The efficiency of different ways of informal learning on firm performance: A comparison between, classroom, web 2 and workplace training

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Abstract

Informal learning or training is today considered to be one of the most viable ways for companies to have appropriately skilled employees. Actually many companies and organizations increasingly are used social media and web 2 for collective learning through informal learning or work place training. The aim of this research is to analyses the efficiency that different mode of training impartation (classroom, web 2 and traditional workplace training) among other factors, have on firm performance. For this purpose a sample of 935 Spanish is used, selected from a total of 65,000, which participated consecutively in national training plans during three years. A multinomial logit analysis was carried out to obtain empirical evidence. The results have showed that the mayor difference in the impartation mode of training is produced among job categories. However the three modes of training impartation are associated with superior business performance.

1. Introduction

In the current changing environment the innovation–information–training triad is considered to be a key factor in the competitive conduct of a firm. Training activities promoted by companies and aimed at employed workers are intended both to improve their skills and qualifications, and facilitate retraining. Enhancing the activities of training and retraining of staff within companies is essential for the maintenance and enhancement of the knowledge and skills of workers, making it a strategic tool and a key factor in the achievement of excellence and business success. In-company training has emerged in part as a result of the modification of professional skills required in various sectors of the economy as a result of the combined effect of a series of interrelated phenomena such as the globalization of the economy, the global financial crisis, the increase in global and domestic competition, new technologies, the reorganization of production systems, and the organizational restructuring of enterprises, among others. Until now the major part of the study are centered in the relationship between training in general term and firm performance. In this context, human skills are indispensable, which is why both human resources and the practices related to their development and improvement have taken on great importance in recent years.

For the firm to develop and maintain essential competencies regarding human resources at least three conditions must be met: (i) staff should be trained on a permanent basis, not only to impart knowledge to them but also new skills and these must be continually updated, (ii) business competitiveness cannot be developed unless companies are able to bring together groups of people who not only cut across specific job titles, but also organizational levels (development of the versatility of staff) and (iii) once the skills training competences are established, these must be continuously deployed and reconfigured in many ways (transfer and application of training and expertise to all business activity).

Currently the economic structure of developed countries is moving towards higher added value and high technology, in which the demand for skilled workers in the production unit continues to grow. According to the European Commission (2008b), technological innovation in education and training “implies a need for new models of production, distribution and access to digital resources, both in the public and private sectors”. Technological innovation comprises new ways of producing, using, storing and managing digital content, as well as the production of digital learning resources of high quality, interoperability and accessibility. Social computing tools promote technological innovation by offering enhanced networking capabilities, supporting personalization, creating opportunities for new learning environments and offering new platforms for knowledge distribution. Furthermore, new creative approaches, such as simulations, gaming, virtual reality and
immersive environments, facilitate technological innovation in Education and Training (E&T), from early school years to specialized professional training. Europe must renew the basis of its competitiveness, increase its growth potential and its productivity and strengthen social cohesion, placing the main emphasis on knowledge, innovation and optimization of human capital potential (European Commission, 2008a).

This substantial increase in demand for “knowledge workers” has created and will create a “skills gap” in the economy, because this type of demand already exceeds the available supply of qualified workers. Other factors include the confluence of an aging workforce, declining job security and the continued demand by industry for a more flexible workforce, which has led to a considerable emphasis on the importance of training the active workforce. Besides the growth of knowledge and technological development has made a lot of what has been learned by adults in the past obsolete or at least modified in content. These workers require training and education to achieve and maintain success in their career (European Commission, 2008b; Ala-Mutka, Bacigalupo, Pascu, & Redecker, 2009).

