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Article

Performance and internationalization effects of the use of ICT in diversified companies

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Performance and internationalization effects of the use of ICT in diversified companies

Efectos del uso de las TIC sobre el rendimiento e internacionalización de las empresas diversificadas

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Abstract

The relationship between Information and Communication Technologies (ICT) and business performance has been a topic of great importance for academics from different areas for several decades. In this sense, this study analyzes the impact of the use of ICT on the diversification strategy of small and medium enterprises (SMEs). From a sample of 95 companies in the Autonomous Community of the Basque Country, it is evident that diversified companies show a higher level of use of ICTs and that

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this resource affects positively the degree of international diversification and business performance. For the descriptive and correlational statistical analysis of the variables, the SPSS software version 21 was used.

Keywords: ICT, diversification, internationalization, performance.

Resumen

La relación entre las Tecnologías de la Información y la Comunicación (TIC) y el rendimiento empresarial ha sido un tema de gran importancia para los académicos de diferentes áreas durante varias décadas. En este sentido, este estudio analiza el impacto del uso de las TIC en la estrategia de diversificación de las pequeñas y medianas empresas (PYME). De una muestra de 95 empresas de la Comunidad Autónoma del País Vasco, es evidente que las empresas diversificadas muestran un mayor nivel de uso de las TIC y que este recurso afecta positivamente el grado de diversificación internacional y el rendimiento empresarial. Para el análisis estadístico descriptivo y correlacional de las variables, se utilizó el software SPSS.

Palabras clave: TIC, diversificación, internacionalización, rendimiento.

1. Introduction

Due to the rapid development of the global economy many companies choose diversification as their strategic choice. In addition, the incorporation of new economic activities has become an essential fact to transform or remain a company with a future. It is for this reason that diversification has drawn the attention of the business world and numerous researchers from different areas during the last decades, who seek to identify the determinants that affect it, as well as demonstrate its effects on business performance.

On the other hand, the advancement of ICT has become an essential ingredient for the survival of the business, improving activities in the value chain of an organization and have generated different changes in both models and business strategies. These changes caused by the influence of these technologies have been equally relevant in the studies of business management scholars of recent years that see their importance as a link between the firm's strategy and business processes.

It is evident that these technologies lead to an increase in productivity by reducing costs, these allow companies to increase the quality and output of new products (Brynjolfsson & Hitt, 2000). In this regard, some studies relate ICT with the degree and type of diversification that the company has, indicating that these elements are influential in one way or another in business results (Chari, Devaraj, & David, 2007; Liu & Ravichandran, 2008; Ravichandran, Liu, Han, & Hasan, 2009; Shin, 2009a; Hüseyin Tanriverdi, 2006).

This study aims to contribute to the literature empirically demonstrating the relationship between the use of ICT in specialized and diversified companies. The other aim is to indicate how they impact on the degree of international diversification and the performance of the businesses in which the company participates.

According to the above, this document begins with the theoretical background in which the main concepts of diversification and ICT are identified, which allow to frame the hypotheses of study. The second section presents the methodology of the empirical study used. Subsequently the respective results are presented along with a discussion. The study closes with the conclusions and future lines of research that can be presented in this field of research.

2. Theoretical Framework

2.1. Business diversification

Diversification means the entry of a company into new product lines, processes, services or markets (Dewan, Michael, & Min, 1998). This implies that a company moves in a series of markets (sectors, industries or segments) to which it was previously engaged (Park & Jang, 2012). Also when the company decides to expand the sales of its goods and services transcending the borders of countries and areas of the world to enter different markets, this involves international or geographical diversification (Hitt, Ireland, & Hoskisson, 2008).

The concept of diversification describes the degree or extent to which a firm is operating simultaneously in more than one industry in its field of activity and therefore in its corporate strategy. Also, the entry into new lines of business is always related to business performance, which has made it essential to use a diversification measure to check the results found (Miller, 2006; Ravichandran et al., 2009; Sánchez & Menguzzato, 2009).

