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DETERMINING FACTORS IN ONLINE TRAINING IN COMPANIES

Abstract:

This article sets out the features of companies that use e-learning to train their workers. Moreover, the factors that determine why companies use this education methodology are analysed. The study indicates that the variables that have traditionally explained the existence of training processes within a company, such as larger company size, a better-educated workforce, or an employment relationship of indefinite duration, are not useful when explaining why a company is more likely to train its workers using e-learning. Instead, intensive use of digital technology (ICT), the capability to innovate with such technologies or a greater adaptability in work processes explains, to a large extent, the probability of e-learning in the organizations. This fact produces a virtuous circle between ICT learning and practice at the “digitised” workplace.

This research is based upon data obtained from a survey made with a sample of 2,038 executives representing the Catalan business sector.

Key words: On-the-job training, workplace learning, e-learning, ICT

JEL: I21, J24, M51, M53

1. - INTRODUCTION

Digital technologies entering the economic field in recent decades have accelerated the process of economic globalisation and the relaxation of laws relating to terms of employment in such a way that companies have found themselves compelled to transform their productive and organizational processes. Furthermore, workers have to adapt rapidly to a new work dynamic, based on self-programmable or autonomous tasks, constant learning and a relaxation of labour relations (Castells, 1996; Carnoy, 2000; Bresnahan, *et al.*, 2002).

Thus, the massive incorporation of knowledge to the business activity together with the relaxation of the labour market has produced a widespread increase in the need for continuous professional training (Vilaseca & Torrent, 2003). This set of training actions developed by companies, workers or respective representative organizations must aim to improve the professional abilities and qualifications of current workers, making it possible for them to face the demands of this changing, digitised and global labour reality.

The technological revolution generates new challenges but it also provides new solutions. Hence, in this context, e-learning emerges as a new training alternative that enables current workers' training and qualification needs to be met properly. E-learning constitutes a flexible methodology that makes it easier to combine work and training. However, use of e-learning in Spain is still limited, with only 36% of Spanish companies with 10 workers or more implementing it (Eurostat, 2009). This figure would be significantly lower if smaller companies were taken into account (Markowitsch & Hefler, 2008).

The basic motivation of this article is to pinpoint the reasons that led to this reduced use of e-learning, by identifying and examining the features of companies that do decide to train their workers by virtual means.

After bibliographical research on the issue, it is clear that there is a significant amount of scientific research where the probability of companies training their workers or not, according to the attributes that both organizations and workers have, is analysed (Hashimoto, 1979; Oi, 1983; Holtmann & Idson, 1991; Lynch, 1994; Greenhalgh & Mavrotas, 1996; Harris, 1999; Tugores & Alba-Ramírez, 2002; Escardíbul et al., 2007). However there are no analyses on the distinguishing features of companies that use e-learning. In order to see if the general pattern of the business decision to invest in training workers is independent from the training methodology (on-site or virtual) or not. These two aspects set up the basic aims of the article.

To this end, the next section examines the literature on how work has changed in a knowledge-based economy, as well as the main advantages offered by using online methodology for work-place training. Subsequently, the methodology and sources of information used in this research are explained. Finally, the main results obtained are set out and the conclusions attained are discussed.

2. - CONTEXTUAL FRAMEWORK

Although there are still numerous companies that do not consider worker training as a key aspect for maintaining competitiveness (on the contrary, they link it to the technology available or to certain equipment or to low-paid workers), in recent years greater importance has been given to the training and

recycling of people as a factor accounting for increases in productivity (Monreal, 2004). In fact, many authors (among them, Johnson, 1982; Piore & Sabel, 1984; and Pfeffer, 1998) say that the best way to increase company flexibility is by means of organizational innovations focussing on the worker, training intensive and enhancing productivity, giving them a feeling of security and belonging to a team (Carnoy, 2000). Typically, increases in productivity do not depend exclusively on investment in technology, but on organisational and training changes in the human resources as well, in order to maximise their potential and make it be to the benefit of productivity (Brynjolfsson & Hitt, 2003).

The consequences of traditional management, production and working methods in a knowledge-based economy are that they have a direct impact on people's lives by making labour relationships more flexible, either voluntarily or by imposition, thus requiring openness to innovation as an essential value in the company as well as a continuous vocational recycling process. Such constant processing of knowledge, updating of skills and continuous re-learning favours the use of e-learning as an essential methodology that guarantees the perfect symbiosis between work and training (Authors *et al.*, 2010).

