

An Empirical Analysis of the Relationship Between IT Training Sources and IT Value



Pedro Soto-Acosta¹, Isabel Martinez-Conesa¹, and Ricardo Colomo-Palacios²

¹Department of Management & Finance, University of Murcia, Murcia, Spain

²Computer Science Department, Universidad Carlos III de Madrid, Madrid, Spain

Information technology (IT) training has been identified as a key factor for the success of IT applications and the most frequently applied coping mechanism to handle changing IT. However, there is a question as to how IT training has to be conducted to obtain desired outcomes (higher levels of IT value). This paper analyses the presence of IT training sources used by firm and examines the influence on IT business value. Here, IT training is studied according to three IT training sources: in-house IT training, outside IT training, and self IT training by employees. In addition, differences in IT training sources are analysed according to two contingency factors: business size and business industry. Results show a positive relationship between IT training sources (outside and self IT training) and IT business value and confirm that IT training sources are positively related to business size and differ moderately by business industry.

Keywords Information technology; training; IT training; IT value; business value

1. INTRODUCTION

Today, the contribution of information technologies (ITs) to economies is unquestioned (Stehr, 2007). IT has been considered fundamental for the development of productivity and knowledge-intensive products and services. Jobs demanding IT skills from employees have increased exponentially all over the world. For example, it is estimated that today there are 4.2 million IT practitioners within the European Union (EU) and that approximately 180 million people are using ITs at work (CEPIS, 2007). In addition, in 2005 the share of employed persons in the EU using computers in their normal work routine exceeded 50% for the first time (Eurostat, 2006).

New hardware, software, and mobile computational devices are constantly being launched, and it seems that this trend will continue in the future (Strohecker, 2005). Companies are committing more and more financial resources in order to acquire the latest technology available. This rapid growth faces a barrier, however; namely the capability of the labour force to understand

and use IT applications. In this sense, IT investments often are underused, or are not used appropriately; this is mainly because employees do not possess sufficient IT skills to use them. This fact may cause IT to become obsolete before it pays off.

Most IT experts recognize that IT training is critical to achieve productive use of the technology (Yi & Davis, 2001). This has also been confirmed by research. IT training has been identified as a key factor for the success of IT applications (McLean, Kappelman, & Thompson, 1993). Sircar, Turnbow, and Bordoloi (2000) found a positive relationship between IT training and firm performance. Furthermore, investigations have shown a positive significant correlation between IT skills and efficient use of IT resources (Lee, Kim, & Lee, 1995) and other studies' findings (e.g., Mata, Fuerst, & Barney, 1995; Ravichandran & Lertwongsatien, 2005) confirmed that IT skills may be source of competitive advantage. Thus, IT training is an important link to productive IT use, which in turn may affect IT value. Nonetheless, there is a question as to how IT training has to be conducted to obtain desired outcomes (higher levels of IT value).

The training process can be divided into three phases (Compeau, Olfman, Sein, & Webster, 1995): (1) the initiation phase, which is concerned with needs assessments and the design and development of training materials; (2) the formal training and learning phase, which refers to the training methods used (lectures, computer-based, case studies, videotapes, etc.) and choice of training sources (outside, in-house, and self IT training by trainees); and (3) the post-training phase, which examines the long-term effects of training in terms of its influence on workplace behaviours. This research focuses on the second phase, the choice of training IT sources (in-house, outside, and self-training by employees), and presents three main contributions. First, it provides knowledge about the IT training sources used by firms. Second, the effect of IT training sources on IT business value is assessed. Finally, the presence of these training sources is analysed according to two contingency factors: business size and business industry.

The paper consists of seven sections and is structured as follows. Section 2 reviews the relevant literature. In section 3, hypotheses are specified. Following that, the methodology

Address correspondence to Pedro Soto-Acosta, Department of Management & Finance, University of Murcia, 30100 Espinardo, Murcia, Spain. E-mail: psoto@um.es

used for sample selection and data collection is discussed in section 4. Then, data analysis and results are examined. Finally, the paper ends with a discussion of research findings, limitations and concluding remarks.

