



MEASURING THE EFFECT OF HUMAN CAPITAL AS A SOURCE OF VALUE IN THE WOOD SECTOR OF GALIZA AND PORTUGAL (2002-2017)

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ABSTRACT

While different approaches have been used to measure the human capital effect on company performance, it is less common testing the effects of the human capital as a source of value in a mostly unorganized sector like the wood and related industries in the Galicia (Spain) / Portugal region. The paper aims at measuring the effect of a single dimension of intellectual capital (human capital) and its value addition for the period of 2002-2017. The findings suggest that human capital is the main dimension that adds value to the wood sector, both in Portugal as well as in Galicia. This paper tests a new model to measure the effect of human capital to study its effects on the value addition to the wood sector.

Keywords – Intellectual capital, human capital, wood sector, value addition.

RESUMEN

Si bien se han utilizado diferentes enfoques para medir el efecto del capital humano en el desempeño de la empresa, es menos común probar los efectos del capital humano como fuente de valor en un sector en su mayoría no organizado como la madera y las industrias relacionadas en Galicia (España) / Portugal. Este trabajo tiene como objetivo medir el efecto de una dimensión única del capital intelectual (capital humano) y su valor agregado para el período 2002-2017. Los resultados muestran que el capital humano es la dimensión principal que agrega valor al sector de la madera, tanto en Portugal como en Galicia. Este trabajo prueba un nuevo modelo para medir el efecto del capital humano para estudiar sus efectos sobre el valor agregado al sector de la madera.

Palabras clave - Capital intelectual, capital humano, sector maderero, valor agregado.

Clasificación JEL: J24

1. INTRODUCTION

Forestry has a long history in Europe since the middle ages, over-exploitation becoming common with the growth of population (Angelstam et al., 2005) and in the last decades of the 20th century, attempts have been made to establish a regulatory framework for forestry management and protection through inter-governmental agreements (Sayer & Maginnis, 2015). Forestry still complements traditional agriculture production, generating income in less dense zones while giving jobs to people (Mourão & Martinho, 2016) and while the paper and pulp industries are dominated by a small number of multinationals, forests are mostly owned by local people trying to improve their livelihood (Sayer & Maginnis, 2015). It is still considered an important economic sector making an important economic effect in the rural areas of many EU countries (Slee, 2006).

Galiza is a province in northwestern Spain characterized by a high relative percentage of its total forest area (around 11% of the total forest area of the country) (Marey-Perez, Diaz-Varela & Calvo-Gonzalez, 2014), accounting for half the Spanish production of timber. 98% of the forests are privately owned (Caballero, 2015). Portugal was EU's third largest producer of paper and pulp in 2010 and overall the forests and related industries accounted for 1,3% of the country's GDP in 2009 (Sarmento & Dores, 2013).

Though there have been various studies in the areas of knowledge management and intellectual capital, very few have been specifically made on the Portugal – Spain (Galiza) region on the wood sector and related industries that are dominated by SMEs with very few large, publicly traded companies. Some studies on the timber industry of Argentina and Latin America were found (F-Jardón & Martos, 2009, 2012, 2014), (F-Jardón & Silva, 2017), but none on the Portuguese – Spanish Galiza area, as far as intellectual capital or human capital is concerned. The studies on Portugal-Spain were mainly related to forest management (Carvalho-Ribeiro & Lovett, 2011) or ownership issues (Marey-Perez, Diaz-Varela & Calvo-Gonzalez, 2014).

2. THE MEANING OF HUMAN CAPITAL

One of the earliest definitions of intellectual capital was given by Stewart (1991) where he defined it as sum of patents, processes, management skills, technologies, information on clients and suppliers and overall experience that gives an edge to the company in the market place. The term 'Intellectual capital' is normally taken as a misnomer, often understood to be of relevance to only high-technology industries and information and communication technology companies, but it is essentially relevant for every business organization (Purohit & Tandon, 2017). Intellectual capital comprises those intangible assets that may generate future benefits for the organization and that create key competitive advantages for the business and are invisible, not easily quantifiable or acquirable or valued monetarily (Lopes & Martins, 2006).