The measure of diversification refers to the degree or level at which a company operates between various business segments, the categorical measures being Wrigley (1970) and Rumelt (1974). One of the most used in the area studies. This measure is based on a series of ratios determined by the sales percentages of each business and identifies whether the company is diversified or specialized.

Likewise, the measure of international diversification reflects the degree to which a company has foreign activity; that is to say, that it carries out its activities in several international markets at the same time (Chari et al., 2007). Sullivan (1994), Has proposed a composite index through the use of two indicators; the

intensity of overseas operations and their geographic reach. This index has subsequently been endorsed as the best way to measure international diversification and has been used in other studies (Chao & Kumar, 2010; Chari et al., 2007).

On the other hand, there are many theories which have defined different aspects that try to answer the question of why companies are diversified. The theory of the agency, the vision of markets, the theory of the resources, the dynamic capacities, the theory of the knowledge and the theory of transaction costs, are some of these perspectives, in which have been framed the different studies of diversification, and which evidence most of the bases of the empirical studies.

From the theory of resources, companies tend to start a process of diversification, on those businesses in which it can take use its resource base and knowledge with the idea of taking advantage of them fully and efficiently. In fact, diversified companies can share resources among their different businesses, generating cost advantages in all of them (Miller, 2006). This is one of the theories in which the majority of studies that relate the resources and technological tools with which the company counts and the diversification strategy (Miller, 2006; Hüseyin Tanriverdi, 2006).

2.2. ICT and business diversification

Technological developments play a very important role in the realization of goods and services manifested through activities that are digitally more intensive (Sharma, 2013). This is why some organizations today see ICT as a way to fight against competition by improving productivity, profitability and quality of operations (Devaraj & Kohli, 2003), as their innovations have offered opportunities to improve their processes and develop new business models and applications. In addition, ICTs also help companies increase their competitive advantage potential, enabling them to carry out primary and supportive activities, either at a lower cost or on a road leading to differentiation and at a higher price (Porter & Millar, 1985).

This new century presents a strong propulsion for companies to adopt ICT as a means for a new business conduct (Sharma, 2013), allowing companies to rethink the way they do business, stimulate creativity, and ultimately create new opportunities (Shin, 2009a). The advance in these technologies has given way to a new kind of opportunities for the organizations, turning them into a strategic resource in which the companies find new opportunities in the market, with low costs and high probability of success (Shin, 2009a).

Because of this, organizations often respond by harnessing ICT to seek innovative applications that enable them to improve or extend the reach of their products and services (McNurlin, Sprague, & Bui, 1989). This makes clear that these technologies lead to an increase in productivity through cost reduction, which allows companies to increase quality, create new lines of business, diversify and cross borders.

In the same way, a greater degree of diversification demands a greater need of coordination of the assets and processing of the information within the multi-business companies (Dewan et al., 1998). In addition to this, technologies such as the Internet, which are associated with an expansion of business scope and a decrease in the specialization of the company (Brews & Tucci, 2004).

According to Dewan (1998), ICT demand is relatively higher in diversified companies with related business lines because these firms require coordination of resources than firms with unrelated diversification (Dewan et al., 1998). The impact of these technologies on companies is greater for related companies than for unrelated ones (Chari, Devaraj, & David, 2008). These companies pursuing diversification strategies, especially those that follow unrelated diversification, should prioritize in the adoption of ICT in operating activities (Sandulli, Fernández-Menéndez, Rodríguez-Duarte, & López-Sánchez, 2012).

For these reasons, firms with higher levels of use of ICT are more likely to diversify.

Hypothesis 1. *Diversified companies have a greater use of ICT than specialized companies.*

As companies can use ICT capital to coordinate their resources and capabilities across different markets, this capital can facilitate the realization of economies of scope and allow companies to operate in several markets simultaneously (Ray, Xue, & Barney, 2013). In addition to this Ravichandran indicates that ICT (taking into account coordination and control in companies) determine the success of international diversification (Ravichandran et al., 2009).