Thus is by firms is important to provide training in continuously and different ways. The diversification of training impartation is nowadays a reality but most of the firms opt for the classic method of impartation there is still some doubts over the efficiency of the training delivery to distance or by web 2 (Chitarro, 2009, Mamaqi & Miguel, 2011; Mamaqi, Miguel, & Olave, 2011). Various studies indicate that the younger generation which grew up surrounded by digital media – roughly referring to individuals born in the early 1980s or later – displays significantly different learning styles from previous cohorts. Several terms have been used to describe this generation of learners, for example “digital natives” (McLester, 2007), “Net Generation” (Oblinger & James, 2005) or even “New Millennium Learners” (OECD, 2008). Although the workers that receive training by firms are the young workers or those demanding job rotation into the firm. Thus there is a high probability that many of them are accustomed at network learning process at individual level. In these cases there is not difficult to adapt the process of outcome learning at firm level. To effectively implement and cultivate the appropriate usage of social media in a multigenerational workforce, it is essential for firms and organizations to develop effective communication plans that allow for ongoing dialogue and feedback. Communication serves as a strategic change lever by facilitating the transition from awareness to the actual ownership and adoption of social media guidelines and integration of social media tools. Social media have become part of mainstream social interaction and it is influencing the way employees gather information and knowledge to do their jobs (Bartolomé, 2008; Borremans, 2007). Barring the workforce from social media learning opportunities could result in the business missing out on key advantages. Companies, in terms of investment made in training, seek to create value through the knowledge generated, with the improvement of professional skills of their workers, in order to improve competitiveness embodied in competitive results such as satisfaction and retention of trained personnel, corporate image, product quality and satisfaction and customer loyalty as well as the achievement of economic and profit growth. The participatory knowledge is the collective learning fomenting the workers participation. This new shared, social, participative, two-way medium is generally referred to as “Web 2.0”. There is currently no single agreed upon definition for Web 2.0. Web 2.0 or “social computing” refers to the range of digital applications that enable interaction, collaboration and sharing between users. Web 2.0 and social media have different meanings. Kaplan and Heinlein (2010) define social media as ‘a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content’. “Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get more people use them.” (O’Reilly, 2006). For Schenckenberg (2009) Web 2.0 is tools may improve knowledge management processes, knowledge exchange, and knowledge creation. Despite the fact that primary scope and aim of the most of these Web 2.0 tools are to socialize, they also contribute to learning activities, in this paper Web 2.0 tools with an internal company focus is the tools may enhance the transfer of knowledge among employees during the continuous training process. These Web 2.0 tools facilitate informal learning as well as sharing and communication.

Despite technological advances regarding the media in implementing web 2 and social media, their evolution in the researcher literature is analyzed based only on the number of people using them or has access to this. Given its importance not only present but also for the future in the recent literature exist an important gap in a common conceptual framework for use of web 2 and social media in business environment. There is some confusion about which of these media is more cost effective for companies in the training of their workers, which is the limit that must be put between training in the workplace, classroom, and online. All this accompanied by the absence of officer firm database-levels which is slower and fragility to obtaining empirical evidence about its impact on firm performance.

The goal of this research is to do a comparison among different ways of in-company training impartation and the impact of them on firm performance. Even if the main objective of the training is to increase productivity it is not easy empirically isolate and quantify its effects. The central hypothesis of this paper is that the firm’s investments in the training have a positive influence on business results, whatever it is its mode of impartation. The paper is organized as follows: in the second section a thorough review is performed of theories and empirical studies that support the working hypothesis including all forms of training impartation. This work allows an evaluation of its conceptual framework and to properly select the variables and indicators used in the model. The third section covers empirical issues such as data sources and a description of variables in the multinomial logit model, among others. The fourth section presents the estimation results and a discussion and the fifth section contains the conclusions.

2. Related work

Before the existence of web 2, in-company training has been imparted only in the classroom and workplace mode. Although in recent years the scientific community is being an important effort to provide relevant evidence about the impact of web 2 and social media on training and firm performance, these are still scarce. Regarding web 2 and its benefits in the business area diverse authors referring as an opportunity to increase firm competitively, created new advantage (Alexander, 2006; Lee, DeWester, & Park, 2008, Chittaro & Roberto, 2007, Bughin, 2009; Liu & Liu, 2009; Redecker, 2009, Kietzmann, Hermkens, McCarthy, & Silvestre, 2011).

The major part of these work are centered about theoretical framework, case study predominating qualitative technique and important emphasis on knowledge management as main objectives. An attractive theoretical framework of analysis provides Andriole (2010). The author identifies six latent factors related with business capabilities that are influenced by using Web 2 tools, and ultimately affect business performance: (i) collaboration and communication, (ii) rapid application development,
(iii) customer relationship management, (iv) innovation, (v) training and (vi) knowledge management. About impact of web 2 on training, the researcher highlights over “the influence training processes since information is becoming user driven and companies face transitions toward shared data, user generated content, and user experience. As a result, training activities are not bound to a specific geographical location or time frame: webinars take place all over the world and blogs, RSS filters, forums, wikis, and podcasts may enhance the training experience. Applications with an internal focus allow for cheaper and efficient education and training for employees, while externally focused applications allow a company to integrate into the on-line industry and lower costs with training customers and suppliers.

