50,0%	14,3%	Monique Cohen, Marion Guillou, Nicole Misson, Laurence Parisot, Daniela Schwarzer, Sandrine Verrier, Fields Wicker-Miurin
14	CARREFOUR	FR	25,0%	0,0%	Diane Labryère-Cuilleret, Mathilde Lemoine, Patricia Lemoine, Anne-Claire Taittinger
15	DAIMLER	DE	25,0%	5,0%	Sari Baldauf, Petraea Heynike, Andrea Jung, Elke Tönjes-Werner, Sabine Maaßen
16	DANONE	FR	38,5%	7,7%	Marie-Anne Jourdain, Gaëlle Olivier, Isabelle Seillier, Mouna Sepehri, Bettina Theissig
17	DEUTSCHE BANK	DE	31,8%	9,1%	Dina Dublon, Katherine Garrett-Cox, Sabine Irgang, Martina Klee, Henriette Mark, Louise M. Parent, Gabriele Platscher
18	DEUTSCHE POST	DE	35,0%	5,0%	Simone Menne, Katja Windt, Andrea Kocsis, Anke Kufalt, Sabine Schielmann, Helga Thiel, Stefanie Weckesser
19	DEUTSCHE TELEKOM	DE	40,0%	10,0%	Sari Baldauf, Monika Brandl, Nicole Koch, Petra Steffi Kreusel, Sylvia Hauke, Sibylle Poon, Ines Kolmsee, Waltraud Litzenberger
20	E.ON	DE	16,7%	0,0%	Denise Kingsmill, Karen de Segundo
21	ENEL	IT	33,3%	0,0%	Giulia De Martino, Lidia D'Alessio
22	ENGIE	FR	57,9%	10,5%	Isabelle Kocher, Ann-Kristin Achleitner, Françoise Malrieu, Marie-José Nadeau, Barbara Kux, Stéphane Pallez, Mari-Noëlle Jégo-Laveissière, Caroline Simon, Lucie Muniesa, Catherine Guillooard, Anne-Marie Mourer
23	ENI	IT	20,0%	0,0%	Karina A. Litvack
24	ESSILOR INTERNATIONAL	FR	18,8%	6,3%	Maureen Cavanagh, Juliette Favre, Louise Fréchette
25	FRESENIUS	DE	0,0%	0,0%	
26	GRP SOCIETE GENERALE	FR	50,0%	14,3%	Barbara Dalibard, Kyra Hazou, Ana Maria Llopis Rivas, Nathalie Rachou , Alexandra Schaapveld, France Houssaye, Béatrice Lepagnol
27	IBERDROLA	ES	38,5%	0,0%	Inés Macho Stadler, Samantha Barber, María Helena Antolin Raybaud, Georgina Kessel Martinez, Denise Mary Holt
28	Industria de Diseño Textil S.A.	ES	25,0%	12,5%	Flora Pérez Marcote, Irene R. Miller
29	ING GRP	NL	25,0%	0,0%	Isabel Martín Castellá, Mariana Gheorghe
30	INTESA SANPAOLO	IT	26,3%	0,0%	Rosalba Casiraghi, Rossella Locatelli, Beatrice Ramasco, Marcella Sarale, Monica Schiraldi,
31	L'OREAL	FR	40,0%	13,3%	Ana Sofia Amaral, Belén Garijo, Françoise Bettencourt Meyers, Sophie Bellon, Virginie Morgon, Christiane Kuehne
32	LVMH MOET HENNESSY	FR	23,5%	0,0%	Delphine Arnault, Bernadette Chirac, Marie-Laure Sauty de Chalons, Marie-Josée Kravis
33	MUENCHENER RUECK	DE	40,0%	5,0%	Ann-Kristin Achleitner, Benita Ferrero-Waldner, Ursula Gather, Anne Horstmann, Ina Hosenfelder, Beate Mensch, Gabriele Sinz-Toporzyssek, Angelika Wirtz
34	NOKIA	FI	25,0%	12,5%	Elizabeth Nelson, Elizabeth Doherty
35	ORANGE	FR	40,0%	6,7%	Helle Kristoffersen, Mouna Sepehri, Anne Lange, Ghislaine Coinaud, Lucie Muniesa, Claudie Haigneré
36	PHILIPS	NL	33,3%	0,0%	Neelam Dhawan, Orit Gadish, Christine Poon
37	SAFRAN	FR	23,5%	11,8%	Monique Cohen, Odile Desforges, Élisabeth Lulin, Astrid Milsan
38	SAINT GOBAIN	FR	40,0%	13,3%	Isabelle Bouillot, Anne-Marie Idrac, Sylvia Jay, Pamela Knapp, Agnès Lemarchand, Olivia Qiu
39	SANOFI	FR	35,7%	21,4%	Bonnie Bassler, Claudie Haigneré, Fabienne Lecorvaisier, Suet-Fern Lee, Carole Piwnica
40	SAP	DE	22,0%	16,5%	Margret Klein-Magar, Anja Feldmann, Gesche Joost, Christine Regitz
41	SCHNEIDER ELECTRIC	FR	38,5%	7,7%	Betsy Atkins, Magali Herbaut, Linda Knoll, Cathy Kopp, Lone Fønss Schröder,
42	SIEMENS	DE	30,0%	5,0%	Birgit Steinborn, Bettina Haller, Nicola Leibinger-Kammüller, Güler Sabancı, Nathalie von Siemens, Sibylle Wankel
43	TELEFONICA	ES	11,0%	0,0%	Eva Castillo Sanz , Sabina Fluxà Thienemann
44	TOTAL	FR	33,3%	0,0%	Patricia Barbizet, Marie-Christine Coisne-Roquette, Anne-Marie Idrac, Barbara Kux
45	UNIBAIL-RODAMCO	FR	36,4%	0,0%	Mary Harris, Jacqueline Tammenoms Bakker, Dagmar Kollmann, Sophie Stabile
46	UNICREDIT	IT	20,0%	0,0%	Maria Enrica Spinardi
47	UNILEVER NV	NL	54,6%	0,0%	Laura Cha , Ann Fudge, Louise Fresco, Judith Hartmann, Mary Ma, Hixonia Nyasulu
48	VINCI	FR	40,0%	20,0%	Graziella Gavezotti, Marie-Christine Lombard, Josiane Marquez, Ana Paula Pessoa, Pascale Sourisse, Yannick Assouad
49	VIVENDI	FR	42,9%	0,0%	Nathalie Bricault, Yseulys Costes, Aliza Jabès, Cathia Lawson-Hall, Virginie Morgon, Katie Stanton
50	VOLKSWAGEN PREF	DE	15,0%	0,0%	Annika Falkengren, Babette Fröhlich, Louise Kiesling

Source: own representation based on the information from: <https://www.stoxx.com/index-details?symbol= SX5E>, retrieval date: 03/03/2017.

Table 1. Overview of the 50 EURO STOXX companies in 2015, of their women quota and STEAM women quota

EURO STOXX 50 index is one of the most liquid indices for the Eurozone and serves for benchmarking purposes. The index is a financial control index which ensures stable and up-to-date figures. It represents the performance of only the largest and most liquid companies in a sector (STOXX Limited, 2016).

The present research focuses on the interrelationship between company success and women on supervisory boards on basis of the EURO STOXX 50 index. Therefore, the aforementioned hypothesis will be tackled in the following sections. The interrelationship between company success and women on supervisory boards is modeled in a univariate single-equation model. Women on supervisory boards represent the independent variable, company success represents the dependent variable. The independent variable is defined as the numerical ratio of the number of women in supervisory board compared to the number of total supervisory board members. The hypothesis is tested using the numerical dependent variable EBT, as a measure for companies' success.

The composition of EURO STOXX index in 2015 changed slightly in comparison to the year before. Two new companies were included in the EURO STOXX index: Fresenius (Germany) and Safran (France) replaced Repsol (Spain) and REWE (Germany), a change which became effective on September 2015 (STOXX Limited, 2015). The composition change of the index takes place once a year, in September, when only the biggest companies are maintained on the basis of their market capitalization and their price index. Out of the 50 EURO STOXX companies four have e.g. the highest index weights: Total (France) with 4.78%, Sanofi-Aventis (France) with 4.39 %, Bayer (Germany) with 4.29 %, and Anheuser-Busch InBev (Belgium) with 4.11 %. In order to examine how successful these companies are, the EBT was chosen as being a relevant KPI, taking thus into consideration the fact that companies may face different tax rates in different states. In other words, the lack of a harmonized taxation system across the Eurozone will not affect the results of this study, the EBT making possible a comparison of the 50 EURO STOXX companies at European level (see table 2).

Women with STEM qualifications on supervisory boards. Does a high women quota in supervisory boards influence firm success?

Company's name	Sector	Country	ISIN	No. of Women	Percentage of Women on the Board	Earnings before Taxes (in Mio. EUR)	EBT/Total no. Of Employees (in thousands)
Air Liquide	Chemicals	FR	FR0000120073	5	41,67%	2.490,40	49,81
AIRBUS GROUP SE	Industrial Goods & Services	FR	NL0000235190	2	16,67%	2.359,00	17,27
ALLIANZ	Insurance	DE	DE0008404005	4	30,77%	9.763,00	68,53
ANHEUSER-BUSCH INBEV	Food & Beverage	BE	BE0974293251	2	14,29%	11.482,33	76,55
ASML HLDG	Technology	NL	NL0010273215	3	33,33%	1.856,08	126,43
ASSICURAZIONI GENERALI	Insurance	IT	IT0000062072	4	40,00%	3.293,00	47,04
AXA	Insurance	FR	FR0000120628	5	35,71%	7.521,00	76,53
BASF	Chemicals	DE	DE000BASF111	3	25,00%	5.297,00	47,11
BAYER	Chemicals	DE	DE000BAY0017	4	20,00%	5.254,00	44,98
BCO BILBAO VIZCAYA ARGENTARIA	Banks	ES	ES0113211835	3	25,00%	4.428,00	32,09
BCO SANTANDER	Banks	ES	ES0113900137	4	36,36%	9.172,00	47,31
BMW	Automobiles & Parts	DE	DE0005190003	6	30,00%	8.706,00	71,22
BNP PARIBAS	Banks	FR	FR0000131104	7	50,00%	9.790,00	51,78
CARREFOUR	Retail	FR	FR0000120172	4	25,00%	1.673,00	4,39
DAIMLER	Automobiles & Parts	DE	DE0007100000	5	25,00%	12.280,00	43,24
DANONE	Food & Beverage	FR	FR0000120644	5	38,46%	1.925,00	19,29
DEUTSCHE BANK	Banks	DE	DE0005140008	7	31,82%	-6.261,00	-61,93
DEUTSCHE POST	Industrial Goods & Services	DE	DE0005520004	7	35,00%	2.055,00	4,13
DEUTSCHE TELEKOM	Telecommunications	DE	DE0005557508	8	40,00%	4.754,00	21,11
E.ON	Utilities	DE	DE0000ENA9999	2	16,67%	-5.841,00	-103,40
ENEL	Utilities	IT	IT0003128367	2	33,33%	5.229,00	76,99
ENGIE	Utilities	FR	FR0010208488	11	57,89%	-5.262,00	-33,96
ENI	Oil & Gas	IT	IT0003132476	1	20,00%	-3.535,00	-125,15
ESSILOR INTERNATIONAL	Health Care	FR	FR0000121667	3	18,75%	1.120,00	18,36
FRESENIUS	Health Care	DE	DE0005785604	0	0,00%	3.262,00	14,67
GRP SOCIETE GENERALE	Banks	FR	FR0000130809	7	50,00%	5.878,00	40,34
IBERDROLA	Utilities	ES	ES0144580Y14	5	38,46%	2.931,30	94,75
Industria de Diseno Textil SA	Retail	ES	ES0148396007	2	25,00%	3.212,67	21,02
ING GRP	Banks	NL	NL0000303600	2	25,00%	5.680,00	103,51
INTESA SANPAOLO	Banks	IT	IT0000072618	5	26,32%	4.056,00	44,67
L'OREAL	Personal & Household Goods	FR	FR0000120321	6	40,00%	4.517,40	54,49
LVMH MOET HENNESSY	Personal & Household Goods	FR	FR0000121014	4	23,53%	5.983,00	47,73
MUENCHENER RUECK	Insurance	DE	DE0008430026	8	40,00%	3.223,00	74,00
NOKIA	Technology	FI	FI0009000681	2	25,00%	1.511,00	26,65
ORANGE	Telecommunications	FR	FR0000133308	6	40,00%	3.197,00	20,49
PHILIPS	Industrial Goods & Services	NL	NL0000009538	3	33,33%	623,00	5,52
SAFRAN	Industrial Goods & Services	FR	FR0000073272	4	23,53%	-1.355,00	-19,33
SAINT GOBAIN	Construction & Materials	FR	FR0000125007	6	40,00%	622,00	3,65
SANOFI	Health Care	FR	FR0000120578	5	35,71%	5.243,00	45,34
SAP	Technology	DE	DE0007164600	4	22,22%	3.991,00	51,84
SCHNEIDER ELECTRIC	Industrial Goods & Services	FR	FR0000121972	5	38,46%	1.736,00	10,85
SIEMENS	Industrial Goods & Services	DE	DE0007236101	6	30,00%	5.983,00	17,19
TELEFONICA	Telecommunications	ES	ES0178430E18	2	11,11%	316,00	2,43
TOTAL	Oil & Gas	FR	FR0000120271	4	33,33%	3.677,45	38,30
UNIBAIL-RODAMCO	Real Estate	FR	FR0000124711	4	36,36%	2.678,30	1.362,31
UNICREDIT	Banks	IT	IT0004781412	1	20,00%	1.775,88	40,84
UNILEVER NV	Personal & Household Goods	NL	NL0000009355	6	54,55%	7.133,00	42,23
VINCI	Construction & Materials	FR	FR0000125486	6	40,00%	3.022,00	16,30
VIVENDI	Media	FR	FR0000127771	6	42,86%	1.196,00	72,95
VOLKSWAGEN PREF	Automobiles & Parts	DE	DE0007664039	3	15,00%	-5.688,00	-49,89

Source: own representation based on the information from: <https://www.stoxx.com/index-details?symbol=SX5E>, retrieval date: 03/03/2017.

Table 2. Overview of the 50 EURO STOXX companies in 2015.

4. Findings

This section focuses in the first place on the enterprises which have women with STEM qualifications in their supervisory boards. Out of the 50 EURO STOXX companies three companies have three women with STEM qualifications, ten companies have two women with STEM qualifications and fourteen companies have only one women qualified in a STEM discipline in the supervisory board. This means that there are 43 women out of the total 220 women members of the supervisory boards of the EURO STOXX 50 companies which have a STEM educational background (see table 3).

In the following we provide a closer view on the companies having the highest women on their supervisory board and their qualifications and positions on board.

The French company Engie has the highest women quota of all companies included in EURO STOXX 50 index: 57,9%. The STEM quota of women in supervisory board is, however, 10,5% (see table 1), which means again that only two women of the eleven have a STEM background. These are Isabelle Kocher and Marie-Noelle Jégo-Laveissière, both engineers graduating from Corps des Mines, a highly esteemed institution in France. Isabelle Kocher is not just a member of the supervisory board, she is also the CEO of the company. The other nine women on supervisory board have different backgrounds, e.g. Ann-Kristin Achleitner graduated in economics and law. Françoise Malrieu has the chair of nomination and compensation committee, Marie-José Nadeau is member of the audit committee and Barbara Kux is member of the ethics, environment and sustainable development committee. Elected directors are Stéphane Pallez and Caroline Simon. Lucie Muniesa represents as director the French state, Catherine Gouillouard is director member of the strategy, investment and technology committee, and Anne-Marie Mourer is member of the appointments and compensation committee.