Many researchers in the area agree that intellectual capital should be classified into three types of capital: human capital, structural capital and customer/relational capital (Saint Onge, 1996); (Sveiby, 1998); (Bontis, 1998); (Bozbura, 2004). Customer/relational capital was separated from the original classification of two types of capital (human capital and structural capital given by Edvinsson & Malone, 1996), namely from the structural capital and was defined as the summation of relationships, interactions, and intimacy of an organization with its customers (Stewart, 1994).

In this context, this paper only studies the human capital.

3. HUMAN CAPITAL EFFICIENCY

Efficiency of intellectual capital is a concept that describes how (efficiently) a company's intellectual capital creates value for it. In other words, it describes the productivity of intangible assets (Kujansivu & Lönnqvist, 2007). Human capital that encompasses all aspects of human behavior in the working environment is at the primary stage of intellectual capital efficiency (Nourani, Chandran, Kweh & Lu, 2018). Human capital efficiency (HCE) measures the value added by the human resources of an organization (Rahim, Atan & Kamaluddin, 2017).

As per Kucharčíková, Tokarčíková & Blašková (2015), although that there is no single methodology for measuring the efficiency of human capital, there is a set of several recommendations that each company should follow when measuring the efficiency of its own human capital:

- Identify basic indicators measuring human capital, which have a clear connection with company performance.
- Use simple measurements and indicators and focus on easily accessible and reliable quantitative information.
- Compare indicators set to the required level, which may be created by company standards, compared based on the benchmarking with companies from the same industry, rate of achievement of the objectives, etc.
- Identify unique specifications of human capital that are necessary for the performance of the position and evaluate objectively whether employees really have them, or whether they need training.
- Keep in mind that the measurement of human capital is carried out to increase its effectiveness in relation to company performance, and therefore, it is necessary not only to do measurement, but also identify deficiencies and problem areas and take measures to improve.
- All measures to increase the efficiency of human capital are considered an investment in human capital and they need to be evaluated.

As per Pulic (2000), human capital (HC) can be calculated using the company's total salaries and wages, and the human capital efficiency (HCE) as a ratio of the value added (VA) to the human capital (HC), where $HCE = VA / HC$. Here VA is the difference between the total sales (OUTPUT) and material costs (INPUT). VA can also be calculated as the sum of operating profits (OP), employee costs (EC), depreciation expenses (DP) and amortization expenses (AM).

We have however, not used Pulic's formula of VAICTM as it simply indicates the efficiency of a company's labor and capital investments, and has nothing to do with intellectual capital, making it an invalid measure to measure intellectual capital (Ståle, Ståle & Aho, 2011), and suggested instead, a new measurement using panel data model approach.

Empirical studies of Greek listed companies suggest that there is a significant relationship between human capital efficiency and the return on equity of the companies, implying that the development of human resources is one of the significant factors of the country's economic success (Madininos et al., 2011).

4. DOES HUMAN CAPITAL CREATE VALUE?

One of the greatest challenges for human capital researchers is to prove that human capital creates value (Česynienė & Stankevičienė, 2011).

Human capital is the life of intellectual capital, being the most difficult to measure and evaluate. It is not owned by the company, it can only be "rented" (i.e. in the form of employees' wages). It can be divided into: tacit knowledge and explicit knowledge. Tacit knowledge is extremely difficult to explain or write down, being the knowledge that people do not even realize they have as it is embedded in their brains. Explicit knowledge is what can be captured, explained in words, traded, or sold. This knowledge usually remains with the company after an employee leaves, given that it was recorded in some way (Kaya, Sahin & Gurson, 2010). In the case of SMEs, the entrepreneur and the inventor are pure human capital as they nurture the idea or concept of the investment (Hisrich & Peters, 2008). Explicit knowledge sharing has a greater effect on financial performance than on operational performance, whereas tacit knowledge sharing has a greater impact on operational performance than on financial performance (Wang, Wang & Liang, 2014).

Human capital, if managed properly, can create value for the firm in the shape of increased revenue, improved customer satisfaction, enhanced quality of the products and services, increased productivity and reduced costs. This statement suggests that the human factor can increase the value of the firm and value produces competitive advantage (Mangi, 2009).