The impact of social media on training should take into account the measure such as the capability to support traditional training, to modify training content, to support asynchronous training, and to codify and distribute training content. In this line the researches works simply missing or are descriptive of particular cases. Therefore it is more than necessary to obtain jobs that provide empirical evidence about it and take the look to the evidence obtained so far and enrich with the new evidence in a novel environment. Below is a review of the work related to previous empirical evidence in the case of traditional training is done.

The accumulation of human capital is crucial for sustaining long-term growth of the economy. Generally it is defined as the formal and informal education that contributes to economic growth through its impact on the productivity of workers and enterprises, and also to complement the application of new technologies. One of the most influential theoretical studies on human capital is that of Becker (1964) around which has grown up a voluminous literature on in-company education and training of workers, and investment in human capital, especially distinguishing between the general and specific. Becker emphasizes the importance of job training a person receives throughout his or her working life for the productivity of the company. He suggested that general training increases productivity in the same amount in the company where it is provided and other businesses, while specific training only increases productivity at the company where it was provided. So companies only invest in specific training if they can appropriate the future income arising from that training. Human capital theory also suggests that workers are paid for their marginal productivity although this may be over the long term with it being related to the effects of specific training. With regard to general training it suggests that it can only be financed by the workers themselves. New theories have been developed to support the provision of general training by companies as they can keep part of the benefit produced for them. In this line Acemoglu and Pischke (1998 and 1999), support the thesis that in competitive labor markets with a compressed wage structure, companies can also provide incentives for general training, even though there is still little empirical evidence about this. The lack of panel data on training activities at the enterprise level is one reason for this. The work of Loewenstein and Spletzer (1999) found no systematic difference in the returns from general and specific training. Despite the differences, we must bear in mind that both arguments are focused on the ownership of the future income productivity of workers, trying to prove that the stock of human capital accumulated through company training activities is one of the main factors of production (Black & Lynch, 1996 and Black, Noel, & Wang, 1999).

Apart from the Theory of Human Capital and other paradigms associated with it, economists have recognized for some time the role of intangible assets such as knowledge and human capital and their role in economic development. As Barrett and O’Connell (2001) training and staff preparation are determining factors in the exploitation of the intangible resource that resides in the workers and makes up the human capital that determines the basis of the strategy of the company. The Human Capital Theory is concerned with education, training, knowledge and experience as “factors” that increase the “economic value” holds that continuing training is not only a necessity for firms today but that continuing training of staff is the basis for the accumulation of knowledge and that it is only in this way that firms can keep themselves competitively present in the market and achieve better results. That is to say that a firm makes the maximum use of the benefits derived from training in its results only if the training provided is to the personal and work benefit of the individual. Perhaps this may often be the reason why the benefit for both worker and business profitability brought about by training do not always match precisely. The interpretation from the point of view of Human Capital Theory is that the determinants or variables of the training cannot cause an immediate effect on business results without a priori having produced visible results in the workers of the firm.

Various models have also been developed at the theoretical-technical level to evaluate the returns from training and these examine the various stages of development and evaluation of the training which firms carry out. This view of training impact assessment aims to capture the idea of return on investment (ROI), addressing the evaluation of the role of training in the organization as an activity that provides more benefits to the company, with the focus on the main objective of the training, which is to provide long-term economic value. Although various evaluation models have provided valuable measurement methodology concerning the results of training at the individual and business level, it has proved difficult to make use of them as analytical models in general studies. They have a fundamental role at the level of the individual firm. But the fundamental utility of the theories and models of evaluation is to support the thesis that training is part of the strategic vision of the company and if properly developed it has a positive impact on results. Given the increasingly important role of human resources and the role of training as a priority strategy in the company, since the early 1990s efforts have been made to compare and try to empirically quantify the impact of training on business results, but there is still a significant shortage of this kind of study. Two lines of investigation have been maintained open in this regard in recent years. One has placed greater emphasis on the evaluation of the quality of the training, leaving aside the fact that the main objective of the training is to produce an increase in productivity. Thus empirical studies have been directed at analyzing the effects of training on salaries, which are used as a proxy for productivity because it is thought that real salary levels will be equal to the marginal productivity of labor if the labor market is competitive, making use only of data about individual workers (Mamaqi, Miguel, & Olave, 2012). Other researchers have tried to measure the effect of human capital on productivity and salary using combined data (individual data from the workers and data from firms).

