

The Effect of Information and Communication Technology in Panama SMEs Performance

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Abstract

This century is mainly characterized by uncertainty in business, a global market and a high level of competitiveness, in which most businesses must change their business strategies to survive, or adapt to market demands in this sense, the information and communication technology are considered in the literature as one of the strategies that companies can use, not just to stay in the current market, but also to significantly improve their business performance. Thus, the objective of this study is to analyze the existing effects between information and communication technology in business performance, using a sample of 615 micro, small and medium enterprises in Panama. The results show that the information and communication technologies have significant positive effects on the business performance of organizations.

Keywords: *Information and Communication Technology, Performance, SMEs.*

1. Introduction

The rapid development of the economy, the globalization of technology, business uncertainty, the high level of competitive markets and the rapid spread of information and communication technologies, are a clear example of the dynamism of the present century (Freeman & Soete, 1997; Koellinger, 2006). Also, a high percentage of organizations, particularly small and medium-sized enterprises (SMEs), are redefining or generating new business strategies to bring them into line with the economic conditions that planted the markets, and to bring them into line with the requirements and needs of current potential customers and consumers, as this will allow them to achieve not only a higher level of innovation, but also a better business performance (Kossai & Piget, 2012).

In this sense, information and communication technology are considered in the current literature in the field of business administration and computing, one of the most relevant topics for achieving a higher level of performance and business progress (Kossai & Piget, 2012), as is increasingly the number of firms considering the importance of the adoption and implementation of information and communication technologies, so

as to enable them to significantly improve their competitiveness and business performance (Paré & Sicotte, 2004; Koivunen, Hätonen & Välimäki, 2008).

Similarly, the information and communication technology are considered key elements in both, the development of production, and in obtaining an increased organizational productivity (Raymond & St-Pierre, 2005), since the automation machinery and equipment that is used in the production and in improving the quality of products and systematizing processes, have not only revolutionized manufacturing, but have also become a significant percentage of production processes, both of large firms and SMEs in industrialized and developing countries (Carbonara, 2005; Ghobakhloo, Benitez-Amado & Arias-Aranda, 2011).

Thus, the adoption and implementation of information and communication technology by SMEs and their relationship to business performance, is an issue that has not been extensively analyzed and discussed in the literature, as various researchers, academics and business professionals and computer science, consider that SMEs generally have more financial constraints than corporate and large firms

(Simpson & Docherty, 2004; Stockdale & Standing, 2006), so further studies are needed to analyze these two concepts and provide theoretical and empirical evidence of the adoption of information and communication technologies in SMEs, and their impact on financial performance, mainly in developing countries (Kossai & Piget, 2012).

In this regard, it is necessary to ensure the realization of more empirical studies to analyze in greater detail the relationship between information and communication technologies and the business performance in organizations, especially in SMEs, both in service companies, and in the manufacturing industry (Kossai & Piget, 2012). Therefore, the main contribution of this paper is the analysis of the relationship between information and communication technology and business performance in the SME's sector in the industry, construction, trade and service in Panama, a developing country using a sample of 615 companies.

2. Literature Review

In the current literature on strategic management and computing, a significant number of researchers, academics and managers are still questioning, on the factors that can best explain why some companies are more successful than others (Bauer, Dehning & Stratopoulos, 2012). One of the theses more accepted and published that best explain this questioning, are precisely those theoretical and empirical studies that establish that the variations in the resources and capabilities of the organizations, the characteristics of the industry or a combination of both, directly and indirectly affect business performance (Schmalensee, 1985; Chakravarthy, 1986; Hansen & Wernerfelt, 1989; Rumel, 1991; Hawawini, Subramanian & Verdin, 2003).

Therefore, the resources and capabilities possessed by firms are attributed to variations in business performance and heterogeneity among the main competitors of the organization (Wernerfelt, 1984), and the characteristics and structure of the industry is attributed to variation in business performance that primarily affects the competitiveness of companies in the industry, existing to new business entry and exit of these barriers, and the strong power that can achieve both buyers and suppliers of firms (Porter, 1979),

also known as the five competitive forces of Porter.

This argument regularly used in the literature by many researchers and gives strong support to the business as a determinant of the performance characteristics of the companies, also can be used to explain differences in firms in international trade, and is commonly considered that there are clear differences in the intensity of the use of resources that countries have (Bauer *et al.*, 2012). Therefore, countries generally have advantages in companies using more intensively the resources and capabilities they possess, and within the industry of information and communication technology they have high business performance, using their skills in an effective and efficient way, to increase their presence and participation in other companies (EIU, 2007).