Unilever NV from the Netherlands has the second highest women quota (54,6%) of all 50 EURO STOXX companies. Six women are part of the supervisory board and three women work as executive directors. Yet, none of them have a STEM qualification. We had a look at the qualification the female supervisory members have in case of Unilever, and we found out for instance that Laura Cha has a law degree, Ann Fudge and Judith Hartmann hold a MBA, Louise Fresco has a degree in agriculture, Mary Ma has a bachelor of arts, while Hixonia Nyasulu has a bachelor of arts in psychology.

On third place in terms of women quota (with 40%) are two German companies: Deutsche Telekom and Muenchener Rueck. Again we saw that out all of the women serving as supervisory board members in these two companies, only a few have a STEM qualification. These are Sylvia Hauke, who is a skilled data processing officer, and Ines Kolmsee, who is an industrial engineer, both working for Deutsche Telekom, and Ursula Gather (working for Muenchener Rueck) with a degree in mathematics, which can be identified as a typical profession in the insurance branch.

If one looks at the companies with the most women with STEM qualifications in the supervisory board, the French company Sanofi leads with a STEM women quota of 21,4%,

followed by the German company SAP with a STEM women quota of 16,5%, and the Spanish Industria de Diseno with a STEM women quota of 12,5%.

What is should be mention here is that several women are members of different supervisory boards in different companies, e.g. Isabelle Kocher. In the same time, 27 companies out of the 50 EURO STOXX companies have at least one women with a STEM qualification, which is more than 50%.

To move further, from a statistical point of view the EURO STOXX 50 companies can be placed into five categories concerning the EBT as dependent variable (see table 3). Only Daimler (Germany) and Anheuser Busch-Inbev (Belgium) have achieved an EBT that is higher than 9.999 Mio. EUR. Most companies (16) are in the class between 0-2.999 Mio. EUR, from sectors such as ‘Telecommunications’, ‘Media’, ‘Real-Estate’, ‘Oil & Gas’, ‘Banks’ and ‘Industrial Goods and Services’.

	EBT		<i>Companies</i>
	<i>n</i>	<i>%</i>	
< 0 Mio. EUR	6	12	SAFRAN, ENI, ENGIE, VOLKSWAGEN PREF, E.ON, DEUTSCHE BANK
0-2.999 Mio. EUR	16	32	IBERDROLA, UNIBAIL-RODAMCO, AIR LIQUIDE, AIRBUS GROUP SE, DEUTSCHE POST, DANONE, ASML HLDG, UNICREDIT, SCHNEIDER ELECTRIC, CARREFOUR, NOKIA, VIVENDI, ESSILOR INTERNATIONAL, PHILIPS, SAINT GOBAIN, TELEFONICA
3.000-4.999 Mio. EUR	12	24	DEUTSCHE TELEKOM, L'OREAL, BCO BILBAO VIZCAYA ARGENTARIA, INTESA SANPAOLO, SAP, TOTAL, ASSICURAZIONI GENERALI, FRESENIUS, MUENCHENER RUECK, INDITEX, ORANGE, VINCI
5.000-9.999 Mio. EUR	14	28	BNP PARIBAS, ALLIANZ, BCO SANTANDER, BMW, AXA, UNILEVER NV, LVMH MOET HENNESSY, SIEMENS, GRP SOCIETE GENERALE, ING GRP, BASF, BAYER, SANOFI, ENEL
> 9.999 Mio. EUR	2	4	DAIMLER; ANHEUSER BUSCH-INBEV
Total	50	100	

Source: own representation based on the information from: <https://www.stoxx.com/index-details?symbol=SX5E>, retrieval date: 03/03/2017

Table 3. Five categories for the EBT of the 50 EURO STOXX companies in 2015.

The independent variable women quota and the number of women in supervisory boards can also be categorized into five classes (see table 4).

Interesting is that only one company has more than 10 women on the supervisory board considering that all EURO STOXX 50 companies have different numbers of employees and also different number of members on the supervisory boards. The company Engie (France) has 11 women out of the total 19 supervisory board members, which makes a women quota of 57.89%. As it can be seen Unilever NV too can be mentioned as a

company with a high women quota of 54.55%. In absolute figures, this means 6 women in a supervisory board which has 11 supervisory board members.

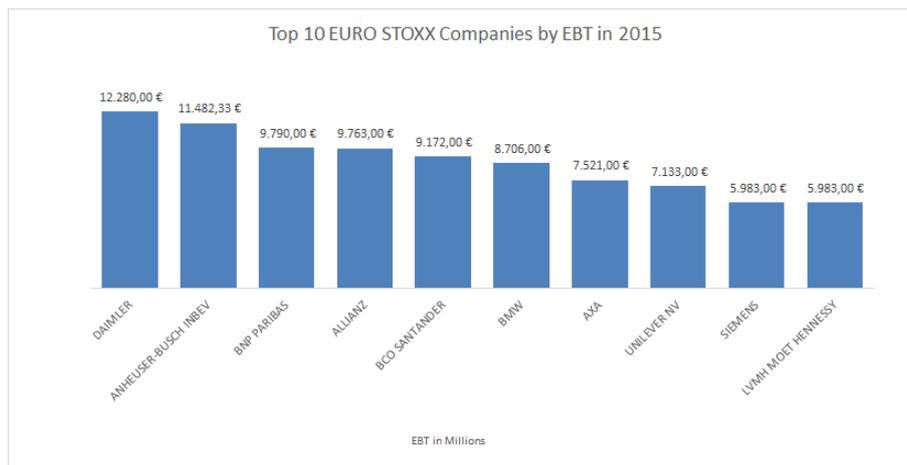
Most companies in EURO STOXX 50 index have 5 to 6 women on the supervisory board causing a women quota of 32% in average for this category.

Women quota			Number of women		
	n	% Companies		n	% Companies
0-20 %	10	20	0-1 women	3	6
					UNICREDIT, ENI, FRESINIUS
21-30 %	13	26	2-4 women	24	48
					ASSICURAZIONI GENERALI, BCO SANTANDER, UNIBAIL-RODAMCO, TOTAL, ALLIANZ, CARREFOUR, LVMH MOET HENNESSY, SAFRAN, SAP, BAYER, ASML HLDG, PHILIPS, BASF, BCO BILBAO VIZCAYA ARGENTARIA, ESSILOR INTERNATIONAL, VOLKSWAGEN PREF, ENEL, ING GRP, INDITEX, NOKIA, AIRBUS GROUP SE, E.ON, ANHEUSER-BUSCH INBEV, TELEFONICA
31-40 %	21	42	5-6 women	16	32
					UNILEVER NV, VIVENDI, L'OREAL, ORANGE, VINCI, SAINT GOBAIN, BMW, SIEMENS, AIR LIQUIDE, IBERDROLA, DANONE, SCHNEIDER ELECTRIC, AXA, SANOFI, INTESA SANPAOLO, DAIMLER
41-50 %	4	8	7-10 women	6	12
					DEUTSCHE TELEKOM, MUENCHENER RUECK, BNP PARIBAS, GRP SOCIETE GENERALE, DEUTSCHE POST, DEUTSCHE BANK
51-60 %	2	4	> 10 women	1	2
					ENGIE
Total	50	100	Total	50	100

Source: own representation based on the information from: <https://www.stoxx.com/index-details?symbol=SX5E>, retrieval date: 03/03/2017

Table 4. Five categories for the women quota of the 50 EURO STOXX companies in 2015.

In order to test the raised hypothesis (H1: Enterprises which have a higher gender quota in supervisory boards are more successful and achieve higher EBT), two steps are necessary. In a first step, the EBT and the EBT / employee of the selected companies should be examined. In a second step, the gender quota per sector and in total should be analyzed for supervisory boards and the findings should be brought together.



Source: own representation – the EBTs of all the 50 companies were taken from <http://www.finanzen.net/> - retrieval date: 03/03/2017.

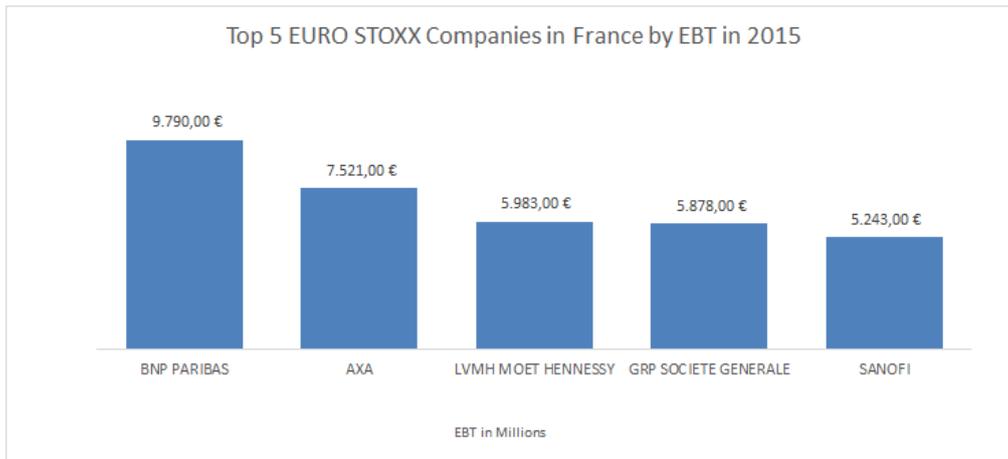
Figure 1. Top 10 EURO STOXX companies by EBT with figures of 2015 in million EUR.

Figure 1 shows a top 10 ranking of the EURO STOXX companies according to their achieved EBT in 2015. On the first place in 2015 was Daimler (Germany) with an EBT of €12.3 million, also the highest value of all companies analysed in this study. Daimler has overtaken Volkswagen (Germany), which was on the first place in 2014 with €10.8 million, but it suffered a serious draw back in 2015 due to the emissions scandal. Daimler is followed in the 2015 EBT ranking by Anheuser-Busch InBev (Belgium) with €11.5 million and BNP Paribas (France) with € 9.8 million.

However, at Daimler only one woman with a STEM qualification is present on the supervisory board. Among the top ten companies by EBT only BNP Paribas can be mentioned as having two women with STEM positions in supervisory board. BNP Paribas is not a typical company where one could expect engineers on the supervisory board. Nevertheless, two women with STEM qualifications are members of the supervisory board. A clear correlation in general between women in total in supervisory boards and especially STEM qualified women and EBT or EBT/ employee cannot be identified.

Due to the fact that the countries Germany and France have the highest number of companies in EURO STOXX 50 index and the highest EBT per company and per employee these two countries are examined more closely.

France is the country with the highest number of companies (20) included in EURO STOXX 50 index and it is an important country in terms of EBT. When the most important companies are analysed BNP Paribas is the biggest company with an EBT of €9.790 million, followed by the insurance company AXA with €7.521 million and LVMH Moët Hennessy with €5.983 million. GRP Société Générale and Sanofi are also in top 5 of the French companies by EBT and it can be observed that especially the sectors ‘Banks’ and ‘Insurance’ have the highest EBT values (see figure 2).

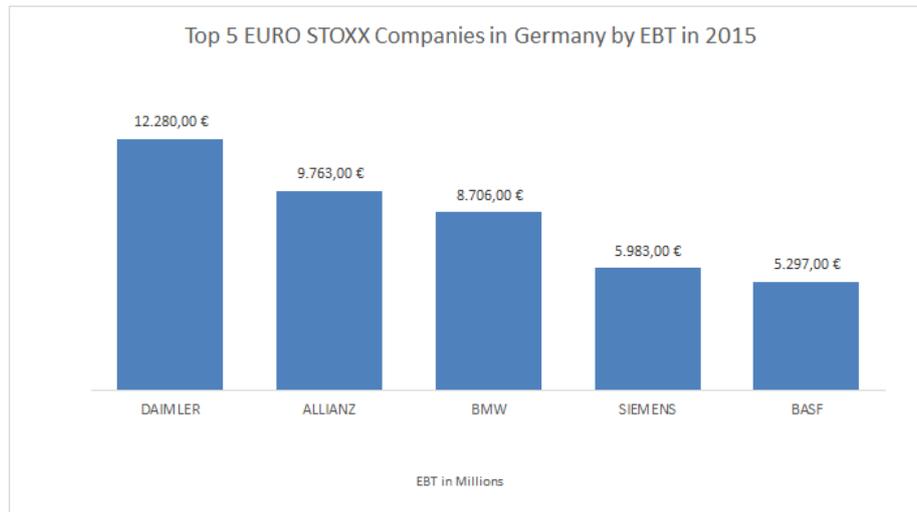


Source: own representation – the EBTs of all the 50 companies were taken from <http://www.finanzen.net/> - retrieval date: 03/03/2017.

Figure 2. Top 5 EURO STOXX companies in France by EBT with figures of 2015 in million EUR.

Looking to the five best companies by EBT in France, Sanofi has three women with STEM qualifications, while BNP Paribas and GRP Société Générale have each two women with STEM qualifications on the supervisory board. This is an indication that more than 50 % of the French best companies by EBT have two or three women with STEM qualifications in their supervisory boards, which shows a slightly positive correlation.

The second most important country from EURO STOXX 50 index in the year 2015 is Germany, which has 14 companies in this index. The highest EBT of all German companies was achieved by Daimler with €12.280 million followed by Allianz (€9.763 million) and BMW (€8.706 million). Siemens and BASF are also in this top 5 by EBT. Compared to France it can be seen that especially the automotive sector is represented twice in this range of companies with the highest EBT. The ‘Insurance’ sector seems to be strong in both France and Germany as in both countries, companies such as Axa and Allianz are in top 5 by EBT (see figure 3).



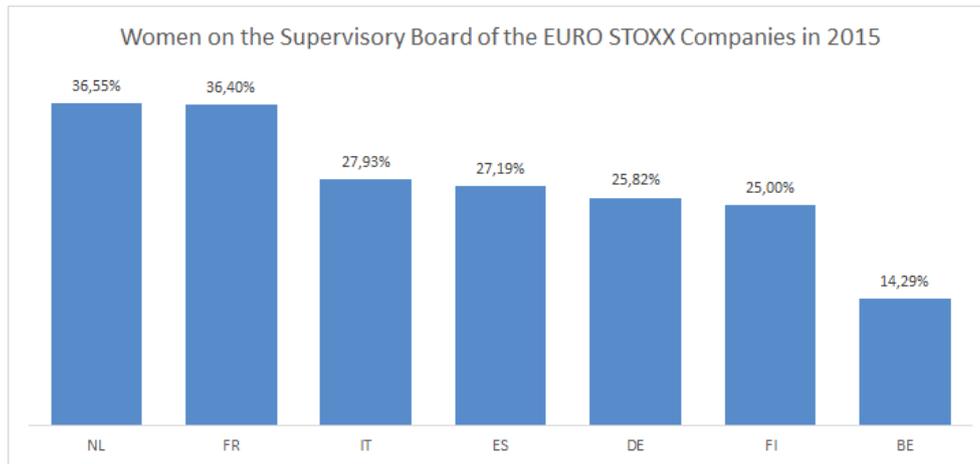
Source: own representation – the EBTs of all the 50 companies were taken from <http://www.finanzen.net/> - retrieval date: 03/03/2017.