Most of these empirical studies have been conducted in countries like the U.S. and Australia and in Europe in countries like the UK, Germany and the Netherlands. Studies like that of Bartel (1994), using data for a large manufacturing company during the period 1986–90, and Bishop (1991 and 1996) found sufficient evidence that the training within the company increases productivity and wages of workers to a considerable degree. In United Kingdom, Ballot, Fahkhafk, & Taymaz (2001) had calculated the impact of training on the profitability of both workers and companies examined the relationship between training and productivity and concluded that there was no relationship between the number of trainees and profitability of the firms surveyed, but that there is a significant and positive relationship between the areas of training and the profitability of companies. Holzer, Block, Cheatham, and Knott (1993) and Ichniowski, Shaw, and Prennushi (1997) found...
relationship between hours of training and productivity. Groot (1999) concluded that there is a substantial relationship between training and wages and business productivity.

The most important results produced by these empirical studies are the following: (i) analysis of the relationship between training and business results has now been carried out in almost all economic areas but the results found have been most significant in the areas of manufacturing and the leading sectors of high technology, (ii) strict rates of returns, such as those calculated for fixed assets and other financial data to refer to business results, have scarcely ever been calculated, (iii) the existence of a positive effect of continuing training variables on sales and other qualitative measures of business production has been accepted, (iv) among the training variables, those related to the areas of training, types of courses, proportion of the total number of workers trained of the total, length of the course in hours and areas as a proportion of the total hours of training and costs of training as a proportion of total sales are the most used and (v) in only one of the empirical works examined, were the common variables of the results substituted for the variables in the reduction of total costs, and analysis carried out on a small number of firms due to the difficulties involved in a cost benefit analysis.

At the level of the data utilized, the set of socio-demographic variables of the workers trained is the one that is most used. The major lack at the level of data is that related to training at the business level, as there is no rigorous evaluation of the training activities carried out and the benefits they provide, and furthermore, it is difficult to get access to the accounts of firms in order to analyze them.

3. Empirical study

3.1. Data source

To carry out this study a data base provided by the Fundación Tripartita para la Formación y Empleo [Tripartite Foundation for Training and Employment] was used, which covered the businesses concerned for the years from 2003 to 2005, which were registered as users of the training credits administered by the FTFE and which were willing to provide specific documentation regarding the kind of training provided, whether it was planned/carried out by the firm itself or taken from national or regional training plans.

The data base utilized in this study contained individualized information on about 16,500 firms in the data base of the FTFE (Fundación Tripartita para la Formación y Empleo) (2005) registered as having carried out training between 2003 and 2005. The first filter applied to the data base was to select those firms which carried out training out consecutively in the years 2003–2005. The second filter had to do with the business sector concerned and the size of the firm in order to ensure their representation in the final sample.

A list of approximately 8000 firms from various sectors and of various sizes was drawn up. From this list a sample of 1700 businesses was randomly selected whose directors (managers, heads of departments of human resources and training) were sent a personal and structured questionnaire. The fieldwork was carried out in the spring of 2006 and a response was received from 935 firms.

3.2. Questionnaire

The questionnaire contained three sections. The first covered general data regarding the firm (business sector, main activity, number of permanent and temporary employees). The following two sections concerned the training carried out from 2003 to 2005 and the business results obtained in the final year. The questions regarding training and results were grouped into themes. Each of these contained five important aspects of training related to planning and intensity of training such as: number of courses, duration of training, personnel qualified categories, type of training (specific and general training) and three mode of impartations of training (classroom, distance (web 2) and workplace training)). All variables related with training is refers the period of three years (2003–2005). With regard to results, were obtained the percentage of net profit increase in the 2006 respect to the 2003-2005 triennium. This difference is appropriated to check the delayed effect that training have on performance (Ballot et al., 2001; Barrett & O’Connell, 2001).

3.3. Characteristics of the sample

Regarding the business sectors involved, the composition of the sample was the following: 37% belonged to the commercial sector and 29% to the service sector. The rest, 20% and 14%, were from the construction and industrial sectors respectively. In terms of the number of fixed employees 33% had up to 5 employees, while 35% had between 5 and 9, 23% had between 10 and 19 and 9% of the sample had more than 19 employees. Almost 62% of the firms had not planned training activities while 33% of them had.