Several authors studied the correlation between investments in human capital and value creation for the firm in different sectors in different parts of the world, namely Riahi-Belkaoul (2003), Mavridis (2004), Chen et al. (2005), Tseng & Goo (2005), Ng (2006), Pew et al. (2007), Kamath (2008), Shih (2010), Maditinos et al. (2011), Komnenic & Pokrajčić (2012), Liepé & Sakalas (2014), Andreeva & Garanina (2016), McDowell et al. (2018), among others. Their findings and conclusions are mostly consensual as it was proved that investments in human capital have a positive effect on value creation and profitability, both for the manufacturing sector as well as the services sectors, even in the case of small organizations that often invest heavily in intellectual capital through their employees, communications, and processes and leverage such investments to foster innovation within the company (Maes & Sels, 2014).

A generally accepted consensus is that human capital is considered the most important element of competitive advantage in most organizations and includes all the competencies of the people within the organization (Memon, Mangi & Rohra, 2009). As people mean everything, human capital is thus the most important capital (Hitt & Duane, 2002). The impact of human capital in value creation is widely acknowledged as an important issue (Coco, Jamison & Black, 2011).

Even from a macroeconomic point of view, OECD (2002) recognizes human capital as the primary driver of competitiveness, prosperity and economic wealth. Scholars have widely acknowledged that human capital is a critical component of firm performance (Bendickson, Muldoon, Liguori & Midgett, 2017; Reed, Lubatkin & Srinivasan, 2006), particularly when it focuses on skills and knowledge and not only on education and training (Unger et al. 2011).

In this study we will attempt to measure the importance of human capital as a value creator for the wood sector of Galiza (Spain) and Portugal. While the hypothesis to be tested is whether human capital has a positive correlation with value generation, it was divided into six distinct sections to test different sectors as under:

H1: Human capital creates value in the extraction sector of Galiza (Spain) and Portugal

The extraction sector in our study comprises of activities of forestry and logging, cork extraction, silviculture, and other related industries. In Portugal, forest ownership is characterized by small property dimensions, elderly and/or absent owners (Martins, Xavier & Fragoso, 2014) and while in Galiza (Spain) the picture is not much different, the property rights of Galician communal forests are private but collective with the passing of the Galician Act of Communal Forests of 1989 (Caballero, 2015). Nevertheless, the forestry (extraction) sector is still dominated by small and medium enterprises, and even by subsistence small businesses (F-Jardón & Silva, 2017). Intellectual capital is more important as a source of competitive advantage in the case of small and medium enterprises than large companies because the tangible resources are often lower, and SMEs should compete through intangible resources (F-Jardón & Martos, 2012). Human capital is the basic component of intellectual capital (Wang & Chang, 2005) as knowledge resides in people and thus, skilled and trained workers make more efficiently the processes and tasks (F-Jardón & Martos, 2012) even in SMEs. That is why it was essential to segregate the extraction sector in this study. Most of the companies under this sector are SMEs.

H2: Human capital creates value in the conversion sector of Galiza (Spain) and Portugal

The conversion sector in Galiza (Spain) comprises of construction carpentry, pulp and timber mills, which is mainly dominated by large companies, some of them not listed. In Portugal, it comprises of carpentry activities, pulp and timber mills, but most of them are SMEs with the prominence of some large companies, especially in the pulp manufacture. In general, the dimension of the companies is larger in Spain. Even though human capital is more important as a source of competitive advantage in the case of small and medium enterprises than large companies because the tangible resources are often lower (F-Jardón & Martos, 2012), it is important to study human capital regardless of the industry type or size because human capital has a greater influence on how a business should be structured in non-service industries (Bontis, Keow & Richardson, 2000). It was necessary to segregate the conversion sector from the other two as it has a mixture of small and medium enterprises with large companies mainly operating in the pulp manufacture. Again, given the diversity of sizes between both countries under study, it was not possible to combine them into one.

H3: Human capital creates value in the finished products sector of Galiza (Spain) and Portugal

The finished products include every industry that is dependent on wood and that is not part of extraction or conversion, namely paper and its articles, cardboard, wood and its articles, wooden furniture. Both for Spain as well as for Portugal, the sector is characterized by the existence of large multinational companies as well as small players in the unorganized sector, better fitted under the small and medium enterprises. Here too, the prevalence of larger players is seen in Spain with smaller ones in Portugal, mandating us to separate both the countries in this study. Traditional manufacturing sector has a lower investment in human capital as compared to the non-traditional sector (services) and the economic value creation is mainly based on “dead knowledge” embedded in machines (physical capital) (Iazzolino & Laise, 2016). Another remarkable point is that manufacturing companies are intertwined with the environment in which they are embedded, and workers are provided with the necessary technical skills that they can have great difficulty in finding in other places (Barzotto, Corò & Volpe, 2016), thus implying that the segregation of the study into Portugal and Galiza (Spain) had to be done while examining the human capital contribution.