E-learning is a relatively new way of providing training and its use, while still limited, has been increasing constantly in recent decades (Lim & Kim, 2003; Brewer *et al.*, 2008). The aim of e-learning is to assure that technology contributes effectively to develop workers' abilities and knowledge and to support their progression in order to keep companies economically competitive (Pantazis, 2002). Most of the teaching community accepts e-learning as a valid and efficient training strategy, with a set of benefits to on-the-job training (Nisar, 2002), such as: (1) saving of time allocated for training; (2) improvement in

student support, allowing for personalized interaction and good follow-up on each student's participation and progression; and (3) increased flexibility of learning, training is available whenever needed, regardless of the time and location, allowing the user to follow at their own study pace.

From the company's point of view, it makes the identification and recording of worker training needs easier, allowing for the development of tailor-made training processes based on each work feature and the business priorities. Moreover, it favours the recording and follow-up of the training given and the evaluation of each participant. This recording of each worker's output on the training courses is a very important tool when making decisions about which workers or groups the company should invest in order to improve its human resources (Nisar, 2002).

Thus, e-learning favours a substantial reduction in training costs, makes knowledge easier and integrates workers into the company (Clarke *et al.*, 2005; Shankar, 2007; Wurtmann & Galli-Debicella, 2008). Pulley (2005) further underlines that e-learning is the only methodology which allows workers to take part in the training process from their workplace, including from different and distant geographical locations, in a synchronous or asynchronous way. Such asynchronicity makes access to learning resources possible 24 hours a day 365 days a year (Childs et al., 2005). Finally, e-learning facilitates the customization of learning according to each worker's needs, choosing the most suitable learning materials and making continuous updating possible (Shankar, 2007).

According to the above evidence, it appears clear that, from the point of view of the organization, virtual learning has many advantages. Nevertheless, there are

still very few companies that plan and implement e-learning strategies to improve their workers' level of competency.

In the context of a knowledge-based economy, this paper aims to answer (1) what features do companies that invest in their workers have and (2) which factors determine the use of e-learning. The specific questions asked in the study were:

With regard to the first objective:

(1a) What are the variables which characterize those companies that invest in training for their workers?

(1b) Do these variables change depending on the training methodology used, virtual or face-to-face?

And with regard to the second objective:

2a) What factors determine the company's investment in training for its workers?

2b) What determines the probability of the company investing in virtual training for its workers?

3. - METHODOLOGY

In order to answer the research questions posed, we have focussed on Catalonia, one of the main European economic regions, and the study of its business and training reality. The first and main source of research used is the Project Internet Catalonia (PIC), a survey carried out with high-profile executives from 2,038 companies that do business in Catalonia. This survey

represents the Catalan business sector and, consequently, unlike other studies, can potentially include the opinion of executives from small companies, which are the most wide-spread in the Catalan business sector (84%) and which have been ignored in many economic studies.

*** *Table 1 around here* ***.

This survey contains information on the companies' general features, on their business strategy, organization, equipment and ICT uses, as well as their workers' general characteristics, among other things. Nevertheless, it should be noted that this information was extracted from what each of the companies' executives said. The second source of information is the *Sistema de Análisis de Balances Ibéricos* (SABI), which provided essential information about economic magnitudes on the 2,038 companies surveyed.

There is profusion of research addressing the analysis of the variables that explain the probability of companies investing in their workers' training. Such variables can be divided into different categories, for example, Tugores & Alba-Ramírez (2002) refer to (1) personal features of the worker, (2) of the company and (3) of the relationship between worker and company.

(1) In the first group, variables such as the average age and education level, both of executive and non-executive workers, are usually significant (Jonker & de Grip, 1999; Tugores & Alba-Ramírez, 2002; Albert *et al.*, 2005).

(2) The activity sector (Harris, 1999; Turcotte *et al.*, 2003; García Moreno *et al.*, 2007), the business dimension (Holtmann & Idson, 1991; Black *et al.*, 1999; Crespo & Sanz, 2000; Caparrós *et al.*, 2005) and foreign share in the

companies' capital stock (Alba-Ramírez, 1994; Escardíbul *et al.*, 2007) are the most frequently considered aspects in company features.