Internationally diversified companies need more investment in information technology in order to coordinate their assets and operations across country borders in different international markets than their non diversified counterparts (Roy & Sivakumar, 2007).

Likewise, The cost-effectiveness of technology facilitates the expansion of business activities into the international markets (Liu & Ravichandran, 2008), because the ICT can support the multinational firm as it seeks to coordinate global operations, diffuse innovation worldwide or provide integrated service to a global corporate customer (Jarvenpaa & Ives, 1993).

From these above arguments, it is conclude that there are a positive impact between ICT and international diversification.

Hypothesis 2. *The level of ICT use is positively related to the degree of international diversification.*

On the other hand, while information technologies have been expected to directly improve business performance in specific value chain activities (eg: supplier performance or customer service delivery), their advanced capabilities offer the promise of greater organizational integration by obtaining indirect benefits (Xue, Ray, & Sambamurthy, 2013).

The adoption of ICT, from the evaluation of its use, will allow a more specific recognition of the impact of these technologies on the organizational strategy, which have been forged through the use of e-business. It is also suggested (Basu & Muylle, 2011) that there is little guidance in the literature, making it attractive for this type of research, assuming that the intensive use of these technologies in operational processes is associated with substantial increases in the productivity of diversified firms, and it has been suggested that the adoption of this technologies should lead to a positive increase in business performance in companies with multiple lines of business.

In this context, organizations that want to produce innovative ideas and diversify, should emphasize the mastery of skills and knowledge in the ICT use that allow a high degree of motivation of their employees to meet objectives and respond to the challenges that arise (García, López, & Epalde, 2015).

Some research commonly relates diversification to ICT in how their spending significantly complements this strategy and is generally related to business performance (Chari et al., 2008; Esteben, 2007; Hu, Zhang, & Teng, 2011; Liu & Ravichandran, 2008; Ravichandran et al., 2009; Shin, 2006)).

The impact on the performance of diversification is a positive function of the level of ICT investment made by the company. This means that this impact of ICT on performance could be significantly positive (for companies with high investment in ICT), significantly negative (for companies with low ICT investment) or neutral (for the average company) (Chari et al., 2007). For these reasons, firms with higher levels of use of ICT are likely to obtain a greater performance.

Hypothesis 3. *The level of ICT use is positively related to a better performance in diversified companies.*

3. Methodology

With the idea of contrasting the hypotheses raised, an empirical study was planned by means of the application of a survey directed to the managers of the SMEs established in the autonomous community of the Basque Country (CAPV) belonging to the industrial sector. These type of companies maintains a high economic weight in the Spanish economy in general and is the one that more agglutinates in this international diversification commu-

nity. (Eustat, 2015). It was possible to obtain a sample of 95 signatures from the application of a self-administered questionnaire presented to companies in physical and online format.

3.1. Measurement of variables

3.1.1. Use of ICT (UICT)

To measure the use of ICT in the company, the manager is asked to indicate in a list of 18 technological tools which is the level of use that the company has considered each one of them. The list of tools has been selected through the suggestions made by the ITU, OECD, Eurostat, INE, Eustat and evidenced in other studies (Albarracín, Erazo, & Palacios, 2014; Guzmán, Serna, de Lema, Enríquez, & Adame, 2010). This variable is composed of the arithmetic mean obtained from a five-point Likert scale in which the manager indicated the level of use of each of the technologies presented. In order to validate this measure, the reliability of the scale is verified through the Cronbach Alpha statistic (0.834) and KMO (0.77) indicating the validity of the scale used.