Figure 3. Top 5 EURO STOXX companies in Germany by EBT with figures of 2015 in million EUR.

For Germany a slightly different situation can be observed. From five companies that were identified as best companies by EBT only three companies have one woman with a STEM background on board. German companies with two to three women with STEM qualifications on supervisory board are missing from this top five companies by EBT. The conclusion for Germany is that no correlation can be seen between the successful companies by EBT or EBT / employee and the women with STEM qualifications in supervisory board.

If by now the focus was on offering a broad insight on the EURO STOXX companies and the KPI EBT, in the following section the emphasis will be on completing this insight by introducing also the information on gender quotas in supervisory boards as found in the annual reports of the EURO STOXX companies. In this respect, figure 4 shows the percentage of women in supervisory boards in each of the 7 countries.

In six out of the seven countries the women quota in supervisory boards in 2015 is higher than 25% in average. The highest women quota in supervisory boards has Netherlands with 36.6% followed by France with 36.4%. Additionally, it can be seen that the expected women quota of 30 – 40% is not yet achieved by EURO STOXX companies.



Source: own representation – the information with regard to the number of women on the supervisory board was extracted from the 2015 annual reports of the respective companies.

Figure 4. Number of women on the supervisory board of EURO STOXX companies in 2015 in different countries.

5. Discussion of Results and Conclusion

As the statistical analysis of the previous section has shown, hypothesis 1 (H1: Enterprises which have a higher gender quota in supervisory teams are more successful and achieve a higher EBT) cannot be supported.

Especially for women with STEM qualifications, hypothesis 1 cannot be supported because no clear correlation can be seen between the EBT or the EBT / employee and the STEM women quota in supervisory boards.

It should be mentioned that the success of companies is not only driven by women in supervisory boards. All supervisory boards of the 50 EURO STOXX companies consist of men and women and the success of a company is also a result of the entire supervisory board, male and female alike. Furthermore, the presented findings should be supplemented by further research into the topic. One future research direction might be a detailed study on women in supervisory and management boards with STEM qualifications including for instance their exact positions or their leadership span.

The quota of women in the supervisory boards is shown in this article on basis of the year 2015. However, the development of the women quota in supervisory boards remains to a certain degree constant over a period of time. The reason is that the term of office of supervisory board members is fixed via contracts for a certain time span – e.g. five years.

For this reason no massive change of the women quota in supervisory boards is expected in short term. Additional research is needed to shed more light on this issue.

Moreover, as presented in the literature review, female participation in supervisory boards shows mixed results with regard to company performance. Therefore, a more holistic approach is needed, researching not only the number of women on board but also considering women participation in total workforce, industry' sectors, management, subsidiaries, etc.

In the same time EBT as a performance indicator provides only a rough approximation of company success, a combination of indicators could provide better results. Even the consequent measurement of the KPI EBT per employee in all cases as relative figure brings additional insights.

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Open Innovation in Times of Covid-19: The case of Project OxyGEN

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ABSTRACT

In the face of the health crisis unleashed by Covid-19, experts worldwide took on the challenge of designing a low-cost emergency ventilator that could be assembled quickly. This study analyzes the successful case of the Project OxyGEN, led by the Barcelona-based design firm Protofy, which created an industrial-class emergency ventilator and obtained approval from the Spanish Ministry of Health (AEMPS) for use on patients. The project received scientific support from a local Research Hospital, and SEAT, a Volkswagen subsidiary, collaborated in the OxyGEN ventilators' mass-production. This open-hardware project sprung into action teams in more than 32 countries involved in the collaborative design process, adopted or made an iteration of the technology. These teams collaborated with suppliers, consultants, universities, and research institutes to drive this innovation forward. The case highlights the Open Innovation approach, inter-organisational relationships between firms of different sectors with research institutions, and innovation communities.

KEYWORDS

Case study, Cooperation, Covid-19, Innovation communities, Inter-organisational relationships, Open Innovation, Open Hardware.

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1. Introduction

In response to the Covid-19 pandemic, teams of experts worldwide took on the challenge of designing a low-cost emergency ventilator that could be assembled quickly. A particularly successful case is the OxyGEN Project, led by the Barcelona-based design firm Protofy. Building on MIT's production guidelines and scientific support from a local Research Hospital, Protofy created an industrial-grade emergency ventilator, which obtained approval from the Spanish Ministry of Health (AEMPS) for patients. SEAT, a Volkswagen subsidiary, collaborated with Protofy in the mass-production of OxyGEN ventilators.

The OxyGEN ventilator is an open hardware project which sprung into action teams in 32 countries. This community contributed to the design process, adopted, or made an iteration of the technology. These teams are also collaborating with suppliers, consultants, clients, universities, and research centers in their countries to drive this innovation forward.

This case study aims to describe and analyse the Project OxyGEN from the perspective of open innovation. We asked ourselves what characteristics and internal organisational practices of Protofy were remarkable to carry out this innovation during the Covid-19 pandemic and interact with the innovation community built around this open hardware project.

The paper is organized as follows: Section 2 addresses the literature review, section 3 briefly describes the methodology and data collection, section 4 presents the case, section 5 discusses the findings, and finally, section 6 draws conclusions, limitations, and future research.

2. Literature Review

2.1. Open Innovation

Open innovation holds that firms can and should use external and internal ideas and paths to market as they look to advance their technology (Chesbrough et al., 2006). As a result of firms adopting an Open innovation approach, Gassman and Enkel (2007) identify three

processes: a) The outside-in process (inbound), where the integration of suppliers, customers, and external knowledge sourcing increase a company's innovativeness, b) The inside-out process (outbound), occurs through external exploitation of internal ideas in different markets, selling IP and multiplying technology, and c) The linking outside-in and inside-out processes by working in alliances with complementary companies.

Although there are more studies focused on the inbound process (e.g., Bianchi et al., 2010; Chesbrough and Crowther 2006; van de Vrande et al., 2009, Parida et al., 2012) than those on the outbound process (e.g., Lichtentaler, 2009) both show positive effects on the performance of the firm. However, there is consensus that to benefit from open innovation successfully, a firm requires absorptive capacity and some higher-order management capabilities to align inbound knowledge flows with the firm's in-house innovation activities.

Besides, Brunswicker and Vanhaverbeke (2015a) argue that the nature of the external source of knowledge (e.g., customers, suppliers, universities, research institutions, competitors, consultants) for inbound processes are different, thus the organizations, according to their internal organizational practices, adopt different strategies to take advantages of each source purposely. These strategies are (1) minimal searcher, (2) supply-chain, (3) technology-oriented, (4) application-oriented, and (5) full scope sourcing.

The minimal searcher (Type 1) does not actively interact with external sources to combine internal and external potentials. Supply-chain (Type 2) has relatively intense interactions with direct customers and suppliers compared to other external sources. Technology-oriented firms (Type 3) have a relatively high degree of cooperation with universities, research organisations, and IPR experts. The application-oriented and demand-driven innovation are characteristic of the application-oriented Searcher (Type 4). Finally, the full scope-searcher (Type 5) is heavily involved in knowledge sourcing, shows a strong interest in external ideas from various innovation sources, and built an innovation ecosystem for new ideas.

It is worth noting that the authors also suggest that these strategy types map onto four internal organizational practices for innovation that help support and enable external knowledge sourcing and alignment at strategic and operational levels: They are (1) long-term investment activities, (2) innovation strategy processes, (3) innovation development processes, and (4) innovation project control.

The first practice involves innovation management directing a company's innovation efforts toward project-focused activities whose purpose is to build long-term knowledge rather than produce short-term results (Brunswick and Vanhaverbeke, 2015b). The implementation of innovation strategy processes helps to identify and recognise the value of new external information and knowledge and direct internal innovation activities (Nelson and Winter, 1982). The third organisational practice: innovation development, which helps to assimilate and transform new knowledge (Tidd, 2001). Finally, innovation project control is related to the firm's actions to reconfigure activities (Benner, 2009; Goffin and Mitchell, 2005) and ensure that innovation measures are carried out within budget, schedule, and satisfactory level performance (Robertson et al., 2012).

Based on the typology mentioned above, this case study examines the firm Prototyfy to determine its external knowledge sourcing strategy and internal organisational practices to leverage inbound knowledge flows for the OxyGEN project.

2.2. Innovation Communities

The first studies on innovation communities were carried out in the context of open-source software projects, typically initiated by individuals or small groups, where they are more observable the interactions between users and the role of communities. However, innovation communities have also been part of the development of physical products in a very similar way (von Hippel, 2005). In 2011, inspired by the free software movement, open-source hardware appeared. Both share similar characteristics and benefits, such as a high level of transparency in the development process, a high level of continuous improvement, and, again, high community participation (Merkel et al., 2012a).

West and Lakhani (2008) point out that communities and their role in the innovation process fit within and offer an opportunity to extend the firm-centric concept of open innovation. Considering them to be a "voluntary association of actors, typically lacking in a priori common organisational affiliation (i.e., not working for the same firm) but united by a shared instrumental goal, creating, adapting, adopting, or disseminating innovations."

Regarding intra-community interactions, the peer-to-peer community support facilitates the adoption and use of innovation (Lakhani and von Hippel, 2003). Meanwhile, identification and interaction within a community mean that innovations fuel imitation and extension by other user innovators (von Hippel, 2001).

Fitcher K. (2009) highlights the role of innovation communities as networks of promoters, redefining innovation communities as "An informal network of like-minded individuals, acting as universal or specialised promoters, often from more than one company and different organisations that team up in a project, and commonly promote a specific innovation, either on one or across different levels of an innovation system."

Based on the framework mentioned above, the case study set out to analyse the community created around the OxyGEN project and its participation in developing and disseminating this innovation.

3. Methods

3.1. Case study methodology

This research used the case study methodology to document and analyse the OxyGEN emergency ventilator's development during the first wave of the Covid-19 pandemic. First, we describe Protogy, the firm that led, accelerated, and developed the project, followed by the context of the Covid-19 outbreak in Spain. Then, we recount the design and development of the Oxygen emergency ventilator itself and finally describe the innovation community built around the project, which played a crucial role in its manufacturing and global distribution.

The case study method was chosen for its suitability for showing how open hardware and the open innovation approach combined to drive innovation forward. As Yin (2009a) remarks, one of the strengths of the case study research methodology is that it provides a rich contextual analysis of the unit of study, at a qualitative detail that cannot be replicated using quantitative or experimental methods.

3.2. Data collection

The primary data sources for this case-study are interviews, surveys, and documental review. Interviews were conducted with the co-founders of Protofy to discuss their perspectives and experiences. We used a semi-structured format for this interview. The interviews were recorded and transcribed to assist in the analysis.

We applied the surveys in the second half of April, during the lockdown. The criterion for selecting the sample subjects (project/team leaders) was the completion of a self-administered questionnaire, through the Google Forms application (online), due to its flexibility and suitability to adjust to the needs of the research for free and without limitations (Abundis, 2016).

The questionnaire consists of 12 questions divided into three sections: general information about the project and team profile, degree of involvement in the OxyGEN project, and cooperation with partners in their respective countries.

Annex 1 shows the questionnaire applied to the OxyGEN community.

The questionnaire's link was sent to all OxyGEN community members registered on Discord.com, the team members' platform to communicate and share relevant information for each project's development. The response level reached 62%, which corresponds to 30 projects/teams worldwide.

Relevant company documents were also analysed. These included the blog, video journal, tutorials, publications in newspapers and magazines, the project's dedicated website, and participating partners' publications.

An active dialogue was maintained with Protofy to clarify inconsistencies and expand and develop the data. In the case of study research, by collecting and cross-examining data about the innovation process from multiple sources, data collection and interpretation are likely to be an accurate representation of reality (Yin, 2009b).

4. The OxyGEN Project

4.1. The company

Protofy is a company based in Barcelona, specialized in the design, engineering, and rapid prototyping of creative and innovative ideas. Protofy prides itself on its agility and its ability to work in close collaboration with its customers and stakeholders.

The company was created in February of 2016 by a multidisciplinary team of young engineers committed to quality, safety, and technology. The team currently consists of seven people, equipped with the knowledge, tools, and talent to design all kinds of electronic circuits incorporated and mechanical parts, Internet of Things (IoT) development, and software development for both desktop and mobile devices.

Protofy's service includes all development stages, from idea generation, testing, prototyping, and redesign of iterations. They aim to integrate hardware (mechanics, electronics, electricity) and software to provide high-quality technological solutions.

This small but knowledge-intensive company stands out for its speed to carry out the projects, between three and six weeks. According to Lluís Rovira, co-founder, this is due to the use of project tools such as lean and scrum, which let them plan and develop projects as design iterations validated by the clients and users. Protofy also has a distinctly developed capacity to create collaboration networks with suppliers and other market participants.

4.2. The problem

The first imported Covid-19 case in Spain was dated January 31, 2020, in the Spanish Canary Islands. One month later, on February 25, 2020, the first case was reported in the Spanish peninsula. However, Covid-19 cases were likely circulating in Catalonia before the official cases were reported (Coma et al., 2020). As Covid-19 confirmed cases grew

exponentially, on March 30, a national lockdown was declared, and all non-essential activities were suspended.

By April 4, Spain had become one of the worst-hit countries by the pandemic. The number of infected rose to 124,736 cases, 57,612 were hospitalized, and 11,700 deceased (Department of National Security DNS, 2020). The number of patients admitted to ICUs reached 3078 cases (Spanish Ministry of Health, 2020). According to the Spanish Scientific News Agency SINC (2020), between 10% and 15% of patients admitted to hospital with pneumonia caused by Covid-19 are admitted to the ICU, 90% of which require intubation and mechanical ventilation, generally for at least two or three weeks.

Thus, one of the most challenging problems to face during the pandemic was the sudden lack of ventilation equipment in intensive care units. With the international markets undersupplied and countries outbidding each other for equipment, locally developing and manufacturing ventilators became the most viable, if not the only option for Spain and many other countries.

4.3. The OxyGEN Ventilator

According to the interview with the founders of Protofy, what motivated them to carry out the OxyGEN Project was to contribute with their knowledge to solve the problem of the insufficient number of mechanical ventilators in the local hospitals to avoid loss of life, and to some extent also try to help alleviate the situation in remote small towns or less developed countries. Thus, their team of engineers set out to design a low-cost emergency ventilator that would be easy to build, with available materials that could be easy to find amid curfews and nation-wide lockdowns.

The team began looking for the technical requirements for the ventilator design and found valuable information shared by other experts who were also working around the world. In particular, MIT's emergency ventilator design toolkit proved useful to the team, and Protofy's design was eventually featured on MIT's website.

Very early, the team also adopted the Open-hardware strategy to carry out the project. They decided to create a dedicated website to document their journey, share information

about the project, and make their design available to download by interested builders worldwide. The decision to create a dedicated website and publish it both in English and Spanish proved to be pivotal, as search engines eventually indexed and gave their site great exposure, especially in Spanish-speaking countries.