(3) The third category includes variables linked to labour relations between the workers and the company, including primarily whether contracts are for a temporary or indefinite period (García-Espejo, 1999; Planas & Passard, 2000; Tugores & Alba-Ramírez, 2002; Caparrós *et al.*, 2004; Castany, 2010), the type of work, full or part time, (Greehalgh & Mavrotas, 1996; Arulampalam & Booth, 1998; Jonker & de Grip, 1999; Tugores & Alba-Ramírez, 2002; Albert *et al.*, 2005 and 2007) and the workers' level of wage (Bishop, 1994; Peraita, 2005; De la Rica *et al.*, 2005; Albert *et al.*, 2007; Görlitz, 2011).

Further more, some recent °studies have begun to add other features, such as those related to availability and use of digital technologies in the company, as well as the level of business innovation (Authors *et al.*, 2010). However, no studies have been identified with an in-depth analysis of the effects the kind of training methodology used (face-to-face or virtual) has on the company's decision to train its workers.

Our research incorporates the most significant variables in the three aforementioned categories, in addition to some variables of a more technological aspect, such as ICT equipment, use of digital technologies and development of business innovation with the support of these technologies.

In order to get closer to the object of our study, we must first describe the Catalan business sector. Such a description is based upon the results obtained from applying the analysis of variance (ANOVA), with aspects related to work training being the axis around which the analysis revolves.

Taking into account the results of ANOVA and in order to identify the determining factors of the probability of a company investing in training (section 4.2.1.) and using e-learning to train its workers (section 4.2.2.), there is a specific model of discrete choice, of dichotomic dependent variable. Specifically, in both cases, a model of logistic regression or *logit* is proposed. This model is a statistical technique suitable when the endogenous variable is categorical and exogenous variables are metric (Hair, *et al.* 2004), as is our case. Furthermore, this technique has been widely used in other similar studies, as in those by Greenhalgh & Stewart, 1987; Barron *et al.*, 1987; Abellán *et al.*, 1997; and García-Espejo, 1999, among others.

The *logit* model is expressed as follows:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_1 + \beta_2 X_{2i} + \dots + \beta_k X_{ki} \quad [1]$$

In this model P_i takes the value of one if the company invests in training (model 1) or if the company uses e-learning as its training methodology (model 2) and takes value null if the company does not invest in training (model 1) or if it does not use e-learning for its workers' training (model 2). Therefore, if we apply these values in the *logit* model, we will find that:

$$L_i = \ln\left(\frac{1}{0}\right) = \ln(+\infty) = +\infty \quad \text{If the company invests in training (Model 1) or uses e-learning (Model 2)}$$

$$L_i = \ln\left(\frac{0}{1}\right) = \ln(-\infty) = -\infty \quad \text{If the company does not invest in training (Model 1) or does not use e-learning (Model 2)}$$

4.- RESULTS

In this section we show, first of all, the features of the Catalan business sector from the development of training processes perspective. Once this analysis is finished and bearing in mind the variables that were significant to it, we will proceed to show the results of the logit model, which allows the determining factors in online training of workers in this context to be identified.

4.1. - Characterization of companies according to the type of training used

This research allowed us to identify three types of companies, clearly differentiated by whether there are training processes or not and by the training methodology used. The first group is made up of those companies that do not invest in training/education for their workers. These companies represent 38.1% of the overall number of companies in Catalonia, and their workers improve and develop their qualifications outside work. The second type consists of companies that invest in training to improve their human resources and use, exclusively, physical attendance as a training method. This second group represents 54.4% of companies. Lastly, the third group encompasses companies that invest or have invested in worker training in the last two years and use on-line methodologies to do so. 7.5% of these companies state that they use e-learning to train their workers.

Analysis of the ANOVA has revealed a set of variables that are significantly different from the three groups identified (see Table 2). They allow us to describe each of the groups more concisely as follows:

(1) The companies whose workers do not have training processes are basically small companies in the less knowledge-intensive service sector, with workers with a medium-low level of education, well established atypical labour relations, where foreign share in their stock capital is practically inexistent and with useless or basic digital equipment. Finally, it is noticeable that although these companies tend to innovate by using information and communication technologies, they do so to a lesser extent than the average Catalan company (48.4% vs 56.4%).

(2) The organizations with workers who pay for their own training and use exclusively face-to-face studies are essentially small companies with one or two premises, the executives are mostly university-educated and non-executives to secondary education level, with salary levels higher than the average, with an indefinite employment relationship with the employees and average Internet equipment.