3.1.2. Degree of diversification

This variable has been measured categorically (dichotomous), differentiating between diversified companies and specialized companies. This classification is based on the categories proposed by Wrigley and Rumelt (Rumelt, 1974; Wrigley, 1970), based on the specialization ratio are identified the main categories of companies (specialized, diversified and dominant business). With this, companies where the percentage of sales of their original business exceeded 95% are classified as specialized, between 95% and 70% are identified as the dominant business and less than 70% were classified as diversified. For purposes of this study, and following are identified two types of company; diversified and specialized (including in these also the dominant business).

3.1.3. Degree of international diversification

To measure this variable, a composite index suggested by Sullivan through the use of two indicators; the intensity of foreign operations (ratio of external sales to the firm's total sales) and its geographical scope (number of countries in which the companies operate) (Sullivan, 1994).

3.1.4. Business Performance

To measure business performance subjective measures have been used through the responses given by managers to this aspect in the questionnaire. Subjective measures, evaluated from the director, are chosen when non-financial performance is involved in the analysis or when objective financial measures are not available (Geringer, 1991).

According to this, which is consistent with the literature, subjective measures to measure performance are correct, reliable and accurate, as well as objective measures (Khan, Khalique, & Nor, 2014). Therefore, it is recommended that empirical research on SMEs should emphasize using subjective measures through a Likert scale, applied to the owners and managers of these companies with the idea of collecting accurate and reliable data and with an increased response rate (Khan et al., 2014). This type of measure has been used by other authors (Basco, 2013; Chandrakumara, De Zoysa, & Manawaduge, 2011; Escribá, Sánchez, & Sánchez, 2008; Mendoza & Toledo, 2014; Ruzgar, Kocak, & Ruzgar, 2015).

Under these arguments, and based on the work of Escribá et al. (2008); six items were used to measure the performance of the diversified company (profitability obtained in the new business, new business sales level, entry costs, market share, reputation and access to resources, knowledge and skills). For this, an average has been calculated as answered by the manager (1 = Much worse than expected, 2 = Worse, 3 = Similar, 4 = Better, 5 = Much better).

4. Results

4.1 UICT and type of company

In order to analyze the relation of the variables of this hypothesis (1) a bivariate test is used in order to verify the significant differences between the use of ICTs in diversified and specialized companies. The t test for indepen-

dent samples analyzes the equality of means of the dependent variable in each of the defined categories.

Initially, and according to the Kolmogorov-Smirnov statistic applied to the two categories (specialized and diversified), it can be affirmed that the variable behaves normally. Likewise, since the Levene test was found to have a significance higher than that determined for its acceptance (0.998), so the variances are assumed to be equal.

According to the results obtained, the average ICT use of diversified companies is slightly higher than that presented by the specialized ones, in the sense proposed in hypothesis 1 and would be in agreement with other works (Brews & Tucci, 2004; Chari et al., 2008). To verify if this difference is significant, the value of the t statistic is analyzed.

According to this analysis, it has been found that the t test is not significant (0.595) and therefore the null hypothesis of equality of means cannot be rejected. This means that although there was a higher level of ICT use in diversified companies over specialized ones, there is no significant difference. Initially proposed in hypothesis (1) cannot be affirmed by lack of sufficient statistical evidence.

4.2. UICT and degree of international diversification

This hypothesis (2) suggests that the use of ICT can be an important factor in the degree of international diversification. Under this assumption it is intended to demonstrate that companies that present a higher level of ICT use also present a greater degree of international diversification. The Kolmogorov-Smirnov test showed that the data meet the normality requirements.

It has been possible to determine that the Correlation Coefficient (Pearson) is a positive value (0.466) with a statistically significant coefficient (p = 0.001), so it can be concluded that both variables are associated in the population from which the sample Analyzed, and that this association shows a direct correlation. With these correlation values it is possible to complement the statistical study through the analysis of simple linear regression, to evaluate this relation. For this the following model has been considered, using a linear regression by OLS (See Table 1).

$$Inter_Div = b0 + b1UICTi + b2Tamañoi + \varepsilon i$$

The size variable has been used for control purposes, following other works (Chari et al., 2007; Sandulli et al., 2012; Hüseyin Tanriverdi, 2006).