The team had to overcome lockdown restrictions to procure the first set of pieces and materials, but they moved quickly with creativity and teamwork. They tapped into their network for expert advice when needed and created a community workspace, also known as "server" on Discord.com, where they could communicate, share information, and problem-solve about the project more effectively with people from their network, as well as visitors to the project's website. In a record time of three days, the team built the first version of the volume-controlled ventilator in wood with two innovative features: a) The use of a Bag Valve Mask Unit (BMV), also known as Ambu bag or manual resuscitator. A standard piece of medical equipment used for patient ventilation in ambulances and b) A retrofitted windshield wiper motor to provide compression.

After a series of iterations, the team decided to separate the design into two versions: a) OxyGEN-M, which can be made at makers' facilities using wood or methacrylate; and b) OxyGEN-IP, an industrial model in sheet metal, designed for mass-production.

Further into the design process, they sought scientific support from the Hospital and Research Institute Germans Trias and Pujol (IGTP) and the Faculty of Medicine and Health Sciences of the University of Barcelona. The hospital's involvement during ideation brought medical expertise and credibility into the project. It is worth noting the absorptive capacity of the hospital staff. Interviewees commented that one of the medical doctors happened to have an engineering degree, which created a natural affinity with their team.

Under the supervision of the medical personnel of the hospital, they carried out all the clinical trials. On March 30, 2020, they obtained a special authorization from the Spanish Ministry of Health (AEMPS) for the OxyGEN model-IP to be used in patients.

Finally, SEAT, a Volkswagen subsidiary, carried out the OxyGEN-IP model's mass-production at their Martorell factory. For this, they modified some of its vehicle assembly lines to assemble the electronic and mechanical components, among them the adapted motor of the windshield wiper, performing an exhaustive quality control with ultraviolet light sterilization. More than 150 employees participated in production to attend to the needs of health care centers. In total, 600 OxyGEN ventilators were produced. Equivalent to 20% of the projected demand in Spain for emergency respiratory equipment due to the Covid-19 outbreak. More than 15 enterprises among suppliers, hospitals, universities, research institutes, and authorities cooperated in carrying forward the OxyGEN project in Spain. Inspired by their success, other Volkswagen subsidiaries from Brazil and Eastern Europe followed suit and produced Oxygen ventilators for their countries.

4.4. The OxyGEN Community

The OxyGEN community is made up of 241 active members distributed in 47 teams in 32 countries. On average, there are five members in each group. Most of the teams (53%) belong to the Americas, 19% to Europe, 15% to Asia, and 13% to Africa. Table 1 shows the OxyGEN community members' distribution.

Continents	Countries		Teams		Members	
	N	%	N	%	N	%
America	13	41%	25	53%	150	62%
Europe	8	25%	9	19%	45	19%
Asia	7	22%	7	15%	28	12%
Africa	4	13%	6	13%	18	7%
Total	32	100%	47	100%	241	100%

Source: <https://www.oxygen.protofy.xyz/community>. Own elaboration.

Table 1. OxyGEN Community members.

The community teams are multidisciplinary. They are made up of engineers from different areas: industrial, mechanics, electronics, and computer science. About 26.32% of teams count with the support of doctors or health personnel; approximately 36.84% of teams count with designers, and another 36% are made up of professionals in other areas. Figure 1 shows the members' profiles of the teams.

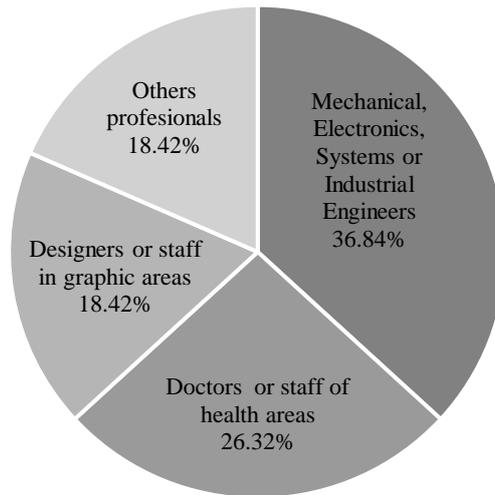


Figure 1. Profile of OxyGEN community members.

The OxyGEN community was formed very early in the project. Because of that, about 43% of teams collaborated directly in the design of the first OxyGEN prototype, but others joined quickly and learned from the experience gained to apply it to their projects. Once Prototyfy company released the manual for ventilator design and construction, 36% of community member teams directly adopted the design. The remaining 64% iterated on the design to develop their own derived version of the ventilator. Figure 2 shows the technology adoption.

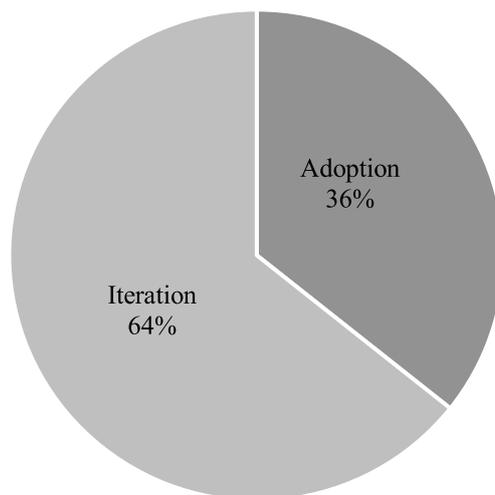


Figure 2. Technology adoption among members of the OxyGEN community

At the time of this study, 43% of the projects are in the prototyping phase, 38% are waiting for authorization from other entities or institutions, and 21% have reached the manufacturing stage. Figure 3 shows the status of the projects.

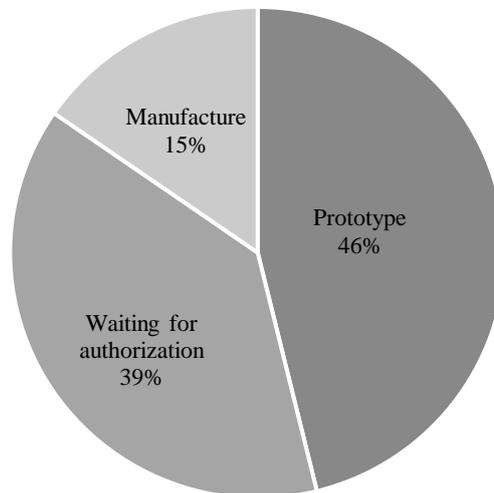


Figure 3. Status of projects in the OxyGEN community.

Most of the teams collaborated with suppliers of equipment, materials, components, and software inside the community (31%), consultants and laboratories outside of the community (27,6%), other teams in the OxyGEN community (17%), and the remaining 30% with universities or research institutes. Figure 4 shows the collaboration of the teams with different partners.

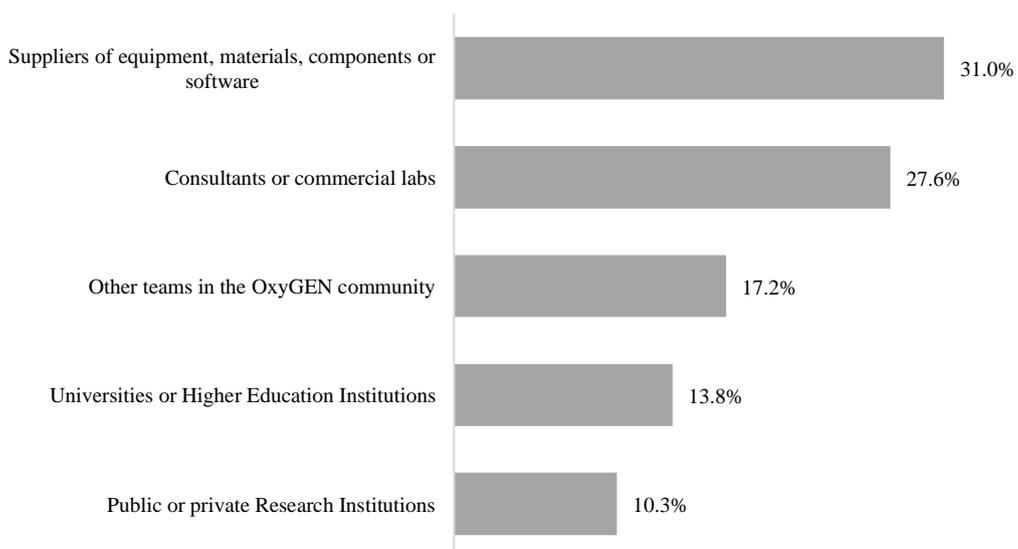


Figure 4. Collaboration partners

5. Discussion

According to the results, the characteristics and internal organisational practices of Protofy and the Project Oxygen community which enabled them to develop and carry out this innovation during the Covid-19 pandemic correspond to the three processes of open innovation: the inbound process, the outbound process, and the linking of inbound and outbound processes (Gassman and Enkel (2007).

5.1. Inbound Process

At the beginning of the process, Protofy had to find useful ideas and external information to develop their project. Nevertheless, the firm had well developed internal organizational practices for open inbound innovation already, which allow us to characterize it as a "full-scope searcher." Brunswicker and Vanhaverbeke (2015) point out that firms in this typology are heavily involved in knowledge sourcing, show a keen interest in external ideas from various sources, and have built an innovation ecosystem for new ideas. The number and diversity of Protofy's sources (researchers in universities, companies, or teams in the world who also had taken on the challenge of creating an emergency ventilator) are a straightforward exhibit of this profile.

The internal organizational practices observed implementing/supporting this innovation sourcing profile are:

1. Innovation strategy processes. Protofy used the open hardware strategy for the development of a low cost and quickly-to-assemble emergency ventilator. Precisely, some benefits of the open-source hardware are a significant source of good ideas, high participation of the community and a high level of transparency in the development process, a high development speed, often high modularity in their solutions, extraordinary development potential for free and a high level of continuous improvement (Merkel et al., 2012b). Niezen et al. (2016) point out that such advantages are particularly well suited for medical equipment production.
2. Innovation development processes. Protofy created an ecosystem to share ideas and solutions to develop the OxyGEN project collaboratively. The practice to document and make everything publicly available in different media formats and platforms, with

a particular preoccupation on how others can make use of their design or how they can be engaged in co-designing the prototype, was critical in building a community of co-innovators and promoters of the innovation.

3. Innovation project control. Protofy used agile project management methodologies to enable rapid prototyping. Well suited to the crisis, which demanded a fast response. Furthermore, workflows built around close and constant communication with customers translated well to dealing with Hospital staff to co-design the ventilator and work with stakeholders in a clinical trial and industrial settings.
4. Long-term investment activities. Protofy carried out the OxyGEN project motivated solely by its spirit of collaboration in the face of the health crisis. However, the activities carried out for the construction of a medical device successfully in such a short-time contributed to developing new knowledge and skills in the project's team. The company could exploit this investment of time and resources in new healthcare industry projects or others.

5.2. Outbound process

The inside-out (outbound) process occurred through the release of OxyGEN ventilator design so that other individuals, teams, manufacturers, or companies could take it and develop their projects. These individuals or firms became part of the community either by adopting or interacting with the technology.

This community of co-innovators and promoters of innovation played a fundamental role in developing and expanding this innovation to other countries. The community interactions with Protofy helped overcome the challenges intrinsic to developing medical technology, while support among the community members facilitated its adoption and use. The leadership of promoters and managerial skills aforementioned allowed Protofy to find complex solutions in a collaborative environment. Based on the results obtained of the survey to the OxyGEN community, below we point out the characteristics beyond the firm level that facilitated the adoption/iteration of the technology:

1. Multidisciplinary teams. This characteristic allows them to find rapid solutions to complex problems or situations.
2. Collaborative technologies support effective communication. They enabled real-time communication, mutual support and allowed massive exposure.
3. Open access to knowledge and information. The pandemic created the conditions for the practice of open innovation to become widespread. This climate of willingness to cooperate in response to the pandemic was further facilitated by using the Creative Commons Licence, which removed legal barriers to involving enterprises such as car manufacturers. In Canada, for instance, car manufacturing companies willing to collaborate with medical technology firms also emerged in response to the pandemic. However, the collaboration did not occur to the same degree due to legal concerns (Globe and Mail, 2020).
4. No language barrier. The community quickly became populated by members from different nationalities, who, in turn, facilitated access to the technology by people from non-English speaking countries.
5. Low level of competition. Developing countries found themselves unable to compete in international markets to acquire the necessary medical equipment during the pandemic, nor did they have local companies to manufacture such equipment. This issue could explain the predominance of teams from developing countries and the absence of teams from advanced economies.
6. Network effects. The initial collaboration with all types of local partners: suppliers, consultants, or commercial laboratories, universities, and research institutions, in turn, fostered the involvement of similar institutions in other countries.

5.3. Linking of inbound and outbound processes

Profy moved to established alliances with relevant and complementary companies to advance the development and adoption of the OxyGEN Ventilator. The GTP Research Hospital and SEAT, most notably, were the partners whose involvement in the project

had the most transformative effect. Partnership with the Research Hospital resulted from Protofy's initiative; however, SEAT's participation came about due to the prior relationship with that company, which had hired Protofy in the past. Acquiring knowledge through the partnership with the Research hospital, while recasting SEAT to make use of one of their designs once again, demonstrates this firm's ability to link inbound and outbound processes to advance their purpose.

6. Conclusions

This case study set out to describe and analyse the OxyGEN Project from the perspective of Open Innovation. In response to the health crisis caused by the Covid-19 outbreak, Protofy, a Barcelona-based design company, led this project, which prototyped, developed, mass-produced, and distributed an industrial-class emergency ventilator to hospitals worldwide by creating an innovation community around the project. Protofy pursued this project with non-profit motivations, yet it provides a useful example of how open innovation strategies and building innovation communities can reduce time to market and increase technology adoption rates.

For this innovation project's design and development, the company directed its efforts to search for external sources of knowledge through cooperation with clients, suppliers, universities, and research centers. In other words, adopted an inbound open innovation process. Also, it deployed its ability to create an innovation community, combining an outbound open innovation process with an open hardware strategy, following the trend of companies adopting practices and values of the open-source movement to advance technological development and project goals.

The organizational practices observed and the strategies adopted by the company also allowed us to characterize Protofy as a "full-scope searcher." Brunswicker and Vanhaverbeke (2015) define firms in this typology as those which are: heavily involved in knowledge sourcing, show a keen interest in external ideas from various sources, and have built an innovation ecosystem for new ideas. Protofy's example, in particular, shows how firms who adopt a full-scope searcher innovation strategy can respond quickly to dramatic change.

The Oxygen community played a dual role in the project's development, as co-creators and promoters of this innovation. As Von Hippel (2006) points out: "Democratization of the opportunity to create is important beyond giving more users the ability to make exactly the right product for themselves. The joy and the learning associated with creativity and membership in creative communities are also important". It was this sense of community the main factor which channeled international enthusiasm into action. This factor, which combined others mainly: the teams' multidisciplinary, collaborative tools to support remote work and effective communication, and a climate of openness for inter-organizational partnerships, resulted in a remarkable response to the Covid-19 pandemic.

For academics, this case study provides an example of open innovation in the crisis and inter-organizational collaboration between firms of different sectors (industries and services) with universities and research institutes. In particular, evidencing how knowledge-intensive business services (KIBS) cooperate with research institutions to receive scientific support and apply knowledge transfer for innovation. (Lee and Miozzo, 2019).