Finally, (3) companies that invest in their workers' training using online methodologies are organizations where most of their executives are university graduates and the rest of the employees' education level is medium-high. They adapt labour relations with their workers, use digital technologies intensively, have a high foreign share in the stock capital and the gross value added provided by each employee is the highest in this economy.

*** *Table 2 around here* ***.

This first approach to the training reality of business, through the analysis of the ANOVA seems to show some significant differences between the features of companies that do not invest in training and those that do, as well as between

those that use face-to-face methodologies and those that use virtual ones. Therefore, next we will make an in-depth study of such a reality using more sophisticated tools of analysis.

4.2. - Determining factors of training

Now we will analyse what the main drivers are that favour the existence of training processes in a company. Thus, we have distinguished two different patterns. The first one combines the determiners of human resource investment being taken on by the company, without distinguishing any type of training methodology. With this we attempt to verify, as a first step, whether the determiners of the business decision to train workers in the Catalan business reality are similar or not to those identified in the international literature on this issue. The second pattern groups the factors that can explain the probability of e-learning use by companies that train their workers.

4.2.1. - Determining factors in company-paid training

The model of logistic regression described below (section 3), includes those factors that have a significant influence on the probability of the company taking on the cost of its workers' training, in contrast to companies that do not train their workers.

As can be seen, this model consists of five statistically significant exogenous variables (average age of non-executives, logarithm of the number of workers, logarithm of the annual average gross salary, innovation supported by ICT and level of ICT uses) and two other non-significant ones, (executives' level of

education and the percentage of workers with indefinite contracts), that, somehow, contribute to improving the goodness of fit of the model. This goodness is acceptably good, as the prognostic capability of the model is of 65.7%, being the Pseudo- R^2 of 45.6% and the R^2 of Nagelkerke of 62.5% (see, Table 3).

*** *Table 3 around here* ***.

According to the Odds-ratio we can state that the variable with the most relevant influence on the decision to invest in company paid training is the level of ICT uses (Odds-ratio of 4.34). This influence is clearly above that exerted by the rest of the variables. Nevertheless, a company's size (measured by the logarithm of number of workers) and the fact that it innovates using digital technologies also constitute very relevant factors in the business decision to train the workers. Lastly, it is noticeable that worker salary with a value of the *Odds-ratio* close to two exerts a positive influence in this decision too. On the other hand, the average age of non-executive workers (Odds-ratio of 0.936) appears to have an inverse relation with regard to the probability of investing in training.

The analysis of the *Odds-ratio* results confirms one of our hypotheses: the existence of a positive relationship between a company's investment in digital technology and work-place training. As a result, out of the three factors with the greatest influence on the probability of training in a company, two are related to ICT; the level of ICT uses and the percentage of companies that have innovated with ICT.

So, we can state that many of the variables that international literature points to as significant to explain the decision to train-workers, are significant also in the case of the Catalan economy. In addition, incorporating the ICT variables helps to better explain the decision to train the company's workers. Therefore, an in-depth study of this economy seems interesting and significant, because in terms of training behaviour it is similar to those already studied in other research.

4. 2. 2. - Determining factors of virtual training in a company

Now we analyse if there are differences between the variables that explain the business decision to train using traditional or e-learning methodologies. Applying the ANOVA's descriptive analysis allows us to anticipate if there are differences between companies that train face-to-face and those who do it virtually or if, on the contrary, they have similar features.

The number of workers in the company, the average age of executives and the average gross annual salary in the company are not significantly different between the companies that use virtual training for workers and those that use exclusively the face-to-face method.

Instead, as can be seen in Table 4, there are significant differences between certain companies and others in variables such as: the level of education of workers, both executive and non-executive; the degree of adaptation of labour relations; the extend of teleworking operating in the company; the presence of foreign share in the company's stock capital; the level of ICT established, as well as the degree of innovation in companies using such technologies.

*** *Table 4 around here* ***.

University studies are more frequent among workers of companies that use e-learning and, similarly, primary studies or lack of studies are less frequent among companies that offer virtual training.

Comparatively, companies that use digital technologies for worker training adapt maintain better labour relations between worker and company. Thus we can observe that, on average, 69% of workers in companies using virtual training have indefinite contracts, which is significantly lower than the 84.4% of permanent workers in companies with training exclusively face-to-face. Moreover, the percentage of workers in companies with virtual training and temporary contracts (12.7%) is higher than that of companies without virtual training (8.4%). Finally it is to be noticed that despite telework being practiced by very few Catalan companies, the percentage of workers doing it in organizations with e-learning treble that of companies with face-to-face training.