2. LITERATURE REVIEW

IT Training

The literature on training suggests that training provide multiple benefits to firms. Training employees facilitates the updating of skills, leads to increased employee satisfaction (Acton & Golden, 2003), increased employee commitment to the organization (Bushman, Fretwell, & Cumbest, 1994), and strengthens the organization's competitiveness (Hughey & Mussnug, 1997; Burden & Proctor, 2000). Although company commitment to training may lead to those potential benefits, there are many different categories and types of training (Switzer & Kleiner, 1996; Huang, 2001; Mathews, Ueno, Periera, Silva, Kekal, & Repka, 2001) and training delivery mechanisms (Acton & Golden, 2003). With regard to IT training, Benamati and Lederer (2001) found that education and training was the most frequently applied coping mechanism to handle changing IT, though managers might question whether they use it sufficiently. Also, IT skills have been found to be a source of sustained competitive advantage. Mata et al. (1995) found that out of four IT attributes—capital requirements, proprietary technology, technical skills, and managerial IT skills—only IT managerial skills are likely to be a source of competitive advantage. Ravichandran and Lertwongsatien (2005) found that intangible IT resources such as IT skills are critical determinants of how IT is deployed in the organization, which in turn can affect performance. In this sense, Sircar et al. (2000) found that IT training is positively correlated with a wide range of firm performance variables—sales, assets, equity, market share, and shares-, even more so than IT capital.

IT training can be provided in a number of forms and by a variety of sources. With regard to Compeau et al.'s (1995) three phases of training, this paper focuses on the second phase, the formal training and learning phase, and more specifically on training sources. Thus this research complements other studies analyzing the initiation phase (e.g., Nelson, Whitener, & Philcox, 1995), the formal training and learning phase with regard to training methods (e.g., Laghos & Zaphiris, 2007; Yi & Davis, 2001), and the post-training phase (e.g., Kay & Thomas, 1995). Nelson et al. (1995) consider that needs assessment sets the stage for effective end-user training. In this sense, they conducted a qualitative study implementing a content-levels framework to train end-users. Laghos and Zaphiris (2007) analyzed the social networks that form around self-taught e-learning communities. More specifically, they conducted a qualitative study with the aim of discovering what roles, groups and characteristics take place when there is no teacher to mentor the learning process. Yi and Davis (2001) examined whether the established behaviour-modeling

approach to software training can be improved by adding a retention enhancement intervention as a substitute for hands-on practice. Results indicated that a combination of retention enhancement and practice led to significantly better cognitive learning than practice alone. Kay and Thomas (1995) developed a monitored system to study the use of the SAM text editor. The methodology offered the means for both low-cost tracking of user profiles for a system and a practical mechanism for constructing detailed individual user models.

IT Business Value

The measurement of IT business value is an important issue within the area of management information systems. In this sense, the value created by ITs can be measured, fundamentally, by subjective measures (e.g., Grover, Teng, Segars, & Fiedler, 1998; Soto-Acosta & Meroño-Cerdan, 2008; Tallon, Kraemer, & Gurbaxani, 2000; Zhu & Kraemer, 2005) or by using financial measures (e.g. Meroño-Cerdan & Soto-Acosta, 2007; Zhu, 2004; Zhu & Kraemer, 2002). The firsts normally use senior executives as key informants on subjective measures of performance. However, IT investments may provide benefits after a certain period but increase operating costs in the short term. In this sense, researchers (e.g. Soto-Acosta & Meroño-Cerdan, 2008) argue that the business process should be the primary level of analysis. As a result, some researchers have given up on trying to correlate results with IT investments and suggest focusing on the actual processes that IT is supposed to enhance (Mukhopadhyay, Kekre, & Kalathur, 1995).