For companies, this case highlights the importance of community-building and developing internal capabilities to co-create with innovation communities. As a way to adopt external knowledge sourcing strategies and take advantage of open innovation.

Policymakers may use this case study to support the streamlining of approval processes for medical equipment and policies to promote public-private research projects.

The main limitation of a case study is that it cannot be generalised but allows digging into how and why questions. In that sense, further empirical research could analyze a sample of industries and services that used open-source values and strategies to innovate during the pandemic. Furthermore, future research could be performed regarding firms that reinvented themselves, innovated their products or services using collaborative tools during the pandemic. Also, to investigate the effects of the new forms of work enabled by these technologies on their organizational structure.

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Does an internship in Business Administration enhance professional competences?

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ABSTRACT

The aim of this study was twofold. First, we want to determine which competences are acquired through an internship, as well as the levels of attainment. Secondly, we want to compare the levels of achievement in two different universities, since we are interested in proving whether the university of origin affects the final results. We thus organized competences following the classification made by the Tuning project, which groups them as instrumental, interpersonal and professional. A questionnaire was distributed among the students participating in internships, and the firms offering them in each university, to assess their perceptions of the competences.

We used the SPSS statistical package to conduct a set of mean tests to identify differences between the perceptions of the students and firms. Students acquire a higher level of professional competences than instrumental or interpersonal competences. There are also differences according to university, which suggests its importance.

KEYWORDS

Internship, Professional Competences, Higher Education.

1. Introduction

In recent years, many universities have started to offer internship opportunities to their students. Although internships can be conducted as a curricular or an extracurricular activity, studies have shown that the majority of colleges offer internships as a component of their academic program (Hergert, 2009). Knouse and Fontenot (2008), undertook a research review of the benefits of internships, and concluded that their main benefits are: (a) enhancing employability, as they can help students find jobs or an internship can be directly translated into a full-time job (b) creating real work experiences for students, which motivate them to continue along a career path, and (c) creating realistic expectations about the real business world and helping to clarify a student's career intentions. Although all these benefits are obtained from an internship experience, Milne and Caldicott (2016) note that many universities basically incorporate internships (work integrated learning) to fulfil their mission of providing graduates who are ready for work within industry.

Evaluating and assessing internship activities is considered important in order to improve university business programs (Beard, 2007). Internship programs often consider the opinions and evaluations of employers in assessing student performance, as employers are the best judges of professional competences (Milne and Caldicott, 2016). The combined assessment of the learning experience by the student, the company employer, and the academic supervisor can be an integral part of the overall program evaluation (Beard, 2007).

The interaction and evaluations of students, employers, and university faculty members provide information about student traits, knowledge, skills, and behavior, as well as perspectives on coursework activities, and can even suggest curriculum changes. These outcomes are priceless and can help both future students and professionals (Beard, 2007). After analyzing the importance of the evaluations and interactions between a student and their employer, this paper compares the skills and knowledge acquired after an internship program from both sides (student and employer) in two different universities.

2. Sample and Methodology

This study analyses the skills and competences acquired by students on a Bachelor's Degree program in Business Administration after their internship placement. The

evaluated students were enrolled at two different universities in Barcelona, Spain, and for privacy reasons, the universities have been called University X, and University Y. All the students were evaluated by their employers at the end of the internship period, and each student also had to fill in a self-assessment questionnaire.

The sample for this study included the answers of 81 students and 210 tutors who had participated in internships at University Y, and of 118 students and 118 tutors who had participated in internships at University X. In total, the sample comprises 527 individuals: 199 students and 328 tutors.

The first step was to compare the questionnaires from both universities and the competences analyzed. The competences were named differently and classified under different areas at each university, and so an initial analysis was conducted to classify each competence and determine which were comparable.

After studying the different competences and skills in the questionnaire, three different areas were created, following the widely accepted Tuning project: (1) Professional Competences, (2) Instrumental Competences, and (3) Interpersonal Competences. This taxonomy meets the objective of including the spectrum of abilities needed throughout working life, without establishing any kind of hierarchy among them (Pagani, 2009). The project was intended to address and realize several of the Bologna action lines, and involved some 100 institutions, including the European University Association (EUA) and the national Conferences of Rectors (González and Wagenaar, 2003, 2005).

Table 1 shows which competences and skills were classified under each of these areas. The other skills and competences in the questionnaires were not considered for this study due to impossibility of comparison between universities.

University X	University Y
Professional Competences	
<ul style="list-style-type: none"> • They show willingness to learn and make efforts to work well 	<ul style="list-style-type: none"> • Learning ability
<ul style="list-style-type: none"> • They strive to understand the company and the sector 	<ul style="list-style-type: none"> • Degree of knowledge of the internal dimensions of the company or other organizations
	<ul style="list-style-type: none"> • Degree of knowledge of agents and the economic, legal, political, sociological environment

	<ul style="list-style-type: none"> • Ability to value the internationalization strategies of the company or other organizations
<ul style="list-style-type: none"> • They demonstrate initiative in their work 	<ul style="list-style-type: none"> • Initiative and entrepreneurship
<ul style="list-style-type: none"> • They are motivated in their work 	<ul style="list-style-type: none"> • Self-sufficiency and motivation for success
Instrumental Competences	
<ul style="list-style-type: none"> • They are effective in solving problems and dealing with incidents 	<ul style="list-style-type: none"> • Problem solving
<ul style="list-style-type: none"> • They know how to plan and prioritize their work 	<ul style="list-style-type: none"> • Organization and planning capacity
<ul style="list-style-type: none"> • They show self-confidence and autonomy in the development of their functions 	<ul style="list-style-type: none"> • Capacity to work autonomously
<ul style="list-style-type: none"> • They are able to correctly use the new technological resources 	<ul style="list-style-type: none"> • Computer skills
<ul style="list-style-type: none"> • They are able to apply theoretical knowledge in their job 	<ul style="list-style-type: none"> • Ability to apply knowledge to practice
Interpersonal Competences	
<ul style="list-style-type: none"> • They are a good team player and perform the part of the work that is assigned to them 	<ul style="list-style-type: none"> • Ability to work as a team
<ul style="list-style-type: none"> • They communicate in a concrete/precise and clear way 	<ul style="list-style-type: none"> • Oral communication in Catalan and/or Spanish
	<ul style="list-style-type: none"> • Ability to transmit knowledge

Table 1. Equivalent Competences for Comparison Purposes.

The next step was to homogenize the data obtained from the questionnaires. The questionnaires were classified into four groups: (1) University X Student Self-Evaluations, (2) University Y Student Self-Evaluations, (3) University X Employer Evaluations, and (4) University Y Employer Evaluations.

The questionnaires from University X consisted of statements that had to be rated by each student/employer using a scale from 1 to 4, with 1 being the lowest value and 4 the highest (excellent). The questionnaires from University Y had to be rated on a scale from 1 to 10, however, with 1 being the lowest (worst) value and 10 the highest. In order to compare all data, the answers from University Y were converted to a 1 to 4 scale. It is important to remember that this difference in scales may have introduced bias into the analysis.

After eliminating the questionnaires that were not completed correctly or included blank answers, we finished with 74 valid questionnaires for the University X Student Self-

Evaluations, 76 valid questionnaires for the University Y Student Self-Evaluations, 71 valid questionnaires for the University X Employer Evaluations, and 198 valid questionnaires for the University Y Employer Evaluations.

3. Results

The t-test was used (via SPSS software) to search for significant differences between means. This was first in order to compare the student self-assessments between the two universities for each set of competences. Secondly it was used to assess the existence of differences between students from both universities, according to the assessment made by the employer. Again the three sets of competences were tested. In each case Levene's test was conducted to identify invariance and an associated t-value was found.

3.1. Student self-evaluations

Figure 1 shows the means obtained from the student self-evaluations, grouped according to the different competence areas. Interpersonal Competences were aspects related to teamwork and proper communication. The Instrumental Competences included topics like problem solving, prioritization and work organization, the appropriate use of technological resources and the application of theoretical knowledge to real case scenarios, and the set of Professional Competences included aspects related to motivation and initiative at work, as well as aspects related to effort and willingness to learn about the company and its sector or industry.

Students from University X rated themselves significantly higher than students from University Y. Although there is little difference (Table 2) between Instrumental and Interpersonal Competences (0.34 and 0.31 respectively), it is interesting to notice that the difference for professional competences jumps to 0.82.

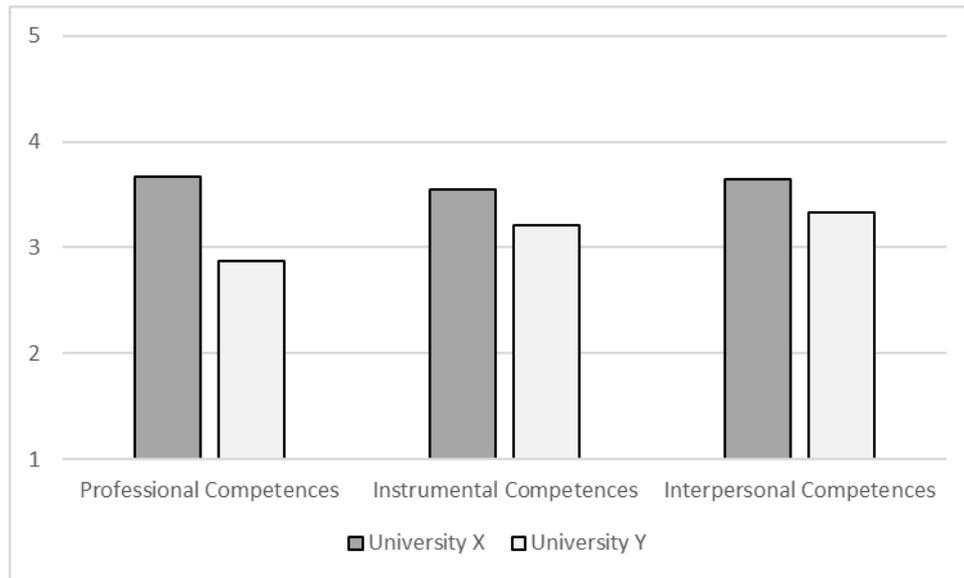


Figure 1. Student Self-evaluation Means.

	University X	University Y	Differences	t-test
Professional Competences	3.67	2.84	0.82	9.13
Instrumental Competences	3.56	3.21	0.34	4.31
Interpersonal Competences	3.64	3.33	0.31	4.14

Table 2. Differences Between Student Self-Evaluations.

3.2. Employer self-evaluations

Figure 2 shows the average results when comparing the employer self-evaluations for each student. Table 3 summarizes the significance level of the differences. Again, those companies with interns studying at University X, rated the student competences with higher values than those from University Y. The differences follow a similar pattern to that obtained in the analysis of the student self-evaluations, however, in this case, the discrepancies for Instrumental and Interpersonal Competences increased to 0.49 and 0.46 respectively. Professional Competences is again the area with the greatest gap (0.78 points).

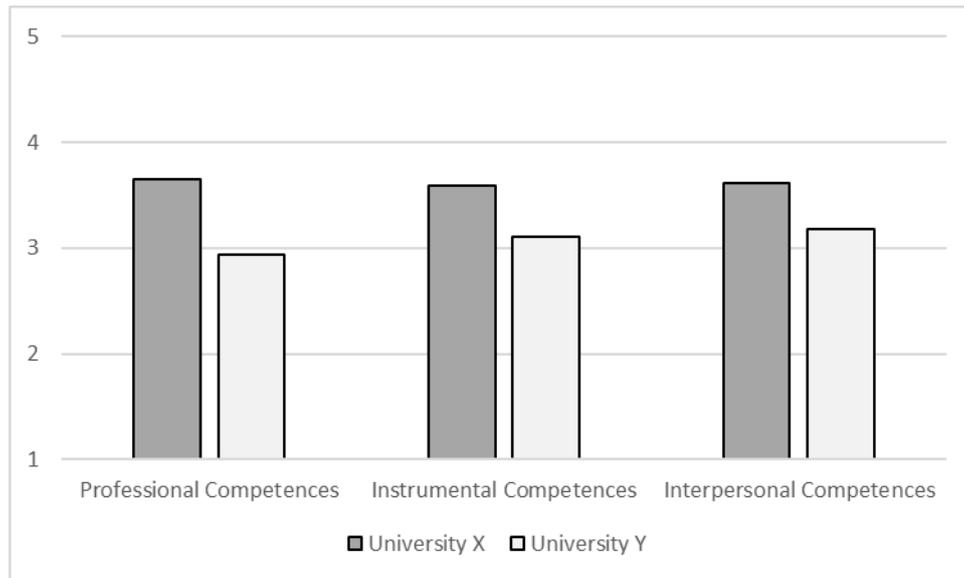


Figure 2. Employer Self-evaluations Means.

	University X	University Y	Differences	t-test
Professional Competences	3.68	2.90	0.78	7.73
Instrumental Competences	3.61	3.12	0.49	5.37
Interpersonal Competences	3.66	3.19	0.46	5.08

Table 3. Differences Between Employer Self-evaluations.

4. Discussion

4.1. Description of the structure

There were some differences in the structures that support the work placement programs in the universities. University X referred to only one faculty (Business and Economics) and the students were managed by this faculty, while those at University Y referred to several faculties and students were managed by a central office, although most of the trainees belonged to the Business and Economics faculty. The first difference, then, involved the volume of managed internships, where University Y had more than University X (also due to the difference in the size and the age of both universities). A first bias may thus be related to the volume of students and tutors involved. Smaller numbers can favor more personalized attention between students and tutors.

Such personalization can be seen in the program that University X has for its future graduates, which includes six sessions with students, in which they are given training in how to write their CVs, a mentoring session is held, and there is then an individualized

meeting about their preferences and to provide advice. There is also a simulation session on how to pass a personal interview, and another with instructions on how to manage a professional career in the short and medium term. Finally, a session on personal skills in professional practice is offered. University Y offers a wide range of courses and training sessions for students who are finishing their studies. They are managed from a centralized office by technicians with extensive experience in the entrance of students into the labor market. The various faculties thus hold workshops for the development of professional competences (personal branding, communication skills, assessment center etc.) are also held, as well as colloquia and round tables with the participation of companies, and a series of quick interviews or speed networking sessions. It is not clear whether all students attend one or more of these training sessions, however, since there is no obligation to do so. Both universities organize a University-Enterprise Day, in which different companies are invited to introduce themselves to the faculty, and where students can leave their CVs and speak with representatives of these companies.

4.2. Design and evaluation of the procedures

Overall procedures are a crucial duty of any organization. They ensure consistency and help gain compliance. Correctly drafted procedures guide actions towards success. They should thus be designed to appropriately document the steps required towards the final purpose, detailing all the tasks to be performed. It is paramount that they are constantly reviewed and updated. This requires to focus on the evaluation of procedures and how improvements are expected to be incorporated. Nor should it be forgotten to collect evidence that will allow the recommended improvements to be identified.

In this study it was important to establish a double follow-up, the purely professional, linked to the company, and the academic, linked to the university, and to organize everything around an academic coordinator, who would develop tasks in both areas, the company area, mainly dealing with the establishment or renewal of agreements, the validation of internship offers, the dissemination and assignment of students; and the academic area, involving the designation of the tutor (who decides whether to ask the students and the company tutor for an intermediate follow-up report), is responsible for the evaluation of learning and student satisfaction, and assesses the internship period and suggests modifications and improvements.