The results of the regression indicate that 31.2% of the variability of the degree of international diversification is associated with the use of ICT. At the same time, the ANOVA statistic shows that the variables are linearly related to a level of significance lower than 0.005. Likewise, a non-standardized coefficient for UICT of 0.176 was identified, with VIF values close to 1 (1.003) in the two variables used, indicating that multicollinearity is not a problem that affects the results.

These results show that companies with a higher degree of ICT use have a greater degree of international diversification and confirm the hypothesis (2).

4.3. UICT and business performance

This hypothesis raises that the use of these technologies can be an important factor in the performance of the diversified company. Under

Table 1. Summary of UICT model and degree of international diversification

Model	*R*	*R square*	*R square corrected*	*typical error*
1	,558a	,312	,283	,20766

a. Predictor variables: (Constant),size, UICT_TOTAL
b. Dependent variable: Inter_Div

Source: own elaboration.

the hypothesis of this hypothesis it is tried to demonstrate that the companies that present a greater level of use of TIC also present a greater entrepreneurial performance.

Under the Cronbach alpha criteria and the Bartlett sphericity test and the KMO test, it was found that each of the performance scales (financial, non-financial and global) represent an adequate measure of the phenomenon to be evaluated.

Once the values of the variables were obtained, the correlation analysis of the two variables of interest, UICT and business performance was carried out, with the result that it was possible to observe that the correlation coefficient for each one of the performance measures; Financial ($p < 0.05$); no financial ($P < 0.01$) and Global ($p < 0.01$), are significant, indicating that the variables are associated and that the correlation is direct. To verify this relationship, the following model was considered, using a linear regression by OLS.

$$Y = b0 + b1UICTi + b2Size + b3age + b4\ Ind_Concentration + b5\ Growth_rate + \varepsilon i.$$

According to other studies, the following control variables have been used: size (Banker, Wattal, & Plehn-Dujowich, 2011; Chari et al., 2007, 2008; Liu & Ravichandran, 2008; Ray et al., 2013; Sambharya & Lee, 2014), age, Industrial concentration and growth rate ((Banker et al., 2011; Chari et al., 2008; Ray et al., 2013; Hüseyín Tanriverdi & Lee, 2008). Table 2 summarizes each of the variables used in the model and its definition.

Table 3 shows the results of the estimation carried out to examine the relationship between the degree of use of ICTs and business performance at the financial, non-financial and global levels. Data were processed by multiple linear regressions by OLS. In all models, it was first verified that the regressors have an inflation factor of variance (VIF) that precludes the presence of multicollinearity.

As shown in table 3, the use of ICTs in SMEs in the sample generates a positive impact on financial, non-financial and global performance.

Results on financial performance
For this relationship, a positive and significant statistic is 0.634 ($p < 0.01$), indicating that the use of different ICT tools improves the financial performance of the company. The validity of the model is also confirmed since the F has a value of 7.210 ($p < 0.01$).

Results on non-financial performance
The results indicate that as the use of ICT in the organization increases, a higher non-financial performance (standardized coefficient = 0.645 and $p < 0.01$) is presented.

Results on overall performance
For this case, a positive and significant statistic is again found (0.690 $p < 0.01$), which indicates that the use of the different tools within the SMEs contribute to the overall performance of the organization. Also for the model is a statistic F positive and highly significant (5,434 $p < 0.01$), which confirms its global validity.

Table 2. Variables used in the UICT model and performance

Dependent variable	
Rend_finan	Financial Performance (Profitability, Sales, Costs)
Rend_No_Finan	Non-financial performance (market share, reputation resources
Rend_Global	Overall performance (financial and non-financial)
Explanatory variable	
UICT	Level of use of ICT in the company
Control variables	Company size according to the number of employees
Size	Age of the company from its beginning of activities
Age	Industrial concentration
Ind_Concentration	Industry Growth Rate
Growth_Rate	

Source: own elaboration.