With regard to business size, 60% of the training courses had specific content for independent workers and businesses of more than 100 employees. With regard to training, the 935 businesses carried out 4,145 courses between 2003 and 2005, an average of 2 courses per firm. The classroom and workplace modes of training jointly accounted for 78% and 22% is web 2 or mixed method (part of training has been distance and part classroom or workplace). The average percentage of the total number of workers trained was 23% and 38% of the firms financed the training from their own resources. The distribution of the courses according to professional category depended on the funding. In the case of subsidies the firms directed a higher number of courses to unskilled workers. In the case of those who funded training from their own resources, intermediate level workers received the greatest benefits. 62% of the firms confirmed that they had never carried out training exclusively with their own funding. In the majority of businesses the person in charge of training was the manager. The bulk of general training was carried out in the area of prevention of risks at work and ICTs, the training with specific content was concerned with issues of production, logistic, marketing and sales. 50% evaluated their training efforts once a year while 30% never did so.

With regard to the results’ variables, 33% of the firms did not provide any data. The remaining 67% fell into the following categories: 43% reported an increase in sales or profits of up to 5%, 28% reported an increase of between 6% and 10% and 29% of the companies reported an increase of more than 10%.

3.4. Application of multinomial logit model (MLN)

The endogenous variable of business performance has three states (categories). In this case of its measurement, to relate to the characteristics (variables) of training the application of the MLN model is appropriate McFadden (1974).

The MLN is a discrete choice model and is considered an extension of the binary logit model. It is the most commonly used discrete choice model when it comes to discrete choice dependent variables with more than two categories. It can be generated assuming that the random residues are distributed according to the i.i.d. Gumbel method (McFadden, 1974, 1981 and McFadden & Train, 2000), and provides a set of probabilities for the categories of the dependent variable. As a binary variable it can be interpreted both as the ratio of occurrence or non-occurrence of some
characteristics of the variable, the expression of the logistic regression is as follows:

$$\log(\text{Pr}/1 – \text{Pr}) = \beta_0 + \sum_{i=1}^{n} \beta_i x_i$$

(1)

The model can be generalized to the case of the independent variable with more than two categories i.e. MLN, establishing a reference category for the independent variable. In this case the two independent variables related to firm performance have three categories (Table 1). Noting Pr, as the probabilities of the categories in the model and Pr0 as the probability of the reference category and \( \beta \) as the coefficients, the MLN with three categories can be expressed as follows:

$$\log \frac{\text{Pr}(c)}{\text{Pr}(0)} = \beta_0(c) + \sum_{i=1}^{3} \beta_i(x) x_i \quad c = 1, 2, 3.$$  

(2)

The interpretation of its effects on the categories (c) of the dependent variable is the prediction of the probability for each category of the \( (x_i) \) as they appear in the expression 3 for the categories 1 and 2 and the reference 0 in the expression 4.

$$\text{Pr}_c = \frac{\exp(\beta_0(c) + \sum_{i=1}^{3} \beta_i(x) x_i)}{1 + \sum_{k=1}^{2} \exp(\beta_0(k) + \sum_{i=1}^{3} \beta_i(x) x_i)}$$

(3)

$$\text{Pr}_0 = 1 – \sum_{k=1}^{2} \text{Pr}(k)$$

(4)

In this model the independent variables \( (x_i) \) are the same for the three categories of the dependent variable. The interpretation of its effects on the categories (c) is the prediction of the probability for each of the \( (x_i) \) as they appear in the expressions 3 and 4 for the categories 1 and 2 and the reference 0, respectively. The index calculation for one side avoids the problem of the endogeneity between variables in the model and for other allows appreciate its change in 2004 vs 2005 respect to the year 2003, established as the basis year.

4. Results and discussion

We estimated the model using as dependent variables “increasing net income in%”. In the final model are included a total of 620 companies as 33% of those firms asked did not answer the question regarding an increase in net profit. The results of the estimation are presented in Table 2.