5. METHODOLOGY

Using the data from the SABI database for all the companies in the industries related to the wood and ancillary sector for the financial years 2002-2017, but only considering companies that had financial data for 2016-2017, the human capital and its efficiency were calculated for every company that had positive values (where $VA > HC$), year wise. All outliers (5%) were eliminated to get lesser skewed results. The data was divided country-wise into three main sectors: extraction, conversion and finished products, to facilitate and segregate interpretation.

The model used for this study is as under:

$$\frac{VA}{TA} = \beta_0 + \frac{HC}{TA} \beta_1 + \varepsilon_i$$

Where,

VA = Value added

TA = Total assets

HC = Human capital

Panel data model was used on our study as it possesses several advantages over conventional cross-sectional or time series data sets (Hsiao, 2014), (Anastasiou, 2016):

More accurate inference of model parameters increasing the degrees of freedom.

- Greater capacity of constructing more realistic behavioral hypotheses, that is not possible using cross-sectional or time series.
- Better control over variables that change over time but not across entities.
- More accurate predictions for individual outcomes by pooling the data rather than generating predictions of individual outcomes using the data on the individual in question.

6. EMPIRICAL ANALYSIS AND FINDINGS

Using a panel data model, we estimated the one-way model random-effects model regression for each one of the constructs above.

Based on the results we can see that for:

- In the Spanish extraction sector, the human capital has a significant effect on value generation, and H1 can be accepted for this sector.
- In the Spanish conversion sector, the human capital has a significant effect on value generation, and H1 can be accepted for this sector.
- In the Spanish finished products sector, the human capital has a significant effect on value generation, and H1 can be accepted for this sector.

TABLE 1: One-way random-effects model regression results per sector

SECTOR	INTERCEPT (β_0)			β_1 HC/TA		
	Estimate	Std. Error	z-value	Estimate	Std. Error	z-value
Spain – Extraction sector	0,3335	0,01164	28,638	1,2412	0,0099	124,340
Spain – Conversion sector	0,1847	0,0039	46,953	1,2131	0,0039	306,354
Spain – Finished products sector	0,1597	0,0038	41,905	1,2632	0,0009	1331,083
Portugal – Extraction sector	0,3376	0,03693	9,142	2,1796	0,01985	109,791
Portugal – Conversion sector	0,1221	0,0127	9,611	1,4882	0,02984	49,868
Portugal – Finished products sector	-0,8079	0,0268	30,065	4,0266	0,0088	545,649

Source: own compilation

- In the Portuguese extraction sector, the human capital has a significant effect on value generation, and H2 can be accepted for this sector.
- In the Portuguese conversion sector, the human capital has a significant effect on value generation, and H2 can be accepted for this sector.
- In the Portuguese finished products sector, the human capital has a significant effect on value generation, and H2 can be accepted for this sector.

This implies that overall in the wood sector and related industries of Galiza (Spain) and Portugal, the human capital plays a significant role in creating value, suggesting that for each unit in percentage of investment in human capital in relation to total assets, the added value in relation to total assets in percentage is around 1,2 percent in Spain and between 1,4 and 4,0 percent in Portugal.

Our results match the conclusions found by other authors in several other studies, where the presence of a significant, positive relationship between human capital and business performance was found to exist. However, our study was more exhaustive given the number of company years used. Below the main studies in the area are given and the differences and similarities are highlighted.