It is crucial that the documentary evidence collected during the process allows improvements to be made, which should be clearly stated in the evaluation of the procedure made by the management centers and decision-making regarding improvements to be introduced.

Needless to say, the level of implementation of the procedures and the related tasks will improve the performance of the organization, and it will certainly exert a positive influence on the satisfaction of its members.

4.3. Satisfaction analysis

The second step was to analyze the satisfaction of the students and that of the company tutors separately. In relation to student satisfaction, the Catalan Agency for University Quality and Excellence (AQU) offers information¹ about the evaluation of internships in relation to the Catalan University System (SUC), as a whole. The public data is grouped by faculties, but there is no data for individual universities, because this information is only offered in aggregate form. Business and Economics faculties are shown to obtain a lower score for internships than the SUC average (5.8 / 10 compared to 6.6 / 10 of the SUC). This could mean that economics and business students are more demanding of external internships, since, as stated in the aforementioned report, 9 out of 10 companies are satisfied that graduates are adequate for labor market needs (AQU, 2019, page 18).

The third step was to conduct interviews with company tutors to see if the deviation that appears between the two universities can be explained based on a qualitative analysis. Personal interviews were conducted with nine tutors (five from University Y and four from University X). First, they were asked if they had experience with students from other universities which allowed them to make comparisons, and most (except one tutor) answered yes. The majority stated that results depended more on people rather than on the university. Among the weaknesses highlighted by tutors from University Y, which do not coincide with those indicated by those of University X, a lack of motivation/commitment to the internships was notable. Three tutors connected to University Y explained that internships are compulsory, and that this is detrimental to the

¹ http://www.aqu.cat/doc/doc_51787985_1.pdf pag. 11. This report, published in 2019, shows the effect of the incorporation of Bologna.

performance of the students, since they do not see them as either having potential for learning or as a project towards their future work.

The tutors were also asked what the universities could do to improve the skills of their future graduates. The tutors linked to University Y suggested (based on observed deficits) improvements in the use of the Office package and languages, and emphasized the expansion of relationships between the university and companies in order to establish a productive dialogue. The tutors linked to University X suggested something similar, although they placed less emphasis on expanding the university-company relationship, so we infer that there is more fluidity in this relationship. This was confirmed by the answers to the question about practices and procedures, and the relationship that companies have with the technicians and tutors of the university. While the tutors at University X arrange a set of meetings, email exchanges and telephone calls with university tutors, those at University Y say that they have contact with the academic tutors when a direct link between university and firms exists (i.e. they are a start-up company, or the firm's tutor is an associate professor).

Finally, the tutors were asked about the assessments that the companies made of their work as tutors. Greater acknowledgement of the work of the tutors of University X is revealed, which undoubtedly positively influences the assessment made by the tutors of both universities.

5. Conclusions

This study identified the competences acquired by undergraduate students during their internship and assessed the level of acquisition of these competences, by comparing the student and company tutor evaluation reports, in two universities from the Catalan Higher Education System.

The quality systems of both universities demonstrate that objectives are designed by the management center; they also detail the procedure to be followed in order to develop a work placement. We believe it is important that the procedure includes the idea of continuous improvement, which facilitates the detection of problems and their solutions. If this is true, then the tutors play a crucial role, and believe that a real exchange is taking place with the university, and that their opinions count.

Three main conclusions can be drawn from the analysis of the student and tutor achievement of competence. First, the type of university matters. In six out of six

analyses, University X performed significantly better than University Y. Regardless of whether it was the student self-assessments or the employer opinions, the students from University X scored higher in the three dimensions/sets under analysis. Further investigation is needed to assess the main reasons for this. There are many possible causes: student motivation, the degree of academic instructor involvement, employer expectations, the resources invested in the internship program, the positions in which students start working, the average student performance in their degrees, and so on.

Second, a consistency in the differences corresponding to the three types of competences was detected. The gap between Professional Competences in the universities is twice as big as the gap recorded for the other two competences, from both the student and employer one point of view. The results also seem to suggest that the students at University X work harder. Further research is also required to determine why students at University X are more motivated.

Finally, there is a similar gap between Instrumental and Interpersonal competences, no matter which group made the assessment (students or employers).

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The Role of Awareness, Learning and Knowledge in Entrepreneurial and Firm Leadership Processes

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ABSTRACT

Scholars in recent years have urged researchers to shift from their traditional focus on specific characteristics of entrepreneurs and leaders toward research on entrepreneurship and leadership processes. To do this, researchers must better understand entrepreneurs and leaders' cognitive processes involved in learning, awareness and knowledge acquisition. In this paper systems thinking theory and system dynamics methodologies are used in the development of a dynamic conceptual framework of learning effectiveness. The research applies the conceptual framework to nine U.S. wineries and identifies the consequences of varying levels of awareness and types of knowledge, as well as alternative learning processes on entrepreneurship and leadership effectiveness. Results indicate that one's level of awareness and knowledge are key factors in enhancing one's ability to learn. The types of awareness and knowledge identified most critical for enhancing entrepreneurship and leadership effectiveness are: (a) awareness of one's mental models and learning patterns, (b) systemic knowledge and (c) business related knowledge. Results also identify that there is a positive relationship between the level of entrepreneurs' intangible key resources and the scope of the learning process undergone. The higher the level of the intangible resources the entrepreneur moves from conducting single loop learning to double loop learning.

KEYWORDS

Management, Learning, Knowledge, Awareness, Capabilities.

1. Introduction

Currently, there is a growing societal demand for entrepreneurship and leadership processes that can effectively direct businesses practices under a more holistic approach that considers business relations with society and with its environment (Porter, 2011; Bocken et al. 2014; Joice and Paquin 2016). This demand requires understanding the whole system that encompasses leadership and entrepreneurship from a dynamic perspective (Senge et al., 2008; Leih and Teece 2016).

The substantial growth in entrepreneurship and leadership in the U.S. wine sector during the last decade goes hand in hand with the double number of U.S. wineries since 1995 and the increasing competition domestically and internationally (Silverman, 2004; Taplin, 2006; Alonso et al. 2013). An interesting result of this change in the U.S. wine sector is the success of some wineries to integrate the social and environmental dimensions in their business goals (Lorenzo et al. 2018). As a result, the U.S. wine sector provides a good scenario for further understanding which tangible and intangible resources and learning capabilities enhance entrepreneurship and leadership effectiveness in satisfying consumer needs and to identify what is the relative importance of each resource and capability.

Given the current need to expand our understanding of entrepreneurship and leadership processes under a systemic approach the present paper answers the following three questions under a systems thinking and system dynamics framework: (a) what are the key intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs?, (b) which learning capabilities are associated with each winery, and how these capabilities relate to the primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs?, and (c) how wineries' intangible resources and capabilities vary based on winery's size and activities undertaken?.

We proceed to review the literature related to the four questions posited. The first part of the literature review focuses on the topic of entrepreneurship and leadership and what makes these processes successful. After identifying the primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs the literature on learning processes is revised in order to identify the relationships between the key intangible resources and three types of learning capabilities. Afterwards, the literature that explores businesses size and activities of operation and the acquisition and

management of intangible resources is revised. Finally, the systems thinking literature on system archetypes is summarized.

The propositions explored in this study are posited in the concluding part of this section.

1.1. Entrepreneurship and Leadership

Literature on entrepreneurship and what makes entrepreneurs successful has grown substantially during the last two decades (Carland, 2002; Freytag & Thurik, 2010; Dimov, 2011; Ayala and Manzano, 2014). Initially research focused on identifying the shared personality characteristics among entrepreneurs that make them willing to start new businesses or other activities (Casson, 1982; Brockhaus & Horwitz, 1986; Blanchflower & Oswald, 1990). However, researchers noticed that these variables could not by themselves explain the various successful entrepreneurial practices and their dynamics since they just focused on specific personal traits and events and not on the underlying cognitive processes and outside factors such as society, culture and physical resources constraints (Mitchell, 2002; Welter, 2011; Wiklund, 2011). As a result, scholars and practitioners are now focusing more on studying the internal cognitive processes involved during entrepreneurial learning, and the impacts that the economic system, institutions and culture have on entrepreneurship success (Ashar, & Lane-Maher, 2004; Zahra, 2006; Weick, & Putnam, 2006; Holcomb, 2009; Grégoire, 2011; E St-Jean and Audet, 2012).

Literature on leadership has followed a similar trajectory as the research done on the entrepreneurship field. Over the first decades leadership research developed several classifications of leaders based on the qualities that the leader possesses and the leadership tasks for which the person is responsible. The main leadership theories developed in chronologic order are: (a) “great man” leadership theory (Carlyle, 1841); (b) trait leadership theory (Galton, 1869), (c) contingency and situational leadership theory (Hersey, 1985); (d) transactional leadership theory (Bass, 1985); (e) transformational leadership theory (Burns, 1998); (f) horizontal or collaborative leadership theory (Chrislip and Larson, 1994); and (g) ethical leadership theory (Mayer et al. 2009). Van Wart (2013) presents a succinct literature review of the abovementioned leadership theories. As a result, research has moved toward further understanding how to manage people instead of tasks and the role of cognition and group factors throughout the leadership process.

Researchers have found that some of the key aspects that enhance the evolution of one's cognition relate to one's ability to sense, ability to be present, ability to reflect, and ability to understand systems (Senge 1993; Teece 1994; Scharmer 2005; Scharmer and Kaeufer 2013; Vago et al. 2018). In that direction, Peter Senge in the Fifth Discipline book (1991) presents what it is called the "personal mastery discipline" as one of the five disciplines for successful leadership and entrepreneurship. The personal mastery discipline is the discipline of aspiration that enhances the creative process that moves people from their current reality to their personal vision. Senge et al. indicate that people who develop the capability to sustain a creative tension between their current reality and their vision are able to achieve their vision in a more serene way. Hence, personal mastery can be associated with characteristics such as self-knowledge, self-control, self-confidence and innovative. Psychology and neuroscience research suggest that people that develop clearer pictures of what they envision are more able to identify the means towards them (Johnson-Laird 1983; Denzau 1994; Hill and Levenhagen 1995). Weiner notes that aspiration is a fundamental driver for recognizing opportunities to achieve one's vision (1972). Psychology research also indicates that people who develop the capacity to hold inner dialogue are less reactive and experience higher mental clarity that allows them to achieve their goals more effectively (Fonagy and Target 1997; Siegel 2007; Kong, 2017). As mentioned above part of the evolution of one's cognition goes hand in hand with the ability to understand systems as a result of the globalization process and the resulting increasing interdependence among people. Developing such a cognitive process is paramount nowadays for the success of companies so that they can properly understand the consequences of changes in their supply chain and markets where they operate. Successful leaders and entrepreneurs are building new partnerships that enhance their sustainable competitive advantage by including the social and environmental systems into the business framework (Senge 2008; Porter 2011; Scharmer and Kaeufer 2013). Two examples of these new partnerships and ways of producing and delivering are Whole Foods Market and Nestlé. Whole Foods Market envisions people and societal well-being as their primary goal (Porter and Kramer 2006), and Nestlé collaborates with NGOs in South America in order to ensure the well-being of the communities and environment where they operate (Brugmann and Prahalad 2007).

As the recent research of entrepreneurship and leadership is suggesting, in order to fully understand what makes entrepreneurship and leadership successful we need to consider

also how entrepreneurs and leaders understand their company, group, society and their surroundings. Entrepreneurship research has noticed that on average just a small percentage of entrepreneurs develop the vision, plan their innovation, and execute all the stages necessary for its full materialization (Stevenson and Jarillo 1990; Zahra 2006). Normally, entrepreneurs focus on the core innovation of the new output and partner with other people in order to develop the other ingredients necessary for the success of the new product or service (Meyer 2002; Sinisammal et al. 2016). When entrepreneurs are not able to fully transform the inspiration of their creation into a business vision the success rate diminishes. Researchers have complemented this argument by identifying the frequently low managerial skills that entrepreneurs possess and how this constrains the materialization and expansion of their ideas (Hitt 2002; Ikupolati et al. 2017)

Summing up, the recent literature on entrepreneurship and leadership points out that the intangible source of the success of these processes depends on the cognitive processes that entrepreneurs and leaders undertake when dealing with themselves and their surroundings. Furthermore, evolutionary cognition literature indicates the emergence of some capabilities and the globalization process demands the acquisition of systemic knowledge. As a result, proposition 1 posits:

The four primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs are: a) basic managerial knowledge, b) project clear vision, c) systemic knowledge, and d) personal mastery (personal growth)¹

1.2. Learning Capabilities

In order to approach entrepreneurs and leaders learning capabilities from a system dynamics approach three learning theories are examined that distinguish the learning process based on the structural scope chosen by the individual. The three learning theories are: a) single loop learning, b) double-loop learning, and c) theory U.

Argyris and Schön (1978) defined the process of learning as the “detection and correction of error”. In system dynamics jargon this process is named “anchoring and adjustment”. It means that people have a goal, target that they want to achieve, and the learning process focuses on reducing the gap between the goal and the current situation.

¹ Personal mastery as defined by Peter Senge et al. (1991) relates to one’s level of self-confidence, self-awareness, and ability to manage stress by “continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively”.

Argyris and Schön (1978) described the single loop learning and the double loop learning processes in the context of organizational learning in the following way: “When the error detected and corrected permits the organization to carry on its present policies or achieve its presents objectives, then that error-and-correction process is *single-loop* learning. Single-loop learning is like a thermostat that learns when it is too hot or too cold and turns the heat on or off. The thermostat can perform this task because it can receive information (the temperature of the room) and take corrective action. *Double-loop* learning occurs when error is detected and corrected in ways that involve the modification of an organization’s underlying norms, policies and objectives.”

Hence, both learning processes are aimed to reduce the gap between the desired outcome and the current situation by thinking and doing. What distinguishes both learning processes is the scope of attention and performance. The scope of single loop learning relies on the correction of existing practices that are not working properly. The scope of the learning process does not question the existing macro organizational drivers as the company vision, goals, and main strategies, but rather focuses on micro organizational practices. As a result, proposition two and three identify that the level of the key intangible resources that enhance entrepreneurship and leadership effectiveness identified in proposition one varies under each learning process. Proposition two posits:

The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – low; b) systemic thinking – low; c) clear business/project vision – low; and d) personal mastery – medium.

Proposition three posits:

The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic thinking – medium; c) clear business/project vision – high; and d) personal mastery – medium.

Scharmer (2005) presents Theory U as a learning process that involves sensing and presence before the thinking and doing stage takes place. As a result, the author uses the term “presencing” (sensing + presence) to expose that deeper scopes of learning can take place when people “stop and listen to others and to what life calls you to do... allow the

inner knowing to emerge” (2005). Hence, the practice of the Theory U learning process requires the integration of the so called “right-brain and left-brain” capabilities and its scope encompasses micro and macro business practices. As Scharmer points out (2005), what differ from one type of learning to the other is the depth of the awareness about the forces that shape the current reality and the consequent source of action. Hence, with the development of our consciousness deeper learning occurs by sensing, witnessing and realizing. After this initial deeper learning process, thinking and doing finishes the details and integration process (Scharmer 2005). The power of deeper levels of learning is that it increases individuals' awareness of the larger whole -both as it is and as it is evolving. Hence, the development of the capability to undergo theory U learning process leads to entrepreneurial actions that increasingly serve the emerging whole and the satisfaction of consumer needs is enhanced.