Various indicators indicate greater model fit. The Initial Log Likelihood Function, \((-2 \text{ Log Likelihood function} \; -2 \text{LL})\) is a statistical measure like total sums of squares in regression. The difference between final (model with all variables) and reduced model (model with only intercept) is chi-square value that is tested for statistical significance. The values of other measure analogous to \( R^2 \) (pseudo \( R^2 \)) indicate a strong relationship (Table 2). However the correlation measures to estimate the strength of the relationship (pseudo \( R \) square measures, such as Nagelkerke’s \( R^2 \)), do not really tell much about the accuracy or errors associated with the model. A more useful measure to assess the utility of a multinomial logistic regression model is classification accuracy. This measure compares predicted group membership based on the logistic model to the actual, known group membership, which is the value for the dependent variable. The benchmark that we will use to characterize a multinomial logistic regression model as useful is a 25% improvement over the rate of accuracy achievable by chance alone. The proportional by chance accuracy rate was computed by calculating the proportion of cases for each group based on the number of cases in each group in the ‘Case Processing Summary’, (Table 2) and then squaring and summing the proportion of cases in each group \((0.43^2 + 0.28^2 + 0.29^2 = 0.357)\). The proportional by chance accuracy criteria is \( 1.25 \times 35.7\% = 44.6\% \). The overall predictive power of the model is over 71%, it being lower for the

Table 1

<table>
<thead>
<tr>
<th>Variables in the model</th>
<th>Measure used in each variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variable in MNL.</td>
<td>Net profit firm increase in percentage (concerning 2006)</td>
</tr>
<tr>
<td>Category</td>
<td></td>
</tr>
<tr>
<td>0 (Is reference category)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>To 5%</td>
</tr>
<tr>
<td>2</td>
<td>Between 5% and 10%</td>
</tr>
<tr>
<td>3</td>
<td>More than 10%</td>
</tr>
<tr>
<td>The independent variables (correspond to the triennium 2003–2005)</td>
<td></td>
</tr>
<tr>
<td>Impartation modes (3 years)</td>
<td></td>
</tr>
<tr>
<td>– Efficiency Index of classroom training for unskilled workers (EI 1)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index of classroom training for skilled and technical workers (EI 2)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index of classroom training for middle manager and executive (EI 3)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index web 2 and mixed training for skilled and technical workers (EI 4)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index web 2 and mixed training for middle manager and executive workers (EI 5)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index web 2 and mixed training for middle manager and executive workers (EI 6)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index of workplace training for unskilled workers (EI 7)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index of workplace training for skilled and technical workers (EI 8)</td>
<td>Numerical</td>
</tr>
<tr>
<td>– Efficiency Index workplace training for middle manager and executive (EI 9)</td>
<td>Numerical</td>
</tr>
<tr>
<td>Types of training</td>
<td>Categorical</td>
</tr>
<tr>
<td>General</td>
<td>0</td>
</tr>
<tr>
<td>Specific</td>
<td>1</td>
</tr>
<tr>
<td>Investment in training (3 years)</td>
<td>Categorical</td>
</tr>
<tr>
<td>Self-financing by the company</td>
<td>0</td>
</tr>
<tr>
<td>Subsidies by state</td>
<td>1</td>
</tr>
<tr>
<td>Paid by worker himself</td>
<td>2</td>
</tr>
<tr>
<td>Control variables (categorical)</td>
<td></td>
</tr>
<tr>
<td>Economic sectors</td>
<td></td>
</tr>
<tr>
<td>Firm size (number of employees)</td>
<td>1. Industry 2. Construction 3. Trade 4. Services</td>
</tr>
</tbody>
</table>

* These variable are calculated as: \( \text{index}_{1,2,3,…315} = \frac{\sum_{\text{course hours duration}}}{\sum_{\text{total course hours duration}}} \). These indexes are calculated in the same way, replacing the respective data in each case.

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categories “increase in profits from 5% to 10%” and “more than 10%”. The classification accuracy rate of 71% is greater than or equal to the proportional by chance accuracy criteria of 44.6%. The criteria for classification accuracy are satisfied in this example. Also the results of estimation that the standard error for independent variable not are larger than 2, so we should interpret the estimated coefficients in the absence of multicollinearity.

The coefficients were obtained by the Maximum Likelihood (ML) method under the assumption of multivariate normal distribution. However by this method we cannot interpret traditionally estimated as is done by the OLS coefficients. Explicitly, the coefficients do not indicate the change in probability. They only represent the Y and X, which according to the sign that throws each will know if it is a direct or inverse relationship. The interpretation was made in terms of coefficients and the respective exponential ratios (odds) for the reference category depending of the magnitude (over or under the unit), always if the respective β coefficients are significant.