As regards the use of ICT by the company it stands out first and foremost that almost half the companies that use e-learning for their workers' training, 48.1% have medium or high ICT uses, a rate twenty points above the average in Catalan companies, 28.3%, and also significantly higher than the 32.5% of companies that train workers without using virtual methods.

Likewise, 85.1% of companies that offer virtual training to their workers claim they have innovated with ICT in the last two-year period. This percentage is reduced drastically when the company does not offer virtual training, shooting

up 21 percentage points with companies which offer face-to-face training exclusively.

Finally, a greater presence of foreign investment in the stock capital of companies that virtually is also noticeable. The percentage of foreign share in companies with virtual training (15.1%) is three times higher than that of companies with face-to-face training (5.5%) and also above the average in companies (0.5%).

We want to state that companies that use e-learning have the highest GAV per employee out of all of the companies analysed, though the differences are not statistically significant. In particular, the apparent productivity of work in companies that use virtual training is €63,716 and that of companies with face-to-face training is €58,350.

To sum up, the results obtained in the individual analysis of variances show that there are distinguishing features between one kind of company and another. Therefore we continued with the analysis of the logistic regression results, in order to determine which factors increase the probability of a company adopting virtual methodologies to train staff. The dependent variable is dichotomic and takes a unitary value if the company uses e-learning to train its workers and null value if it uses exclusively face-to-face training, that is to say, provides training but not through virtual delivery.

The result is a model which, with the addition of the set of independent variables that have been analysed individually, aims to identify relationships between the variables and at the same time check if their inclusion allows the probability of virtual training in a company to be explained and predicted. All

variables keep the sign and statistical significance of previously analysed models. Thus, there is strong complementarity among independent variables with levels of correlation among variables below 40%. That is to say, the model suggested does not show problems of multicollinearity.

The results obtained (Table 4) show that the probability of virtual training in a company depends on four variables: the level of ICT uses (high and low), innovation with ICT, foreign share, indefinite contracts and the average age of non-executives. The other variables, despite seeming relevant in the ANOVA analysis, have not proved significant when considering the logistic regression model.

From the *Odds-ratio* value, which shows the degree of influence each variable has on the probability of the company investing in virtual training, we can conclude that those who have advanced ICT uses have a very high probability of investing in virtual training and, on the contrary, those who have low ICT uses have a significant negative probability of not doing so. In fact, these variables appear to be the most relevant in the model. Furthermore, the next most significant variable is innovation with ICT. Investment in technology has a great influence on the decision to train by means of e-learning.

The following, in order of influence, are also significant: the percentage of indefinite contracts, the average age of workers and, lastly, the presence of foreign share in the company's stock capital.

Seemingly, the level of ICT uses shows a clear link between intensity of technology use within the main components of the company's chain of value and the use of e-learning for work-place training. In order to assess this effect

correctly, we have transformed the qualitative variable ICT: low, medium or high in three dichotomic variables, according to its level. We left aside the variable of control of medium ICT uses. The reason for transforming the variable that shows the level of ICT uses with regard to the previous analysis (model 1), is due to the fact that the two types of companies have medium technology uses and, consequently, there are no statistically significant differences between those that use virtual methods and those that do not to train their human resources. Instead, there are considerable differences in the extremes, between high and low uses. So, the result allowed us to identify the position that companies with virtual training have with regard to the use of ICT. Both the negative sign of low level use and the positive sign of high level use confirm the strong correlation between adoption of e-learning and use of digital technologies.

*** *Table 5 around here* ***.

As regards the type of relationship, we state that the relationship between the probability of a company providing and investing in e-learning and the existence of advanced ICT uses, innovation with digital technologies and presence of foreign share in the company, is direct. On the other hand, the probability of investing in this kind of training is reduced by a limited use of digital technologies, the workers' average age and, seemingly surprising, the existence of indefinite contracts in the company.

Finally, the probability of virtual training in a company is positively correlated to innovation with ICT. Thus, a more intensive use of ICT in the workers' training

is, in turn, to the benefit of a greater use of digital technologies in business process innovation. The presence of foreign share in the stock capital is also statistically significant and has a positive effect. This confirms that introducing other business cultures with more tradition of on-the-job training, and thus more evolved in this aspect, implies a clear move towards innovating training methodologies.