- McDowell et al. (2018) in the context of SMEs in USA, where the findings were of a significant positive relationship between human capital and organizational capital. They did not focus much on value creation. Our current study was different as it analyzed the effect of human capital on value creation and business performance.
- Andreeva & Garanina (2016) in the case of Russian manufacturing companies found out that human and structural capital positively influenced organizational performance explaining a quarter of its variation, while relational capital did not have any significant influence. This was also not a similar study to ours, as it measured three components of intellectual capital instead of concentration only on human capital.
- Liepé & Sakalas (2014) using a sample of 26 European Union companies (excepting Luxembourg) and Lithuania studied the human capital investment to the GDP and found out that for every 1 euro invested in human capital, the GDP multiplier was 5,8 times. This study approximates to ours, only differing in the sense that it used companies from different sectors and did not segregate them into countries, ignoring the effect of the local environment on the human capital (Barzotto, Corò & Volpe, 2016). However, the conclusions are the same. The investment in human capital has a positive correlation with value creation.
- Komnenic & Pokrajčić (2012) in their study of Serbian financial, commercial and industrial companies also found out that the relationship between human and structural capital and corporate performance was significant. The results of their study were somewhat like ours, as they also found out that human capital has the greatest significance in the value addition process.

- Maditinos et al. (2011) using 96 Greek companies listed in the Athens stock exchange studied the effect of intellectual capital using the VAICTM model. This study is quite different from ours, where we developed a new model to study the value addition of human capital.
- Shih, Chang & Liu (2010) on the banking sector of Taiwan, found out that human capital has a positive and direct influence on structural capital. This analysis is not like ours, where we attempt to measure the value addition of human capital to the business performance.
- Kamath (2008) in the Indian pharmaceutical industry used the VAICTM model and failed to find any significant positive relationship between the firm's performance in terms of productivity, profitability and market valuation. The study used parameters that were different from our study.
- Pew, Plowman & Hancock (2007) on various sectors as per the listing of the Singapore stock exchange also used the VAICTM model and found out positive correlations between the company's intellectual capital and performance. Their study did not focus on human capital specifically and is different from ours.
- Ng (2006) on the Canadian wireless technology companies, studied the effect of structural capital and human capital on future revenue generation, and concluded that human capital did not have such a great effect on the revenue generation as structural capital. This study was based on the correlations between the various components of intellectual capital and did not focus specifically on human capital, being thus different from our study.
- Tseng & Goo (2005) studied a sample of Taiwanese manufacturing companies and the relationships between innovation capital, organizational capital and relational capital on enhancement of corporate value, while human capital is only being studied for its relationships with the other types of capital. The analysis and findings are different from our study and do not match our findings.
- Chen, Cheng & Hwang (2005) on Taiwanese manufacturing companies, used the VAICTM model, and thus their findings are not comparable to our analysis.
- Mavridis (2004) on the Japanese banking sector also used the VAICTM model, and so their findings cannot be compared to our study objective and conclusions.
- Riahi-Belkaoui (2003) on US multinationals studied the combined effect of intellectual capital on value creation without focusing on human capital, and thus, their results are not comparable with ours.

7. CONCLUSIONS, PRACTICAL IMPLICATIONS, LIMITATIONS AND POSSIBLE ADVANCES

7.1. Practical implications

Investment in human capital contributes to extensive economic growth. Some of the benefits of investment in human capital are growth of the production, services, quality, labor productivity, decrease in costs, other innovations, high quality relationship with customers, growth of the competitive ability on the market (Kucharčíková, 2014).

This paper proves that the returns of human capital are higher than the investment in value addition, when taken as a ratio to total assets. The recommendations to the wood sector is that investments in human capital should be increased to increase overall the value addition. Our study proved that there is a positive correlation between human capital investment and value creation both for Galiza (Spain) and Portugal. In the case of Spain, one-euro investment in all the three sectors implies an increase in business performance of 1,2 euros. In the case of Portugal, the positive correlation is even higher, ranging between 1,4 euros for the conversion sector, to 2,1 for the extraction sector and around 4,0 for the finished products sector. This can be justified by the argument of F-Jardón & Martos (2012) that intellectual

capital is more significant in the case of small and medium enterprises. In Portugal, there was a higher number of SMEs, as compared to Spain.

7.2. Limitations and possible advances

Our analysis was limited to the wood and related industries of Galiza (Spain) and Portugal and did not cover other areas of the world. The study could be extended to other economic sectors and other regions of the world in the wood sector too. With an expanded geographical area, the results may differ, especially in the case of SMEs, where the studies are rare.

Similarly, we limited our study to human capital and did not consider the effects of value addition brought about by structural capital and relational capital. These two other types of capital, that together with human capital, compose the intellectual capital, could also be studied to enrich and improve the wood and related industries sector.

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