What indeed can be interpreted is the probability occurrence each one of the category of the dependent variable (Odds Ratio).

The constants in the model for both sub-dependents show the expected odds of falling into the given category vs. the reference category when a person has zero Index Efficiencies (EI).

Taking into account the sign and the significance of estimated coefficients, the data support the initial hypothesis of a positive relationship between some characteristics of training realized by firms and the results obtained. For both categories of the dependent variable the significance of the coefficients reveals that there not are pronounced difference between the significance of Index Efficiencies (EI) that characterized the mode of impartation of training. The major difference is found among EI as job categories. Also state subsidies and self-financing company are related positively to the results. The content of the specific training increases expected odds of falling into the given category vs. the reference category depending of the magnitude (odds) for the reference category depending of the determination was made in terms of coefficients and the respective exponential ratios (odds) for the reference category depending of the magnitude (over or under the unit), always if the respective β coefficients are significant.

In the case of firms which responded to the question and which expected odds of falling into the given category vs. the reference category depending of the magnitude (odds) for the reference category depending of the magnitude (over or under the unit), always if the respective β coefficients are significant.

The classification accuracy rate of 71% is greater than or equal to the proportional by chance accuracy criteria of 44.6%. The criteria for classification accuracy are satisfied in this example. Also the results of estimation that the standard error for independent variable not are larger than 2, so we should interpret the estimated coefficients in the absence of multicollinearity.

The coefficients were obtained by the Maximum Likelihood (ML) method under the assumption of multivariate normal distribution. However by this method we cannot interpret traditionally estimated as is done by the OLS coefficients. Explicitly, the coefficients do not indicate the change in probability. They only represent the Y and X, which according to the sign that throws each will know if it is a direct or inverse relationship. The interpretation was made in terms of coefficients and the respective exponential ratios (odds) for the reference category depending of the magnitude (over or under the unit), always if the respective β coefficients are significant.

What indeed can be interpreted is the probability occurrence each one of the category of the dependent variable (Odds Ratio).

The constants in the model for both sub-dependents show the expected odds of falling into the given category vs. the reference category when a person has zero Index Efficiencies (EI).

Taking into account the sign and the significance of estimated coefficients, the data support the initial hypothesis of a positive relationship between some characteristics of training realized by firms and the results obtained. For both categories of the dependent variable the significance of the coefficients reveals that there not are pronounced difference between the significance of Index Efficiencies (EI) that characterized the mode of impartation of training. The major difference is found among EI as job categories. Also state subsidies and self-financing company are related positively to the results. The content of the specific training increases its significance as companies increase their profits.

The results of analysis are a comparison of the probability occurrence of two categories relative to the base category corresponding to “net profit increased to 5%” and corresponds to category “0".

In the case of firms which responded to the question and which obtained an increase in profitability of between 5% and 10% versus categories “increase in profits from 5% to 10%” and “more than 10%”. The classification accuracy rate of 71% is greater than or equal to the proportional by chance accuracy criteria of 44.6%. The criteria for classification accuracy are satisfied in this example. Also the results of estimation that the standard error for independent variable not are larger than 2, so we should interpret the estimated coefficients in the absence of multicollinearity.

The coefficients were obtained by the Maximum Likelihood (ML) method under the assumption of multivariate normal distribution. However by this method we cannot interpret traditionally estimated as is done by the OLS coefficients. Explicitly, the coefficients do not indicate the change in probability. They only represent the Y and X, which according to the sign that throws each will know if it is a direct or inverse relationship. The interpretation was made in terms of coefficients and the respective exponential ratios (odds) for the reference category depending of the magnitude (over or under the unit), always if the respective β coefficients are significant.

What indeed can be interpreted is the probability occurrence each one of the category of the dependent variable (Odds Ratio).
those that had obtained an increase of up to 5%, in terms of the odds the following may be highlighted:

- There is the chance that firms increasing its profit from 5% to 10% instead of up to 5% in the case of Efficiency Index calculated for classroom of training impartation in the job categories for “skilled and technical workers” and “middle and executive manager”. In both categories and in the modality of classroom training the odds of benefit can increase until 1.2 times and 2.1 times, respectively. While in the category of unskilled training the coefficient in this mode of impartation is negative and insignificant.