To analyze and choose the business activities responsible for IT business value, the value chain analysis of Porter (1985) has been used. This approach has been broadly used in the IS literature to study the business value of IT. For instance, Mahmood and Soon (1991) developed a comprehensive model for measuring the potential impact of IT. Their model suggests that IT can help firms to improve performance along the value chain, on downstream dimensions, internal dimensions within the organization, and upstream dimensions. Following, Mahmood and Soon (1991), Tallon et al. (2000) separated IT business value into downstream dimensions (sales support, customer services, and market expansions), internal dimensions (internal process, internal operation, and staff productivity), and upstream dimensions (coordination with suppliers and business partners). More recently, Zhu and Kraemer (2005) measured e-business value from upstream dimensions (impact on sales and impact on procurement) and internal dimensions (impact on internal operations). This research uses for measuring IT business value the effectiveness of upstream and internal online activities. The business value of these activities is discussed below.

Upstream online activities can potentially provide distinct value propositions to the firm. These come from the reduction of procurement and inventory costs, as well as strategic networks with suppliers that allow effective and efficient supply chain management (SCM). With regard to procurement costs, Kaplan

and Sawhney (2000) indicated that buying in e-marketplaces considerably reduces transaction costs. With regard to strategic links and SCM, Internet technologies can enhance SCM decision making by enabling the collection of real-time information, and access to and analysis of this data in order to facilitate collaboration between trading partners in a supply chain. In this sense, Frohlich and Westbrook (2002) showed the importance of linking customers and suppliers together in tightly integrated networks.

The adoption of Internet technologies for internal activities can also provide value propositions to the firm. These come from the collaboration and exchange of knowledge between employees as well as through the availability of information for management and planning. With an Intranet's ability to provide intraorganizational communication at reduced cost, employees can distribute and communicate their ideas more readily, enabling them to be more involved in the decision-making process (Lai, 2001). Other alternatives come from the possibility of hosting discussion forums and/or repositories, where employees can create and share knowledge, which may be used for group learning. Using Internet technologies for the internal processing of commercial transactions can also create business value, since the automation of the sales process reduces overall load on staff supporting the customer, which allows staff to focus on more complex tasks or on exceptions instead of routine tasks (Meroño-Cerdan, Soto-Acosta, & Lopez-Nicolas, 2008).

3. DEVELOPMENT OF HYPOTHESES

This section develops hypotheses for the present study, drawing on the existing information systems and e-business literature. Three relationships will be explored: IT training sources and business size, IT training sources and business industry, and IT training sources and IT business value.

IT Training Sources and Business Size

Business size has been consistently supported as an important organizational factor for technology adoption (Damanpour, 1992). For instance, Zhu, Kraemer, and Xu (2003) measured business size by the number of employees and demonstrated that larger size firms are more likely to adopt e-business. With regard to IT training, Westhead and Storey (1997) argued that employees in small and medium-size enterprises are less likely to receive training than their counterparts in larger firms, and they offer two explanations: ignorance and market-forces. The former considers that small businesses are not aware of the benefits of training and consequently provide less for their employees. The latter suggest that small businesses anticipate that the costs associated with training may exceed the benefits to be derived from it. Therefore, as larger businesses usually allocate greater financial, technological and personnel resources to IT training (Soto-Acosta, 2008), larger firms might be expected to have more IT training sources:

Hypothesis 1: The presence of IT training sources is positively related to business size

H1a: The presence of in-house IT training is positively related to business size.

H1b: The presence of outside IT training is positively related to business size.

H1c: The presence of self IT training is positively related to business size.

IT Training Sources and Business Industry

The ability to analyze separate industries is extremely important because of their vastly different characteristics, even though some relationships may be true across a broad spectrum of firms. In this sense, the industry in which a business operates has been found to influence the business' information processing requirements (Yap, 1990). Thus, firms belonging to the service industries, which rely on the processing of information, depend heavily on information systems (Premkumar & King, 1994). In contrast, retail industries, which rely on the transfer of goods, may have a greater dependence on point-of-sale systems, whereas manufacturing industries depend more on specific information systems related to production such as ERP and CAD/CAM systems. These arguments suggest that firms from different industries may require distinct IT training sources. Thus, the following hypothesis is proposed:

Hypothesis 2: The presence of IT training sources differs by business industry

H2a: The presence of in-house IT training differs by business industry.