Proposition four posits:

The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic thinking – high; c) clear business/project vision – high; and d) personal mastery – high.

1.3. Businesses Intangible Resources by Size

One of the major soft internal challenges faced by small and medium wineries is the background of the founder or manager (Aggelogiannopoulos 2007; Charters, Clark-Murphy et al. 2008) and the ability to develop adequate managerial skills (Dillon 1992). Dillon et al. study indicates that adequate planning and management are key determinants of small and medium winery's success or failure. As the authors point out “economically unsuccessful wineries are not managed by individuals who plan to fail, but by managers who often fail to plan.” It is normally the case that wineries are operated by a grape grower that has vertically integrate downstream into winemaking (Chaddad 2013). When this is the case, and when wineries are small, there is a major need to ensure that the new winery owners acquire the necessary managerial knowledge to ensure the winery's sustainability. Poor time management and poor financial management tend to bring these wineries to failure (Morris 2008; Dobie 2009). White (2010) mentions that it is necessary to think

first about who is the ideal customer (the target market), before deciding about the produce, price, promotion and distribution strategies, a step that is frequently not taken.

Proposition five posits:

Small wineries' entrepreneurs and leaders have a relative lower level of winery managerial knowledge and systemic knowledge.

1.4. Entrepreneur Personal Mastery and Activities Engaged

Peter Senge in the Fifth Discipline (1991) presents what it is called the "personal mastery discipline." The personal mastery discipline is the discipline of aspiration that enhances the creative process that moves people from their current reality to their personal vision. Senge et al. indicate that people who develop the capability to sustain a creative tension between their current reality and their vision are able to achieve their vision in a more serene way. Hence, personal mastery can be associated with characteristics such as self-knowledge, self-control, self-confidence and innovative. Psychology and neuroscience research suggest that people that develop clearer pictures of what they envision are more able to identify the means towards them (Johnson-Laird 1983; Denzau 1994; Hill and Levenhagen 1995). Weiner notes that aspiration is a fundamental driver for recognizing opportunities to achieve one's vision (1972)

Recent research indicates that the key for sustained competitive advantage is to expand businesses mission beyond the creation of profit for shareholders to the creation of what is being called "shared value" (Wilber 2001; Porter 2011; Scharmer and Kaeufer 2013). Shared value is produced when the company's motivation is to provide something beneficial for people, animals, beings or the ecosystems, shifting the current standards towards the notion of serving the systems that the company is part of. The idea is to have the intention and create value not just for the company's stakeholders and direct consumers but also for the other systems that the company is part of (Senge 2008; Kramer 2011). As Porter argued (2011), it is the shift from seeing that if businesses increase profit it is good for society to seeing that what is good for society is good for businesses. One of the underlying principles is that by giving more at all levels, the company receives more at all levels as well. Employees feel more fulfilled, and some consumers and investors feel better directing their money to companies that take care of the bigger system and genuinely care about their customers (Friedman and Miles 2001; Sen and Bhattacharya 2001; Vargo and Lusch 2008)

Proposition 6 posits:

Entrepreneurs with higher level of personal growth (self-confidence, stress management, self-awareness) diversify winery activities to satisfy social and environmental consumer preferences.

Section two introduces the data sources and presents the research methodology. Section three exposes the results and section four presents the main discussion. Finally, section five summarizes the conclusions.

2. Methodology and Data

The present section describes the methods used to study the entrepreneurship and leadership processes in nine U.S. wineries including the data collected and its analysis.

2.1. Systems thinking

There are several methods typically used to study complex systems but systems thinking is the most suitable for the present study because it provides the tools to answer the systemic questions without having to run a simulation model. The particular systems thinking tools used to study the nine wineries are related with the construction of causal loop diagrams (CLD).

2.1.1. Causal loop diagrams and systemic features of wineries

Causal loop diagrams are a central tool used in system thinking. CLD summarize the direction and sequence of key relationships involved in the system under study. Systems thinking leads researchers through a series of steps that produce the CLD (Sterman, 2010). The main steps involved in developing meaningful causal loop diagrams are: (1) to define the problem or challenge, (2) to name the main variables that intervene in the problem, (3) to draw the reference mode² of the main variables over time, and (4) to develop dynamic hypotheses³ that explain the shape of the reference modes identified.

The main components of causal loop diagrams are the variables studied and the relationships between the variables studied. The relationships can be either positive, self-

² A reference mode is a pattern of dynamic behavior among system variables due to interrelationships and feedback loops among the variables.

³ A dynamic hypothesis is a tentative explanation of how a system structure leads to observed dynamic behavior.

reinforcing loops that generate growth and amplify deviations, or negative, self-balancing loops that bring stability to the system. A third component of a CLD is delays that indicate the elapsed time between change in the causal variable and its effect on the influenced variable.

An example of a causal loop diagram for winery C. Winery C, when faced with a difficult financial situation, decided to cut salaries in order to bring the firm to a break-even situation. This strategy is represented by the negative --balancing feedback loop on the left, which indicates a symptomatic solution. A year after, winery C decided to professionalize the winery and hired a professional financial manager to handle the short run and long run winery decisions. The negative balancing feedback loop with a delay on the right reflects this fundamental solution.

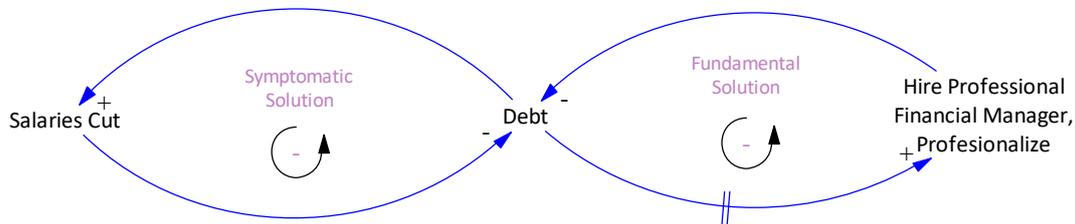


Figure 1. Causal loop diagram example.

2.2. System Dynamics

In order to elucidate the behavior generated by the systemic features identified in the causal loop diagrams the stocks and flows variables must be distinguished. Stock variables are those that can accumulate units over time. Flow variables increase or reduce the level of units in stock variables over time. For instance, we have a variable that measures the stock of systemic knowledge (amount of systemic knowledge that we have accumulated over time) assuming a range from zero to a hundred, and we have another variable that measures how much systemic knowledge the individual has gained during the last year. The name of the variable that measures the amount of systemic knowledge that the individual has gained during the last year can be “systemic knowledge gained” and it measures the inflow of systemic knowledge. On the other hand, if during last year the individual has forgotten some systemic knowledge then we have an outflow of systemic knowledge. This variable can be called “systemic knowledge forgotten”. The surveys developed distinguish variables in terms of stocks and flows.

The rate of inflow or outflow is modeled with feedbacks that go from stock variables to flow variables and converters that directly affect the rate of flow. Finally, the system is modeled with variables that introduce delays in the process.

2.3. Sources of information

The data gathered are both, quantitative and qualitative in nature and come from four sources: (a) documentation, (b) observation, (c) interviews, and (d) surveys.

E-mails were sent to all wineries in Missouri that had websites – sixty out of one hundred and twelve—inviting them to participate in the research. Two additional wineries, one from Virginia and another from Maine were invited to participate in the study to provide a contrast to Missouri's system of wine distribution.

Seven Missouri wineries expressed an interest in participating in the study. Face to face interviews with these wineries took place during the months of March, April and May of 2013. The nine wineries participating in the study were categorized into small wineries (less than 10,000 cases per year), medium wineries (between 10,000 cases and 99,999 cases per year), and large wineries (equal or more than 100,000 cases per year) as the study of Dillon, 1992 et al. suggest.

2.3.1. Face-to-face interviews and methods

Two methods were combined to gather the first set of data. These were qualitative interviews and the observation method. Given the nature of the face-to-face interviews conducted, mainly with winery managers and owners, a combination of the *general interview guide approach* and the *standardized open-ended interview approach* were implemented during the qualitative interview (Patton 1990). The general interview guide approach involves outlining a set of issues that are to be explored with the interviewee before the interview begins. The guide serves as a basic checklist during the interview to make sure that all relevant topics are covered. Under this approach as Patton mentions, “the interviewee remains free to build a conversation within a particular subject area, to word questions spontaneously, and to establish a conversational style but with the focus on a particular subject that has been predetermined” (1990). The standardized open-ended interview approach consists of a set of questions carefully worded and arranged. This approach is used when it is important to minimize variation in the questions posed to interviewees.

The rationale behind combining the general interview guide approach and the standardized open-ended interview approach is that the first allows the flexibility to explore specific areas that come into the conversation while having a clear direction about the key points that need to be elucidated. Having this flexibility is crucial for achieving the process feedback, the connection between interviewer and interviewee that allows sincere responses and a deeper understanding of the case studied (Patton 2005). The combination of these approaches also helps the development of probes and follow-up questions that allow the triangulation of observations that ensures the accuracy of the answers gathered. Also, having some questions carefully worded and being able to posit them at the appropriate time allows the comparison among case studies. This is necessary because as research has indicated (Creswell 2012), how a question is worded and asked affects how the interviewee responds. Finally, this approach to data collection allows the sequence of questions to move from less-controversial questions related to their background, present behaviors, activities and experiences, to more opinions and feelings about present and past situations, and to finally attitudes towards the future. This sequence is recommended when conducting qualitative interviewing (Patton 1990).

The observational methods applied were both as participant and onlooker, since in some occasions I walked with the winery manager to each part of the winery and I was invited to try some technologies or take part of some production processes, and in some other occasions I just observed while waiting. In every case the winery managers knew that I was there and that I was collecting data for the present research (the overt observational method). Researchers have posited some concerns about the validity of observational data since applying an overt methodology has an impact on what is being observed, since people may behave differently when they know that are being observed. However, researchers have also claimed the ethical issues involved when conducting covert observations, naming them “the debate over secrecy” (Patton 2005).

Observational research allows the researcher to capture information that winery managers are not aware of given their daily routines and greater familiarity with their business. It is important to acknowledge that the data gathered from overt observation may not fully reflect the standard winery behavior since people were aware that they were being observed. Furthermore, the observational data reported are affected by the perspective of the observer that at the same time is being affected by its environment. The duration of the interview and observational processes was between 2 hours and 5 hours, the time

required to answer the interview questions and make the necessary observations. Researchers evaluate the quality of observational reports by the extent to which the report permits the reader to enter into and understand the situation described (Patton 1990).

All the conversations took place during at each winery and are recorded. This is crucial when conducting qualitative research since what matters the most is how interviewees phrase their responses and how they convey them (Patton 2005). Recording all the conversations allows the researcher to not worry about capturing the specific words expressed by the winery manager and to be able to take notes about the specific points that need to be emphasized. Hence, in this type of research the mechanics of gathering data require complete recording of all the conversations with each winery manager, specific notes taken during the face-to-face interviews and field observations, as well as the acquisition of certain documents that were requested from winery managers (mainly financial documents).

The questionnaire items used in the face-to-face interview are either open ended questions or questions requiring answers in the form of a Likert scale of five points (Likert 1932). One point represents a 'low degree' and five points represents a 'high degree'. The information gathered during the face-to-face interview covers the following topics: (a) background information; (b) winery goals – specificity, alignment, diversification; (c) winery performance – production, sales, costs and revenues; (d) winery inputs – grapes source, employees types; (e) winery specific assets; (f) winery's strategic means – imitability level, relevance level; (g) winery's values – fairness, truth, altruism; (h) employee and manager characteristics – well-being level, winery identification level, ; (i) employee management – learning enhancement, knowledge level, relationships quality and uniqueness; rewards system; (j) relationships with suppliers and distributors – quality and uniqueness; (k) organizational structure – fit, adaptation level; (l) intangible resources management – relevance level, imitability level, (m) main external challenges, (n) main internal challenges, (o) main external opportunities, and (p) main internal opportunities. Finally, the specific learning processes that the research focuses on are: (a) winery managerial knowledge; (b) personal mastery knowledge; (c) group knowledge; and (d) systemic knowledge.

The specific questions considered in the face-to-face interview can be found together with the consent form are reported in appendix 2.

After gathering the first set of winery information (face-to-face interview recordings, complementary documents and observational notes) it was coded and introduced into an excel document. The questions from the face-to-face interview that are based on a five-point Likert scale were converted into a scale of 0 or 100 points. The relevant information from the open-ended questions was coded based on the ranges observed from all the answers and relevant sentences and paragraphs are written down and used as a complementary proof to the results presented.

Once the data are organized and allocated certain codes, inductive analysis is used in order to identify patterns, to label themes and to develop category systems, insights and new understandings. System thinking theory and the system dynamics approach is used in order to elucidate generic structures from each winery and identify if there is any relationship between the patterns observed and the systems thinking archetypes.

The questionnaire can be improved by introducing additional questions similar to those above, to ensure the consistency of the answers. This strategy is sometimes introduced when researchers want to estimate the level of answers deviation related to key questions. In the present study the interviewer double checked interviewees' explanations and reasoning by posing extra questions not included in the questionnaire when necessary. However, it would be beneficial to develop the extra validation questions before the interview takes place. Finally, the coding process from the open-ended questions was conducted by the present author. A second researcher that also coded the open-ended questions would enhance the validity of the results presented in the aggregated results tables.

2.3.2. Online survey questions and methods

Following preliminary analysis of the face-to-face interview data, an online survey with questions designed to gather complementary data using a five-points Likert scale was distributed to all the nine participants via e-mail. These additional questions related to the wineries' strategies related to: (a) their desired production and sales, (b) their desired relationships among personnel, (c) their desired relationships with customers, and (d) their desired relationships with government officials. In particular, the questions were designed to identify the limiting factors that are blocking the success of each strategy, together with their evolution over time, and the main processes that have alleviated these limiting factors and affected their evolution over time. The specific questions related to

managers and personnel traits were designed to determine: (a) the leadership level, (b) the leadership type, (c) the level of risk aversion, and (d) the level of uncertainty borne. Some questions were open-ended, and some involved a five-point Likert scale.

The method used to code and analyze the data from the online survey is the same as the method used to code and analyze the data from the face-to-face survey explained above. The online survey questionnaire can be found in appendix three. The specific questions considered the online survey can be found in appendix 2.

3. Results

The present study addresses the four questions posited by testing the validation of seven propositions and providing complementary information from the face-to-face interviews and online survey. In order to summarize the relationship among the four questions posited, the propositions and the data collected table 1 and 2 are presented.

Research Questions	Propositions
1. What are the key intangible resources (stocks) that enhance entrepreneurship and leadership effectiveness in order to satisfy consumer needs?	1. The four primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs are: a) winery related knowledge, b) systemic knowledge, c) business clear vision and d) personal growth level
2. What learning capabilities are associated with each winery, and how these capabilities relate to the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs?	2. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – low; b) systemic thinking – low; c) clear business/project vision – low; and d) personal mastery – medium.
	3. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the double loop learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic thinking – medium; c) clear business/project vision – high; and d) personal mastery – medium.