In this regard, various researchers, academics and practitioners of business and computer science, believe that information and communication technology play an essential role in the growth and development of SMEs, as this technology allows organizations not only substantially improve their production and business performance (Aral, Brynjolfsson & Van Alstyne, 2007; Nguyen, 2009; Kossai & Piget, 2012), but also more flexible production processes (Ghobakhloo *et al.*, 2011), increase their competitive advantages (Ion & Andreea, 2008), and adapt products and services to the tastes and needs of its current and future customers and consumers (Kutlu & Ozturan, 2008).

Similarly, current literature states that the information and communication technology significantly reduces transaction costs for SMEs, facilitate decentralization of information quickly and efficiently (Czernich Falck, Kretschmer & Woessmann, 2011) and are one of the variables that most affect the performance of organizations (Bayo-Moriones & Lera-López, 2007; Gaith, Khalim & Ismail, 2009) and the level of competitiveness (Bayo-Moriones & Lera-López, 2007). Also, the adoption and use of information and communication technology allow companies, especially SMEs, to increase and strengthen all their innovation activities (Koellinger, 2008; Polder, Van Leeuwen, Raymond & Mohnen, 2009; OECD, 2010).

Similarly, Mughal and Diawara (2011) concluded that the level of training and experience of managers and/or owners of SMEs are positively

associated with the adoption and implementation of information and communication technology companies in Pakistan. Furthermore, Kossai, Lapa Suza and Roussel (2010) showed that the human capital that the organization has, is the primary determinant of the adoption and implementation of information and communication technologies in the electronics sector. Also, Machikita, Tsuji and Ueki (2010) analyzed in detail the adoption of information and communication technologies in SMEs in Indonesia, Philippines, Thailand and Vietnam, and concluded that firm size positively influences their adoption.

Meanwhile, Alam and Nour (2009) concluded that the measures taken by the Malaysian government authorities, that encouraged the use of firms information and communications technology, were significantly important for the adoption and implementation of the SMEs information and communication technology. Also, Lal (1999) and Katrak (1997) had previously identified a significant positive relationship between existing technological skills, and the degree of adoption and implementation of the company's information and communication technology in the sector of electronic goods and electrical SMEs in India.

Moreover, in the literature there is also publishing studies that establish an important contribution of information and communication technology, both at the macro level and the micro level of firms (Jorgenson, Ho & Stiroh, 2008; Polder *et al.*, 2009; OECD, 2009, 2010; Bloom, Draca, Sadun, Kretschmer, 2010). In such studies it is established that the information and communication technology, not only have a close relationship with economic activities, but also to productivity, employment, competitiveness and economic and financial performance of the companies (Kossai & Piget, 2012).

Therefore, the effects of information and communication technology in the SMEs performance, generated much debate in the literature among researchers, academics and practitioners in the field of management science and computing, as currently there are few studies published in which it has not been demonstrated very clearly the effects of information and communication technology performance (Kossai & Piget, 2012). At the macro level, studies in the eighties, developed primarily in U.S. companies, did not establish with certainty the relationship between information and communication

technology, and business performance of organizations (Loveman, 1994; Brynjolfsson & Yang, 1997).

But, it is from the publication of the productivity paradox by Solow (1987), which encouraged researchers and academics to generate studies of more rigorous empirical research, to demonstrate the relationship between information and communication technology, and productivity (Brynjolfsson & Hitt, 1998; Jorgenson & Stiroh, 2000). Also, in the late nineties, the publication in the literature of a variety of modeling, testing and the use of different measurement scales generated business performance in the first instance, a major contribution to the analysis and discussion of the performance and moreover, most empirical studies that established a significant positive relationship between information and communication technology and business performance (Kossai & Piget, 2012).

Thus, the first empirical studies that showed a positive relationship between information and communication technology and business performance, were based on intermediate performance measures such as stock rotation, but not worked with other measures such as profitability (Barau *et al.*, 1995). Meanwhile, Brynjolfsson and Hitt (1998) showed that information and communications technology positively affect the productivity of firms, but had no effect on profitability. However, in the constant search to find a significant positive relationship between information and communication technology and profitability, other researchers measured the profitability as the economic and financial performance of companies, finding a positive relationship between the two constructs (Dedirck, Gurbaxani & Kraemer, 2003).