H2b: The presence of outside IT training differs by business industry.

H2c: The presence of self IT training differs by business industry.

IT Training Sources and IT Value

In the literature on information systems it is widely argued that EDI (Electronic Data Interchange) may enhance organizational efficiency. Mukhopadhyay et al. (1995) found that EDI enabled the effective coordination of material movements between manufacturers and suppliers, which resulted in significant cost savings and inventory reduction. Nonetheless, investing in IT is not a necessary nor sufficient condition for improving firm performance, since IT investments might be misused (Tallon et al., 2000). In this sense, IT assets cannot improve organizational performance if they are not used appropriately. However, when used appropriately IT is expected to create intermediary effects, such as IT being embedded in products and services, streamlined business processes, and improved decisions, which can be expected to have an influence on the performance of the firm (Ravichandran & Lertwongsatien, 2005). Ravichandran and Lertwongsatien (2005) found that

intangible IT resources such as IT skills are critical determinants of how IT is deployed in the organization, which in turn can affect performance. Similarly, Mata et al. (1995) suggested that IT might be a source of sustained competitive advantage and found that IT managerial skills are likely to be a source of competitive advantage. Moreover, Sircar et al. (2000) found that IT training expenditures are correlated significantly and positively with firm performance. Thus, the third hypothesis posits a positive relationship between IT training sources and IT value:

Hypothesis 3: There is a positive relationship between IT training sources and IT business value

H3a: There is a positive relationship between in-house IT training and IT business value.

H3b: There is a positive relationship between outside IT training and IT business value.

H3c: There is a positive relationship between self IT training and IT business value.

4. METHODOLOGY

Data

The data source for the present study is the e-business E-mail: W@tch survey 2003, an initiative launched by the European Commission for monitoring the adoption of IT and e-business activity. Telephone interviews with decision-makers in enterprises were conducted in March and November 2003. The decision-maker targeted by the survey was normally the person responsible for IT within the company, typically the IT manager. Alternatively, particularly in small enterprises without a separate IT unit, the managing director or owner was interviewed.

In this study, the population considered was the set of all enterprises which are active at the national territory of Spain

and which have their primary business activity in one of ten sectors considered. The sample drawn was a random sample of companies from the respective sector population with the objective of fulfilling strata with respect to business size. A share of 10% of large companies (250+ employees), 30% of medium sized enterprises (50–249 employees) and 25% of small enterprises (10–49 employees) was intended. The number of firms totalled 1,010. As shown in Table 1, 91.1% of firms were small and medium-sized enterprises (less than 250 employees) and each sector considered had a share of around 10% of the total sample.

With regard to respondents' titles, 54.4% were IS managers, nearly 20% were managing directors, and 12.1% were owners. The dataset was examined for potential bias in terms of the respondents' titles. No significant differences were found, suggesting that the role of the respondents did not cause any survey biases.

Measures of Variables

This section describes the variables used for measuring the presence of IT training sources, business size, business industry and IT business value. The formulation and criteria for answering the questionnaire as well as prior research support are listed in the Appendix.

Business size: among several possible measures of firm size, such as annual revenue and number of employees, the latter was selected as a firm size indicator, following the tradition of the IT literature. For example, Brynjolfsson, Malone, Gurbaxani, and Kambil (1994) used number of employees as a control for firm size.

Business industry. This variable identified whether the business was operating at the manufacturing, services or commercial industry and was coded as a categorical variable.

IT training sources. Using a dichotomous scale, respondents assessed the use of three IT training sources: in-house, outside, and self IT training by trainees.