5. – CONCLUSION

The aim of this study was to investigate more deeply the factors that affect the business decision to train workers, paying great attention to the type of training used by companies. In this research, we start from a specific economy, the Catalan one, which is, made up mostly of small companies (almost 88% of the companies have fewer than five workers), and where foreign share in their stock capital is practically symbolic (it swings between 4% and 5%). Furthermore, their employees generally have a level of education which could be improved (the majority with only a secondary school education) and the companies have a reduced or low use (70%) of ICT possibilities.

According to the development or not of training processes by the workers and to who finances such processes, we have distinguished three types of companies, of which the most distinguishing attributes are shown in Figure 1.

**** Figure 1 around here ***.*

In this economy the reasons that move companies to train their workers are similar to those shown by the international literature on the issue (Castells 1996; Bresnahan et al., 2002; Coetzer & Perry, 2008; Fan & Wei, 2010). Thus, we can state that factors such as business size, salary, level of ICT use as well as its use in innovation processes, have a positive impact on the business decision to train the workers, whereas the age of non-executive workers has a negative influence on such a decision.

In particular, business size has a positive influence on the probability of training in the company (Holtmann & Idson, 1991; Black et al., 1999; Storey, 2004; Holden et al., 2006; Coetzer & Perry, 2008). We have seen before that possibilities of training in bigger companies are higher than in small companies because, among other factors, they have a greater capacity to replace the worker who is being trained, they get economies of scale with the training and, in addition, they are more likely to be able to offer attractive career opportunities based on the worker's qualifications (Castany, 2010).

Moreover, it is clear proof that there is an obvious positive correlation between company-provided training and better-paid workers. This higher salary level in companies with training coincides with the results obtained by Albert et al. (2007).

The level of ICT uses and innovation using digital technologies have a significant and positive influence in the model. This fact demonstrates the existence of a strong positive relation between the probability of training in a company and a more wide-spread use of ICT in all fields of the company. Indeed, the use of more and more specialized technologies requires very

specific knowledge and capabilities that are not easy to find in the labour market. Consequently, training will be the way to get such abilities (Castany, 2010). Moreover, this training will contribute to benefiting from this technology, using it in a more efficient way, which will lead to improved productivity and competitiveness.

The average age of non-executives is significantly negative, that is to say, companies with younger staff are more likely to offer training to their workers; basically for two reasons, as training for new employees is normally directed at younger workers who are expected to make such an investment more profitable. Thus, companies will opt to finance training of younger workers, who have a longer estimated working life (Greenhalgh & Stewart, 1987; Jonker and de Grip, 1999; Albert et al., 2005).

Face-to-face learning *versus* e-learning in on-the-job training.

Turning to the final aim of this study, we have analysed if the companies that train their workers virtually have distinguishing features from those that do it face-to-face, as well as if the reasons behind the decision to invest in the training of workers are equal or different to some extent.

(a) Firm typology

The results of this analysis show, firstly, the distinguishing features of companies that decide to train their workers virtually. In these companies, the degree of ICT use, as well as the degree of innovation in those using such technologies is relatively high as is the level of worker training. Moreover, there is a greater degree of adaptation of labour relations, that is to say, a higher incidence of temporary rather than permanent contracts and an increase in

teleworking. Finally it is to be noticed that companies that train virtually have a higher presence of foreign share in their stock capital.

To sum up, we can state that companies that train virtually are relatively better equipped digitally, make a more intensive use of ICT, are more innovative and are more active in high-knowledge business sectors.

**** Figure 2 around here ***.*

Additionally, it is clear that companies that use digital technologies to train their professional staff have highly qualified human resources, much higher than in companies that train their workers face-to-face. This difference is more pronounced regarding workers with no executive responsibilities where the percentage of university-educated non-executive workers in companies with virtual training practically doubles that of those with face-to-face training. Similarly, 71.2% of companies with virtual training have largely university-educated management, compared with 59% of companies with face-to-face training or the Catalan average of 54.8%.

The use of digital technologies in work-place training and business innovation allows a virtuous circle to appear that generates a greater gross value added per employee and an increase in competitiveness (Sambrook, 2003). There is a high correlation among virtual training, innovation with use of ICT and an apparent increase in productivity. The existence of innovative training processes using digital technologies makes it easier for the worker to be more innovative with the support of ICT. A consequence of this innovative activity is the generation of a higher gross value added per employee.