Recently, other studies in the literature have demonstrated the existence of a significant positive relationship between the adoption and implementation of information and communication technology, and profitability or business performance (Baldwin & Sabourin, 2002; Melville, Kraemer & Gurbaxani, 2004; Bloom & Van Reenen, 2007; Koski, 2010; Tello, 2011; Bauer *et al.*, 2012; & Ismail & Mamat, 2012; Kossai & Piget, 2012). Based on the arguments presented above, right now you can set the following hypothesis:

H1: The information and communication technology have significant positive effects on business performance

3. Methodology

To test the hypothesis of this research, an empirical study was conducted in 615 SMEs in Panama, taking into consideration the business directory of the General Controllorship of the Republic, which had registered in December 2011, 49,775 companies of all sizes and sectors. For purposes of this study, only those firms that had to date from 3 to 250 employees were considered, reducing the business directory to 47,654 firms. Therefore, the sample was selected at random with a confidence level of 96% and a sampling error of $\pm 4\%$, leaving a total of 648 companies, applying the survey through a personal interview during the months of June to December 2012 managers and/or owners of the selected firms, of which 615 were validated in all, obtaining a response rate of 95%.

The article includes an extensive review of the literature of different authors on the subject of matter, as well as the analysis and interpretation of the responses of 615 SMEs surveyed in Panama in 2012. This last, was organized in two parts as follows: One refers to the Information and Communication Technology, and the other has to do with business performance.

3.1. Dependent Variable

With regard to the measurement of performance, the classification of Quinn and Rohrbaugh (1983) was used, they measured through four models: a) the internal process model that prioritizes communication, stability and internal control of the organization, b) The open system model focused on flexibility, growth, resource acquisition and external support of the organization, c) the rational model that prioritizes the criteria of efficiency and productivity from a point of view outside of the organization and, d) the human relations model focused on flexibility and the development of human resources from an internal point of view of the organization. In this sense, Quinn and Rohrbaugh (1983) established 8 items to measure the four models proposed in the performance scale, as measured by a standard five-point Likert scale ranging from 1 = very unfavorable to 5 = Very favorable.

3.2. Independent and Control Variables

To measure the degree of utilization of information and communication technology, managers and/or owners of the 615 Panamenian SMEs surveyed, were asked to indicate if their company had (1 = Yes, 0 = No) the following six items:

1. ¿Do you have an E-mail?
2. ¿Do you have a web page?
3. ¿Do you do electronic purchases using Internet?
4. ¿Do you use online banking?
5. ¿Do you do marketing using Internet?
6. ¿Do you have Corporate Internet?

From the responses obtained, the information and communication technology variable was constructed by the sum of affirmative questions, having a nominal variable with a value of 0-6. This way of setting the variable can be seen in Garcia (2007) and Garcia, Martinez, Maldonado *et al.* (2009).

Size: This variable was measured by the average number of employees in 2011 of the companies surveyed.

Age: Measured by the number of years since the start of the company's operations, until the date of the implementation of the survey.

4. Results and Discussion

To verify both the relationship between information and communication technology and the level of SMEs performance, size and age of firms and test the study of hypotheses research, an analysis of linear regression was performed using the MCO through the following model:

$$Performance_i = b_0 + b_1 \cdot ICTs_i + b_2 \cdot Size + b_3 \cdot Age + \varepsilon_i$$

Where, $ICTs_i$ correspond to the level of use of the information and communication technology in the company. *Size*: average number of employees, *Age*: years of the company existence. The results obtained are presented in the following table 1.

Table 1. ICTs and performance in Panama's SMEs

Variables	Efficiency
ICTs	0.236*** (5.911)
Size	-0.027 (-0.687)
Age	-0.085**

	(-2.152)
F	12.950***
R ² adjusted	0.055
VIF Highest in the model	1.038

Below each standardized coefficient, in parentheses, value of the t statistic-student

** p ≤ 0.1; ** p ≤ 0.05; *** p ≤ 0.01*

Table 1 shows that a greater use of information and communication technology within SMEs in Panama, has a positive and very significant effect on business performance (standardized coefficient = 0.236 and $p < 0.01$) as confirming the hypothesis stated. However, the size does not affect the level of business performance of the SMEs in Panama, because statistically is not a significant variable. On the contrary, the age of the SMEs in Panama have a positive and significant effect on business performance (standardized coefficient = -0.085 and $p < 0.05$), although lower than the information and communication technology and negative, which indicates that the age of the SMEs influences inversely to the performance, meaning that at the beginning of the operations of SMEs they usually have a better level of business performance, and when the market stabilizes so does business performance.