TABLE 1
Sample characteristics (N = 1,010)

Sample characteristics by sector, size, and respondent					
Sector Name	%	N	Number of employees	%	N
Manufacture of textiles and leather	10	101	1–9	38.4	388
Manufacture of chemicals	9.9	100	10–49	25.8	261
Manufacture of electrical machinery	9.9	100	50–249	26.8	271
Manufacture of transport equipment	9.9	100	More than de 249	8.9	90
Crafts and Trade	10.7	108	Respondent title	%	N
Retail	9.9	100	Owner/proprietor	12.1	122
Tourism	9.9	100	Managing director	19.6	198
Business services	9.9	100	Strategy development	1.9	19
Telecommunications & computer services	9.9	100	Head of IT/DP	22	222
Health and social services	10	101	Other IT senior member	32.4	327
			Others	12.1	122

IT business value. As discussed earlier in section 2.3, the present research uses for measuring IT business value the effectiveness of upstream and internal online activities. Two constructs representing upstream and internal online activities were used. Since correctly measuring IT business value is important, an exploratory factor analysis (EFA), Cronbach's alpha calculation and confirmatory factor analysis (CFA) were carried out in order to improve constructs reliability and validity.

5. ANALYSES AND RESULTS

With regard to the presence of IT training sources, 66.9% out of all analyzed firms (676) was employing at least one type of IT training source. Table 2 shows detailed results. The use of self IT training by employees was the most frequently found form of IT training, with 51.8% of the total number of firms having it. In addition, this IT training source was found in 76.03% of all firms that had at least one type of IT training source. The second and third IT training sources in importance were outside and in-house IT training, respectively. Less than 30% of all analyzed companies presented in-house IT training and 44.3% were using outside IT training.

Table 3 shows results for companies presenting more than one IT training Source. For companies using in-house IT training, it was found that 20.5% used also outside IT training and 19.5% self IT training by employees. With regard to firms using outside IT training, we found that 20.5% used in-house IT training and 32.4% self IT training by employees as well. Furthermore, the three IT training sources were found in 15.44% of all analysed companies.

TABLE 2
Presence of IT training sources

IT training source	Total % (N = 1010)	At least one IT training source % (N = 676)
In-house IT training	26.8%	39.64%
Outside IT training	44.3%	65.68%
Self IT training	51.8%	76.03%
No training	33.1%	–

TABLE 3
Presence of more than one IT training sources

IT training source	In-house IT training	Outside IT training	Self IT training
In-house IT training	–	20.5%	19.5%
Outside IT training	20.5%	–	32.4%
Self IT training	19.5%	32.4%	–

Results for the First Hypothesis

In order to test whether the use of IT training sources is influenced by business size, the latter was introduced as a four-level categorical variable, coding whether the business pertained to group 1 (between 1 and 9 employees), group 2 (between 10 and 49 employees), group 3 (between 50 and 249 employees) or group 4 (more than 250 employees).

As presented in Table 4, statistical differences (between the four size groups) at the 1% level were encountered for all the IT training sources (in-house, outside, self IT training by employees). Therefore, hypotheses H1a, H1b and H1c were supported.

Results for the Second Hypothesis

The second hypothesis postulated that IT training sources differ by business industry. Business industry was coded as a three-level categorical variable that represented whether the business belonged to the manufacturing, service or commercial industry. Results (see Table 5) showed that, within the sample, IT training sources were influenced by business industry for in-house ($p= 0,000$) and self IT training by employees ($p= 0.000$), while for outside training differences by industry were not found ($p= 0.060$). Through this analysis, hypotheses H2a and H2c found support, whereas H2b was not supported.

Results for the Third Hypothesis

The third hypothesis suggested a positive relationship between IT training sources and IT business value. The statistical technique used to test this hypothesis was the hierarchical multiple regression analysis.

To assess the business value of IT training sources, two constructs representing the value of upstream and internal online activities were used. Business industry and business size were introduced as control variables in order to avoid unexpected effects on IT business value. The former identified whether the business was operating at the manufacturing, services or commercial industry and was coded as a dummy variable. The latter was measured as the total number of employees and was coded as a continuous variable.