Table 3. Summary of the UICT model and performance

	Financial Performance	*Non-financial performance*	*Overall performance*
UICT	,634***	,645***	,690***
	(4,610)	(3,993)	(4,696)
Age	-,6437***	-,402**	-,586***
	(-3,824)	(-2,033)	(-3,245)
Size	ns	ns	ns
Ind_Concentration	-,277**	ns	ns
	(-2,145)		
Growth_Rate	,333*	ns	ns
	(2,684)		
F	7,210***	3,278**	5,434***
R2 correct	,437	,222	,357
Durbin-Watson	1,595	1,561	1,636

Note: *= p £ 0.1; **= p £ 0.05; ***= p £ 0.01. Under each standardized coefficient, in brackets, the statistical value of t student. VIF highest on all models 2,006. Mean of waste for all models 0.000

Source: own elaboration.

These results show that companies with a higher degree of use of ICT have a higher performance, which confirms the hypothesis raised. These results show a direct impact of information technology on business performance and would be in line with other studies (Bharadwaj, 2000; Prasad, Heales, & Green, 2010).

On the other hand, since no significant coefficients were found for all control variables examined, it is not possible to demonstrate through this work that firm size, growth rate and industrial concentration influence the impact on performance of companies have the use of ICT. Contrary to this, the age of the company has obtained significant values with which this variable influences the established relationship.

5. Conclusions and discussion

According to the results obtained, it has been determined that although a higher level of ICT use was found in the diversified companies over the specialized ones, there is no statistically significant difference, so what was initially proposed in hypothesis 1 was not able to be accepted. Contrary to this, the hypothesis 2 could demonstrate that the companies with greater use of these technological tools had a greater international activity.

With these results it has been concluded that ICT has a positive impact on the implementation of product diversification and international diversification, however, despite the fact that the first approach has not been statistically confirmed, if there is evidence of a greater degree of use of ICTs in companies that have diversified into new products and markets.

Likewise, with respect to international diversification, it is concluded that ICT is a key factor for companies to expand their markets beyond the borders of their country of origin. Given that greater internationalization implies an increase in the number of countries in which the company operates, the processing of information promoted by ICTs is particularly relevant to take advantage of a greater geographic scope.

With regard to the impact of ICT on the performance of diversification, it was proposed to

determine the direct relationship of ICT to the performance of the diversified enterprise. With the proposed analysis, it has been possible to demonstrate this relationship statistically, concluding that companies that make greater use of ICT will be reflected in a better performance of the businesses in which they have entered.

The proposed findings point to the potential of diversification performance, which requires an investment and use of ICT to develop organizational capacities that facilitate the processing and coordination of information in the different business units in which the company participates.

On the other hand, since the study developed has identified previous theoretical and empirical studies, it has shown that there is a great interest to analyze the use of ICT and its impact on the different organizational factors (Li, 2009; Melville, Kraemer, & Gurbaxani, 2004). This bibliographic review has also identified the factors that lead companies to diversify their business line, recognizing in ICT a resource that can help companies to find new opportunities to expand the range of products of organizations and their impact on the performance of the diversified company (Chari et al., 2008; Hu et al., 2011; Liu & Ravichandran, 2008; Ravichandran et al., 2009; Shin, 2009a, 2009b).

The findings of this research may have implications for business managers as it allows them to see how the investments they have made in ICT in recent years are being used to a greater degree and how they can impact the strategy of organization.

One of the identified limitations of this research is the small sample of diversified companies used. A greater samples size would have increased the significance of the results and would have allowed further analysis and comparison of the economic results of the surveyed companies.

Among the future work that can be derived from this, are: 1) Identify which of the implanted technologies generates greater impact on the results of business diversification 2) analyze the relationship of ICT with other units of analysis of diversification as the mode of Input chosen to implement this strategy; 3) apply the performance model on geographic diversification indices due to the current interest in the internationalization of companies.

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