Similarly, to test the validity of the linear regression model the adjusted R² was used, the value obtained was 0.055, and the value of Fisher F, obtaining a value of 12.950 ($p < 0.01$), which indicates that there is a proper fit of the model used. In addition, the independent variables were analyzed to determine the existence of multicollinearity between them, obtaining a factor of variance inflation (VIF) close to 1 (1.038), so the presence of multicollinearity is discarded.

Furthermore, these findings have numerous implications in Panamanian SMEs, among the most important is the one which states that companies to achieve a significant increase in performance will have, on one hand, to intensify the use of information and communication technology with those that have both production operations, and the various activities of management of all functional areas or department, as the information and communication technologies are one of the many variables that positively affect business performance, so it is essential not only for the growth of the organization, but also for their own survival,

which acquires, renews or incorporates in all processes adequate and efficient use of information and communication technologies. Similarly, managers and/or owners of the Panamanian SMEs whose organizations already have information and communication technologies will have to offer a series of training courses and instructions in the information and communication technology, with the purpose of having workers and/or employees who use this kind of technology do it more effectively and efficiently. In addition, managers must also consider the strategic planning within the organization, change or renewal of information and communication technology, and the recruitment of staff required, to give the preventive and corrective maintenance of the technology that is acquired, with the purpose of significantly increase the level of business performance.

The use of information and communication technology by Panamanian SMEs occurs mostly in the use of two tools, email and electronic banking, presenting very low use rates for the use of corporate intranet, conduct marketing, purchases and sales through the Internet, tools to help improve and become more efficient internal processes, to achieve business growth and increase production efficiency. Moreover, the average use of six technologies that record SMEs in Panama, have an average of 3.1% and only 14.1% of firms reported using all technologies, the highest percentage of companies (48%) use between 3 and 5 of the technological tools.

Finally, the government authorities of Panama will have to implement a series of policies by undertakings to provide facilities, loans or tax incentives to those organizations, mainly to SMEs, that acquire or establish new information and communication technologies, as this will allow the companies to achieve a higher level of performance. Furthermore, also the government at all levels will have to design and implement training programs in the use and management of information and communication technology, as this will facilitate SMEs proper adoption and implementation of these technologies both in their production and management processes.

The analysis in the investigation showed that there are statistically significant differences in the use of information and communication technology, taking the size of the firms, where micro and

small businesses have very low rates of use of these technologies, compared to medium companies that do greater use of them. Furthermore, this study has a number of limitations that need to be clarified. First, is the limitation of the sample, since it was considered only companies from 3 to 250 employees in some provinces of Panama, which left out of the study many of the firms (1-2 employees), which together represent about 25% of the total population, which would be necessary for future studies to consider both smaller companies and SMEs from other provinces to see the behavior of these variables.

Second, is the limitation of obtaining information as it was only considered in the survey part of the total information and communication technology and business performance. It was also too difficult to obtain the information, because most of the firms felt that the requested information was confidential and was not very willing to answer surveys, so the data provided by the managers do not necessarily reflect the actual use of information and communication technologies, and business performance of the SMEs.

Another limitation is the instrument for measuring information and communication technology and business performance as it was applied only to the managers of SMEs, so it is assumed that they have extensive knowledge of the two topics used in this study. It would be appropriate for future studies, to apply this survey to both, employees and customers of the organization, to collect information from a different perspective and correlate it with the information provided by the managers.

Finally, in the scale for measuring information and communication technology only six questions were considered, and for measuring business performance only eight questions were considered, and it would be important in future studies to consider more quantitative measures. Therefore, one might ask at this time what would happen to the business if performance variables were considered? What about business performance and information and communication technologies if other items were considered for measurement? These and other questions can be derived from this empirical study and can be answered in future studies.

5. Conclusion

Based on the results obtained is possible to conclude in two essential aspects. Firstly, the information and communication technology effectively have a close relationship with business performance of SMEs in Panama, so it is possible to conclude that as firms increase the adoption and implementation of information and communication technologies both inside and outside the organization, so does business performance. Therefore, if managers and/or owners of SMEs in Panama want to get a higher level of performance in their companies, initially they will have to significantly increase the use of information and communication technology available to the organization, as this will enable businesses to achieve their goals and objectives.

Secondly, is possible to conclude that the size of the organization has no influence on the generation of business performance, so any company, regardless of size, can achieve a higher level of business performance through more intensive use of technologies of information and communication. Also, since the age of firms (young companies vs. mature companies) have an adverse effect on business performance; it is also possible to conclude that as the retention of businesses in the market in which they participate is increased, it will stabilize the performance you must have to get a base of customers and consumers more stable.

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