The basic econometric relationships may be specified as follows:

$$\begin{aligned} DV1 &= f(INT, OT, ST, \varepsilon), \text{ and} \\ DV2 &= f(INT, OT, ST, \varepsilon), \end{aligned} \quad (1)$$

where INT stands for in-house IT training; OT denotes outside IT training; and ST represents self IT training by employees. DV1 and DV2 denote the dependent variables, upstream IT value and internal IT value, respectively. More specifically, the regression equations are:

TABLE 4
IT training sources and business size

IT training source	Group 1 (1 ≤ E < 10)		Group 2 (10 ≤ E < 50)		Group 3 (50 ≤ E < 250)		Group 4 (E ≥ 250)		Chi-squared test	
	N	%	N	%	N	%	N	%	X ²	p
In-house IT training	74	19.2	69	26.5	90	33.5	35	40.2	25.37	0.000**
Outside IT training	118	30.8	110	42.1	155	57.4	61	69.3	69.85	0.000**
Self IT training	169	44.1	107	41.3	176	66.2	62	73.8	58.73	0.000**

Note: E= employees; * Significant at P < 0.05 level; ** Significant at P < 0.01 level.

TABLE 5
IT training sources and business industry

IT training source	Manufacturing industry		Commercial industry		Service industry		Chi-squared test	
	N	%	N	%	N	%	X ²	p
In-house IT training	85	21.5	10	19.3	143	35.9	28.57	0.000**
Outside IT training	180	45.2	77	37.2	187	47.1	5.636	0.060
Self IT training	181	46.4	96	46.6	514	51.8	17.04	0.000**

Note: *Significant at P < 0.05 level; **Significant at P < 0.01 level.

$$\begin{aligned}
 DV1 &= \alpha + \beta_1 INT + \beta_2 OT + \beta_3 ST \\
 &+ (FirmSize + IndustryDummies) + \varepsilon, \text{ and} \\
 DV2 &= \alpha + \beta_1 INT + \beta_2 OT + \beta_3 ST \\
 &+ (FirmSize + IndustryDummies) + \varepsilon,
 \end{aligned}
 \tag{2}$$

where α is the intercept; the β_i 's are coefficients; and ε is the residual term that captures the net effect of all unspecified factors.

The analysis was performed in two steps. The dependent variables were initially regressed on the control variables in step 1. Then, in step 2 the three IT training sources were added. Regression results are summarized in Tables 6 and 7. Results in model 1 confirmed that the control variables employed do not explain the dependent variables. Model 2 showed that the direct effect of IT training sources upon IT business value was significant as the increment in the squared multiple correlation coefficient (R²) was statistically significant. The effect for outside IT training and self IT training by employees upon IT business value was positive and statistically significant (support for hypotheses H3b and H3c was found), while for in-house

IT training the relationship was not significant (support for hypothesis H3a was not provided).

6. DISCUSSION

The results indicate that IT training is widespread among Spanish firms, since 66.9% out of all analyzed companies was employing at least one type of IT training source. The most frequently found training source was self IT training by employees. Specifically, 51.8% of the sample was using self IT training. In addition, this type of training was found in almost 80% of firms that have at least one form of training. Moreover, 44.3% were using outside IT training and less than 30% of all analyzed companies presented in-house IT training. These results confirm that firms make extensive use of IT training and support previous research studies, suggesting the importance of IT skills and training. For instance, Benamati and Lederer (2001) found that education and training was the most frequently applied coping mechanism to handle changing IT. Mata et al. (1995) found that out of four IT attributes—capital requirements, proprietary technology, technical skills, and managerial IT skills—only

TABLE 6
IT training sources and upstream IT value

	MODEL 1	MODEL 2
Manufacturing industry	-0.127	-0.099
Commercial industry	0.017	-0.044
Number of employees	0.066	0.045
In-house IT training		-0.029
Outside IT training		0.208**
Self IT training		0.137*
F-value	1.663	3.72**
Adjusted R ²	0.022	0.091
Δ in R ²		0.069**

Significance levels: *0.01 < p ≤ 0.05; **p ≤ 0.01.