	4. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under Theory U learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic thinking – high; c) clear business/project vision – high; and d) personal mastery – high.
3. How do wineries' intangible resources and capabilities vary based on winery's size and activities undertaken?	5. Small wineries' entrepreneurs and leaders have a relative lower level of winery managerial knowledge and systemic knowledge
	6. Entrepreneurs with higher level of personal growth (self-confidence, stress management, self-awareness) diversify winery activities to satisfy social and environmental consumer preferences.

Table 1. Research Questions and Propositions Correspondence.

Propositions	Survey Questions Number that relate to the Proposition
1. The four primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs are: a) winery related knowledge, b) systemic knowledge, c) business clear vision and d) personal growth level	Q.13, Q.14, Q.21, Q.22, Q.29, Q.30, Q.32, Q.34, Q.35, Q.37, Q.53, Q.66, (Face-to-face survey); Q.39, Q.40 (Online survey)
2. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – low; b) systemic thinking – low; c) clear business/project vision – low; and d) personal mastery – medium.	Q.21, Q.29, Q.35 (Face-to-face survey); Q.39, Q.40 (Online survey)
3. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic thinking – medium; c) clear business/project vision – high; and d) personal mastery – medium.	Q.21, Q.29, Q.35 (Face-to-face survey); Q.39, Q.40 (Online survey)
4. The level of the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs under the single loop learning process in a range of low to high is: a) business managerial knowledge – medium; b) systemic	Q.21, Q.29, Q.35 (Face-to-face survey); Q.39, Q.40 (Online survey)

thinking – high; c) clear business/project vision – high; and d) personal mastery – high.	
5. Small wineries’ entrepreneurs and leaders have a relative lower level of winery managerial knowledge and systemic knowledge	Q.13, Q.14, Q.21, Q.29, Q.35, (Face-to-face survey); Q.39, Q.40 (Online survey)
6. Entrepreneurs with higher level of personal growth (self-confidence, stress management, self-awareness) diversify winery activities to satisfy social and environmental consumer preferences.	Q.13, Q.14, (Face-to-face survey) and Q.39 (Online survey)

Table 2. Propositions and Data Sources for their Test Correspondence.

The answer of question one is based on the answers received in the face-to-face interview and online survey. The level of entrepreneurship and leadership effectiveness to satisfy consumer needs is estimated by the number of customers’ economic goals, social goals and environmental goals that the winery is able to satisfy (Q.13 and Q.14 in the face-to-face survey). The level of the winery owner intangible resources is estimated via the Likert scale survey questions. With these two sets of data we can see the relationships between customer satisfaction levels and what intangible resources levels possess the most effective wineries. Finally, the initial results are contrasted with the answers related with the identification of the main internal and external challenges and opportunities. Results are presented in tables 3 to 7 below.

Table three presents producer goals gap levels by category. Winery owners estimate how much consumer’s value price and efficiency, social values and winery’s relationship with the community, and winery’s environmental practices. Based on that estimation and the winery current satisfaction of consumers’ preferences table three indicates that Winery G is the one that satisfies the least consumers and winery D is the one that satisfies the most. Small wineries show less effectiveness in satisfying consumers’ preferences especially in terms of economic goals.

Goals Gaps Levels*	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
Winery Economic Goals Gap	6.0	4.0	5.0	1.0	6.0	0.1	5.0	1.0	3.0
Winery Social Goals Gap	1.0	0.5	0.5	0.1	2.0	1.5	5.0	2.0	2.0
Winery Environmental Goals Gap	1.0	1.0	0.5	1.0	1.0	1.0	0.0	1.0	1.0
Total Goals Gap	8.0	5.5	6.0	2.1	9.0	2.6	10.0	4.0	6.0

* Goals gaps range from 0 to 10

Table 3. Winery Goals Gap Levels by Category.

Table four indicates entrepreneurs’ knowledge stocks for four categories and wineries’ investment level on the development of the four knowledge categories for its employees. Small wineries entrepreneurs interviewed present lower levels of personal mastery, systems thinking and winery managerial knowledge. The small winery entrepreneur with higher knowledge stock is the only small winery that facilitates wine tours, and catering.

Knowledge Stocks and Inflows	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
Personal Mastery Knowledge (PMK)	50	70	70	85	60	70	65	75	65
Group Learning Knowledge (GLK)	60	80	80	90	70	80	80	90	80
Systems Thinking Knowledge (STK)	50	70	70	85	60	75	60	80	65
Winery Managerial Knowledge (WMK)	50	70	70	85	60	85	60	85	60
Inflow Rate PMK	10	70	70	80	60	70	60	70	80
Inflow Rate GLK	70	70	60	80	60	70	60	70	80
Inflow Rate STK	60	70	80	70	50	80	40	80	70
Inflow Rate WMK	80	70	80	80	60	80	70	80	70

Table 4. Entrepreneurs’ Knowledge Stocks and Wineries’ Knowledge Inflows.

Table five presents entrepreneurs risk aversion level and business clarity levels. The entrepreneurs interviewed from small wineries tend to be more risk averse than entrepreneurs from medium and big wineries. The entrepreneurs interviewed that run small wineries and experience comparatively lower risk aversion levels than the other

small wineries entrepreneurs experience lower economic goals gap than their peers. The entrepreneurs from the present research that lead big and medium wineries have higher levels of business vision clarity.

Risk Aversion & Business Vision Clarity Level*	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
Risk Aversion	9	2	2	1	8	3	6	3	3
Business Vision Clarity	8	8	9	10	3	8	6	10	7

* Risk aversion and Business/Project vision levels range from 0 to 10

Table 5. Entrepreneurs’ Risk Aversion and Business Clarity Levels.

Wineries’ main internal and external challenges are presented in table 6. Most small wineries interviewed identify that one of their main internal challenges it the low business background that limits the efficiency and effectiveness of the managerial side of the winery. Difficulties with personnel management and capitalization are identified as the main internal challenges in the medium and big size wineries interviewed.

Main Challenges	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
Internal									
First	Low Sales	Accounting Effectiveness	Capitalization	Keeping up supply to satisfy demand	Business background	Strategy to utilize the facility to its maximum	Marketing	Personnel Management	Right Size Equipment Strategy
Second	Low Tasting Room Capacity		Personnel Management	Accounting Effectiveness	No clear business vision	Personnel Management	Location	Effective Capital Management	Marketing
Third	Business background		Accounting Effectiveness		No clear sales strategy		Low Tasting Room Capacity	Retail Room Underinvested	Business background
External									
First	Distribution	Distribution	Distribution	Bugs and Animals from Grapes	Distribution		Demand Seasonality	Retailers Negotiation Power	Distribution
Second	Weather	Weather	Grape Provision	Online Distribution	Competition		Poor Distribution Contract		

Third			New Competitors Closer to Main Market						
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Table 6. Wineries’ Main Internal and External Challenges.

The main sources of wineries’ success identified during the interviews are location and natural amenities for small wineries. For the medium and big wineries interviewed the main sources of success identified are a clear business vision, high quality products, high quality treatment and nice atmosphere, and business background.

Main Success Sources	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
First	Location	Good community and politicians connections	Pets Friendly	Long Term Vision	Natural Amenities Around	High Quality Products	Quality Wine	Business Background	Location
Second	Same wine in sweet and dry	Both family generations engaged	Inside and Outside Areas	Confident and Motivated People		High Quality Facility	Good Combination with B&B and Restaurant	Sufficient Initial Capital	Good partnership with close wineries
Third	Location		Happy atmosphere			High Quality Treatment		Clear Vision and Constancy of Aim and Effort	Community relationships

Table 7. Wineries’ Main Success Sources.

Based on the information presented the above tables the four primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs in the wine sector are the: a) business managerial knowledge, b) clear business vision, c) systemic knowledge, and d) personal mastery.

In order to answer the second question, “what learning capabilities are associated with each winery, and how these capabilities relate to the four primary intangible resources identified that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs?” we first need to present wineries sizes and activities engaged. The next two tables indicate the size of wineries, based on the number of cases that they sell per year, and the type of activities in which they engage. Small wineries produce less than 15,000 cases per year and big wineries produce more than 100,000 cases per year based on mid-west

and east coast standards (Dillon et al. 1992). Results indicate that small wineries do not engage in as many activities as medium and big wineries. In particular, some wineries do not offer tours and do not host business related events. On the other side, the big winery distributes the wine through a national chain distributor. See table 9 for a detail of all the activities engaged in by each winery.

	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
Size	Small	Small	Medium	Medium	Small	Medium	Small	Big	Small

Table 8. Wineries' Size.

Activities	Winery A	Winery B	Winery C	Winery D	Winery E	Winery F	Winery G	Winery H	Winery I
grapes production	1	1	1	1	1	1	1	1	1
several wines	1	1	1	1	1	1	1	1	1
wines and other beverages	0	1	1	1	1	1	1	1	1
wine tasting	1	1	1	1	1	1	1	1	1
winery tours	0	1	1	1	1	1	0	1	0
winery events									
families/community businesses	1	1	1	1	1	1	1	1	1
self-wine distribution	0	0	0	1	0	1	0	0	0
hostel service	1	1	1	1	0	1	1	0	1
hostel service	0	1	0	1	0	0	1	0	0
catering	0	1	0	1	0	0	0	0	0
restaurant	0	1	0	0	0	1	1	0	0

Table 9. Wineries Activities Engaged.

Based on the above two tables, the results presented in table 4, and entrepreneurs' verbal explanations about the strategies and approaches implemented in order to reduce goals gaps and the gaps that they see in terms of their relationships with employees, customers, suppliers and politicians, we see that small wineries interviewed mainly apply the single loop learning technique. In some instances, when experiencing critical situations, double loop learning technique is applied. The medium and big wineries interviewed are able to apply single and double loop learning processes. No winery interviewed has reported the application of Theory U learning. A summary of these results is presented in table 10.

	Learning Scope	Learning Main Steps	Intangible Resources Level			
			Business knowledge	Systemic Knowledge	Business clear vision	Personal Growth
Single loop learning	Micro, existing processes	Thinking - Doing	low	low	low	medium
Double loop learning	Macro, structural change	Thinking - Doing	medium	medium	high	medium
Theory U	Any	Presencing* - Thinking - Doing	medium	high	high	high

*Presencing is defined by the author of Theory U as the process of Sensing + Presence (Scharmer, 2005)

Table 10. Relationship between the four Intangible Resources Level and the three Learning Capabilities.

Table 10 results confirm propositions 2, 3 and 4.

In order to answer question three, we look at table 4, table 5, table 8, table 9, and table 10. Table 4, table 8 and table 10 indicate that small wineries have on average lower levels of personal mastery, systemic thinking knowledge and winery related knowledge. The small winery with a higher knowledge stock contrasts with the other small wineries; it facilitates wine tours, and catering. There are no significant knowledge differences between medium and big wineries. In terms of knowledge inflow differences, small wineries tend to have a lower inflow of systemic thinking knowledge.

In terms of wineries engagement with social and environmental goals results indicate that small wineries tend to have bigger economic goal gap. This may be related to the lower level of winery related knowledge and systemic knowledge. The disparity of social goal gaps among wineries sizes is not as big as the disparity of economic goal gaps; however, medium wineries report smaller social goal gaps than small and big wineries. This higher performance may be associated to their higher level of winery managerial knowledge, systemic knowledge and personal mastery. There is no significant difference among wineries in terms of the level of environmental goal gap.

4. Discussion

4.1. Theoretical Implications

The present investigation expands on the theoretical framework of entrepreneurs and leader’s development of learning capabilities in two ways. Firstly, by exploring

entrepreneurs and leader's relationship with two well-known learning processes (single loop, and double loop), and a newer learning process associated with higher levels of awareness (Theory U), and identifying the level of intangible resources needed in order to be able to engage in each type of learning process. Secondly, by using the systems thinking framework and identifying the relative importance of certain stock and flow variables in the development of learning capabilities in order to ensure the satisfaction of clients.

4.2. Practitioners Implications

The results from the present study to nine wineries of different sizes (small, medium and large) indicate that the four primary intangible resources that enhance entrepreneurship and leadership effectiveness to satisfy consumer needs are: a) business management knowledge, b) business/project clear vision, c) systemic knowledge and d) personal mastery. In order to ensure the satisfaction of economic goals business management knowledge and business clear vision are identified of paramount, hence, entrepreneurs have to ensure that there are sufficiently equipped with these foundations in order for the business to not go bankrupt soon after its inception. Systemic knowledge and personal mastery skills are associated with the ability of entrepreneurial and leadership abilities to sustain the business as long as the management knowledge and business clear vision are in place. Hence, managers that invest in enhancing their systemic understanding and personal mastery will be more equipped to maneuver the business over time.

Results also indicate that the level of a) business management knowledge, b) business/project clear vision, c) systemic knowledge and d) personal mastery, effect entrepreneurs learning capabilities. The owners of the small wineries interviewed presented on average lower levels of the above four intangible resources and reported to undertake single loop learning processes. Entrepreneurs of the medium and large wineries mainly experience higher business vision and systemic knowledge, and undergo single loop learning processes and double loop learning processes. None of the entrepreneurs interviewed express to follow Theory U learning process. Hence, it is important to implement time-management strategies as well as networking strategies that will allow small wineries to develop their intangible resources and be able to perform more double-loop learning processes.

Finally, research indicates that in both tangible and intangible resources, small wineries experience lower levels of resources, which limits their ability to undertake effective entrepreneurship and leadership processes and develop more effective capabilities. In this regard, business owners would benefit by identifying which public administrations can support them during the initial years in order to be more equipped and be able to compete in seemingly more equal conditions.

The results presented are part of a pilot study conducted to nine wineries. Further research that investigates the questions posited to a larger number of wineries is necessary. Besides the need of investigating a larger sample, interesting systemic features to study in future research are the key feedbacks, converters and delays that enhance entrepreneurship and leadership learning capabilities to satisfy consumer needs, and to identify which are their characteristics under the three main learning processes studied. Furthermore, research on practitioners that apply Theory U learning processes is needed in order to identify other intangible stocks, converters and feedback loops that may be unique for this type of capability.

4.3. Educators Implications

Results indicate that tools and techniques to enhance entrepreneurs and leader's ability to undergo theory U or deep learning processes need to more available and taught so that the people who are able to undergo this learning process can actually undertake it. Complementarily, more tools and techniques that enhance systems thinking and system archetypes education for entrepreneurs and leaders would help to substantially enhance their ability to effectively address recurring detrimental behaviors.

5. Conclusion

This paper investigates entrepreneurship and leadership learning processes and their effectiveness in satisfying consumer's needs in nine wineries. Results from the case studies show that in order for entrepreneurs and leader to effectively satisfy consumer needs the primary intangible resource that has to be acquired is substantial managerial knowledge together with a clear business vision. The other two intangible resources that are key for entrepreneurship and leadership ability to satisfy consumer needs are above average systemic knowledge and personal growth.

Results also indicate that there is a positive relationship between the type and level of intangible resources possessed by entrepreneurs and leaders and the type of learning performed. The higher the level of the four intangible resources the wider and deeper the learning scope results. However, entrepreneurs and leaders with high levels of the four intangible resources explored are not equipped enough with tools and techniques that would allow them to undergo deep learning processes.

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