- In the case of web 2 the Efficiency Index is significant and positive in the category of “middle and executive manager” is more important (odds 1.3) than in the category of “skilled and technical workers” (odds 1.8). These results are similar with of the results obtained in the classroom mode.

- There is a high probability to increment the firm benefit between 5% and 10% if the training is development in the workplace and for the category “unskilled worker” until 3.3 time, being in the case of category of with a odds 3.3 since in the category of “skilled and technical workers” this odds up to 1.9. However in this modality of training impartation the coefficient in the category of “middle and executive manager” is negative and insignificant.

In the case of firms who answered the question and who had an increase in net profits of more than 10% versus those firms that increased their profits by 5%, in terms of the odds obtained the following may be highlighted:

- The coefficients for Indexes Efficiency have the sign and significance similar that in the previous category. The major probability to increment more than 10% occurs in the cases of the “skilled and technical workers” and “middle and executive manager” when it is the classroom and web 2 training modes. For unskilled worker in the modality of workplace training there a high probability to increment until 2.2 time the net profit.

- Fitted probabilities (Fox & Andersen, 2004) for the principal category are showed in the Fig. 1. The two first charts shown the probability for the web 2 Index Efficiency in the case of category “unskilled worker” and “middle manager and executive”, since between these two categories exist the major differences.

The third chart makes reference the fitted probability in the case of classroom training distinguishing among “unskilled”, “technical” and “middle manager and executive” as predictors of firm performance.

Finally in both categories of dependent variable the training subsidies increase this opportunity by up to 2.2 times and in equal mode the self-financing company increases the opportunity by up to 3.4 times. The firms that work in the industrial sector increase this probability by up to 4.3 times this opportunity by comparison with the service sector. With regard to business size, those that employ between 19 and 49 people are at a disadvantage by comparison with those that employ more than 50.

5. Conclusions

Training is regarded as a key factor in the creation of business knowledge and is currently considered to be one of the most appreciated intangible business assets. Although is indisputable
that its real effects on business results, continue to be difficult to quantify. In this context this present work a multinomial logit model is used to contrast not only the relationship between training carried out between 2003 and 2005 in the case of 935 businesses and their results, but also analyze three way of training impartation: classroom, web 2 (mixed inclusive) and workplace mode.

The principal hypothesis of the work is confirmed by the results of model estimated in two senses: there exist a relationship between training and firm performance whatever it is the mode of training impartation. The business that had a rise in net profit of more than 5%, by comparison with those that had only increased net profits by up to 5%, increased this advantage by giving training courses to skilled and unskilled workers and middle managers and directors. If the training given is specific the probability of greater profits increases and the same is true if the training is subsidized. Training paid for by the company it is only significant in the case of executive staff.

The web 2 mode to impart training have the same impact on the performance that the classroom in the case of “skilled worker and technique” and “middle and executive manager” categories. However almost not used in the case of “unskilled worker”. Also the chance to participate in web 2 is greater for execs and managers compared to the other categories. These results are according with the theoretical field of various authors that consider as principal benefit of firm by web 2 training the “Management efficiency”. Nowadays the firms should seize new forms of blended training-learning scenarios (formal/informal; classroom/distance; intra-extra-institutional; mixed learning scenarios and pedagogical approaches). By its very nature, web 2.0 is predominately for informal learning (or training) scenarios. Web 2.0 tools can offer new ways for blended training, implementing mixed classroom/distance learning scenarios, Anderson (2007). They also support new pedagogical approaches Different kinds of content (text, pictures, sound, videos, etc.) can be combined, allowing for creative and diverse forms of expression giving equal opportunity to unskilled workers taking account that the firms wine more competitive advantage in long-term with the collective learning or organizational knowledge. Although the results achieved and the importance advance that quantitative research suppose in the field of social media and web 2, this research is not extensive of different limitations such as: the lack of quantitative work in the field of social media and web 2 does not allow having empirical evidence and comparing the results. In the multinomial logit model only the main effects have been analyzed. The possible interactions that can occur between different variables and more indicators of performance should be included in further research.

For future research it is equally important the development and advancement about theoretical frameworks as the empirical evidence contrasting the utility of using web 2 and social media as a way of staff training that should be assessed in the context of the work environment, new knowledge disseminated among workers whose totality is the source of creation of new organizational knowledge.

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