TABLE 7
IT training sources and internal IT value

	MODEL 1	MODEL 2
Manufacturing industry	-0.131*	-0.106
Commercial industry	0.015	0.057
Number of employees	0.156**	0.107
In-house IT training		0.043
Outside IT training		0.214**
Self IT training		0.147*
F-value	3.74*	7.84**
Adjusted R ²	0.038	0.124
Δ in R ²		0.105**

Significance levels: *0.01 < p ≤ 0.05; **p ≤ 0.01.

IT managerial skills are likely to be a source of competitive advantage. Ravichandran and Lertwongsatien (2005) found that intangible IT resources such as IT skills are critical determinants of how IT is deployed in the organization.

The results showed, as hypothesized, that the presence of IT training sources is positively related to business size. This finding is not surprising, since larger businesses usually allocate greater financial, technological and personnel resources to the development and implementation of ITs (Soto-Acosta, 2008). This result confirms Westhead and Storey's (1997) argument, which suggested that employees in small and medium-size enterprises are much likely to receive training than their counterparts in larger firms, because management is not aware of the benefits of training and considers that the costs associated with training may exceed the benefits to be derived from it. In addition, this finding supports other recent research that analyzed ITs adoption according to business size. For instance, Zhu et al., (2003) measured business size by the number of employees and demonstrated that larger size firms are more likely to adopt e-business. Similarly, Teo and Pian (2004) found evidence of a positive link between web site adoptions and firm performance.

Furthermore, results demonstrate that the presence of IT training sources differs by business industry. The differences appeared for in-house and self IT training, where service firms presented higher levels of adoption, while for in-house IT training differences were not found. This result supports existing information systems literature. For instance, Goode and Stevens (2000) found business industry significant in the adoption of Internet connection, showing service industries to be the largest adopters, followed by retailers and then manufacturers.

Finally, the empirical results showed a positive relationship between IT training sources (outside and self IT training) and IT business value. The lack of relationship between in-house training and IT business value lead us to believe that this may be the reason why firms are using less this type of training. This findings confirm previous studies that found a positive relationships between IT skills/training and business value (Benamati & Lederer, 2001; Mata et al., 1995; Ravichandran & Lertwongsatien, 2005; Sircar et al., 2000) and suggest that firms may obtain better results if the use outside IT training or self IT training instead of in-house IT training.

7. CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

Most IT experts recognize that IT training is critical to achieve productive use of the technology. This statement is supported by research. For instance, IT training has been identified as a key factor for the success of IT applications and has been found to be correlated positively with a wide range of firm performance variables. Nonetheless, there is a question as to how IT training has to be conducted to obtain desired outcomes (higher levels of IT value). In this sense, IT training can be provided in a number of forms and by a variety of sources. With regard to Compeau et al.'s (1995) three phases of training, this paper focuses on the second phase, the formal training and learning phase, and more specifically on the choice of training sources (in-house, outside and self IT training). In this sense, the relationship between IT training sources and IT business value is tested on a large sample of Spanish firms from different sectors. Additionally, the presence of these training sources is analysed according to two contingency factors: business size and business industry. Broadly, this research offers several contributions: (1) it provides knowledge about the IT training sources used by firms; (2) it validates that the presence of IT training sources is positively related to business size and differs moderately by business industry; and (3) it shows a positive relationship between IT training sources (outside and self IT training) and IT business value.

While this study presents some interesting findings, it has some obvious limitations, which can be addressed in future research. First, the sample used was from Spain. It may be possible that the findings could be extrapolated to other countries,

since economic and technological development in Spain is similar to other OECD Member countries. However, in future research, a sampling frame that combines firms from different countries could be used in order to provide a more international perspective on the subject. Second, the IT business value measures are subjective in the sense that they were based on Likert-scale responses provided by managers. Thus, it could also be interesting to include objective performance data for measuring IT business value. Third, the key informant method was used for data collection. This method, while having its advantages, also suffers from the limitation that the data reflects the opinions of one person. Future studies could consider research designs that allow data collection from multiple respondents within an organization. Fourth, this research takes a static, cross-sectional picture of IT training sources, which makes it difficult to address the issue of how IT training is conducted over years. A longitudinal study could enrich the findings.

AUTHOR BIOS

Pedro Soto-Acosta, is a Professor of Management at the University of Murcia (Spain). He holds a PhD in Management Information Systems (MISs) and a Master's degree in Technology Management from the University of Murcia. He was recipient of the *Extraordinary Doctoral Award in Business Research*. He received his BA in Accounting and Finance from the Manchester Metropolitan University (UK) and his BA in Business Administration from the University of Murcia. He attended Postgraduate Courses in Management Research at Harvard University (USA). His work has been published in journals such as the *European Journal of Information Systems*, the *International Journal of Information Management* and the *International Journal of Electronic Business*, among others.

Isabel Martinez-Conesa is a Professor of Finance and Accounting at the University of Murcia (Spain). She holds a PhD in International Financial Information. She was recipient of the *Extraordinary Doctoral Award in Business Research*. She also has been the director of seven dissertations about international financial analysis and accounting information system. Three of them were European Ph doctorate. Her work has been published in journals such as the *European Accounting Review*, the *International Journal of Accounting*, the *Research in Accounting Regulation*, the *Spanish Journal of Finance and Accounting*, and the *European Business Review*, among others.

Ricardo Colomo-Palacios is an Associate Professor at the Computer Science Department of the Universidad Carlos III de Madrid. His research interests include applied research in information systems, software project management, people in software projects and social and semantic web. He received his PhD in Computer Science from the Universidad Politécnica of Madrid (2005). He received his MBA from

the Instituto de Empresa (2002). He has been working as a Software Engineer, Project Manager and Software Engineering Consultant in several companies including Spanish IT leader INDRA. He is also an Editorial Board Member and Associate Editor for several international journals and conferences, and he is the Editor-in-Chief of *International Journal of Human Capital and Information Technology Professionals*.

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APPENDIX: MEASURES

Constructs and indicators	Description	Literature Support
IT training sources	Does your company support employees in acquiring computer or IT networking skills? Does your company offer its employees the following support measures?	
In-house IT training	(a) In-house IT training? (Y/N)	Campeau et al. (1995); Ravichandran & Lertwongsatien (2005); Sircar et al. (2000); Yi & Davis (2001)
Outside IT training	(b) Participation in IT training offered by third parties? (Y/N)	Campeau et al. (1995); Ravichandran & Lertwongsatien (2005); Sircar et al. (2000); Yi & Davis (2001)
Self IT training	(c) Employees can use some of their working time for learning activities (Y/N)	Campeau et al. (1995); Ravichandran & Lertwongsatien (2005); Sircar et al. (2000); Yi & Davis (2001)
Internal IT value		
INV1	What effect has the use of online technologies for the collaboration and the exchange of knowledge between employees? (1–5)	Gold et al. (2001); Lai (2001); Wu, Mahajan, & Balasubamanian (2003)
INV 2	What effect has the use of online technologies for the internal processing of commercial transactions? (1–5)	Stratman & Roth (2002); Zhu (2004); Zhu & Kraemer (2005)
INV 3	What effect has the use of online technologies for the availability of information for management and planning? (1–5)	Mata et al. (1995); Porter (1985); Soto-Acosta & Meroño-Cerdan (2008)
Upstream IT value		
UPV1	What effect has online procurement on the procurement costs? (1–5)	Soto-Acosta & Meroño-Cerdan (2008); Wu et al. (2003); Zhu, Kraemer, Xu, & Dedrick (2004); Zhu & Kraemer (2005)
UPV2	What effect has online procurement on your relations to suppliers? (1–5)	Tallon et al. (2000); Soto-Acosta & Meroño-Cerdan (2008); Teo & Pian (2003); Wu et al. (2003); Zhu et al. (2004); Zhu & Kraemer (2005)
UPV3	What effect has online procurement on the costs of logistics and inventory? (1–5)	Soto-Acosta & Meroño-Cerdan (2008); Wu et al. (2003); Zhu & Kraemer (2005)

Note. Y/N, dummy variable; 1–5, five-point Likert-type scale.