*** *Table 6 around here* ***.

Furthermore, companies that currently train their workers using e-learning seem to be better adapted to the new conditions of adjusted production expected by a competitive and globalized economy. The conception of paid work and socialized production typical of the industrial era is inverting (Castells, 1996; Carnoy, 2000). Companies need to make labour relations flexible in order to meet the frequent changes in demand. The number of “flexible” workers, that is to say, part-time, temporary, self-employed, and so forth increases while on the other hand, traditional full-time work tends to disappear or is reduced (Carnoy, 2000). In addition, the number of workers teleworking is also increasing (Osterman, 2000). Hence, we can see that companies with a lower percentage of indefinite contracts and higher percentage of temporary contracts are the ones that use virtual training methods for their workers. Similarly, a still incipient, but growing trend towards the internationalization of those companies where there is a greater relative presence of foreign share, is noted.

(b) Decision drivers

Secondly, the research analysed the factors affecting the probability of companies using e-learning to train their workers. The comparative analysis of variables that affect business investment in face-to-face training or virtual training shows that only some factors are relevant in both cases. Thus, the average age of non-executive workers affects negatively the probability of training (face-to-face or virtual). In this sense, the negative correlation stated by a considerable part of the international scientific literature (Greenhalgh & Stewart, 1987; Jonker & de Grip, 1999; Albert et al., 2005) and based upon the

inverse relationship between age and remaining years of work life expectancy that can make the investment profitable, is met.

Two factors that affect positively the decision taken by companies to train (face-to-face or virtually) are the acquisition of sophisticated technological equipment and the desire to use it to innovate. Therefore, a more sophisticated use of digital technologies generates the need in a company to improve the level of workers' professional qualifications, and this need can be well met with face-to-face or virtual training. This investment is perceived as essential and profitable to the companies because it allows them to get the maximum added value from the investments made, innovating and increasing the competitiveness of the company. There are many studies that clearly show that investing in technology is not enough by itself to increase company productivity. The way in which ICT are integrated into the organization and how they are applied and used are fundamental variables for improving productivity and it is in these processes where human resources has a key role (Brynjolfsson & Hitt, 2003).

On the other hand, when talking about investing in virtual training, the type of labour relations that link workers and companies becomes significant. However, this relationship does not follow conventional guidelines, but quite the contrary, since permanent workers are not those who have a higher probability of receiving training. Despite the interest in recouping the investment in training being the same as in other companies; length of contract does not prevent an investment in training but the opposite, as training is needed in order for business to develop correctly. Moreover, deciding to train non-permanent workers is favoured by the lower cost of training processes using e-learning, which allows for a quicker return on investment. All of the above demonstrate

that a greater adaptability of labour relations is not to the detriment of worker training and qualifications.

Although foreign share in the stock capital of companies in Catalonia is not that important, its presence is significant when companies have to decide whether to train their workers virtually or not. In this case, what Alba-Ramírez (1994) illustrated, about Spanish companies with foreign share and a high percentage of qualified workers being the ones with a higher probability of training their workers, would be confirmed. Particularly, in the case of Catalonia, Escardíbul et al. (2007) state that organizations with a majority foreign share and international presence tend to universalize training actions for the entire staff. Foreign share comes basically from EU countries, United States and Japan. All these countries have a long tradition in continuous work-place training and their companies have more advanced technological uses. In addition, they appear to transfer this training culture using ICT to the companies they invest in. Possibly, such an impulse is favoured by the existence of a wider geographical dispersion of these companies' business premises. In these cases the use of virtual training helps to overcome spatial barriers in the development of training processes.

Finally, it is noticeable that when talking about investing in virtual training, as opposed to face-to-face training, two variables are not significant anymore: company size and the average salary of workers. Lower costs for on-line training as well as greater adaptability make the size of the company a non-significant variable in the business decision to train workers. Therefore, this training method seems to overcome one of the main obstacles that companies have when deciding to invest in their workers' training, their own size. Moreover,

the average salary level has no significant influence on the decision to train virtually. In a way, the use of e-learning contributes to spread the business investment in their worker training. On-line training makes investment in training more accessible for all companies, irrespective of their size, and for all their workers, that is to say, irrespective of their salary. Nevertheless, employee age still affects negatively when the company considers this investment (Greenhalgh & Stewart, 1987; Jonker & de Grip, 1999; Albert et al., 2005).

6. – IMPLICATIONS FOR PRACTICE

In a crisis situation such as the current one, companies are particularly interested in increasing their efficiency, reducing their costs and at the same time having qualified workers that make the most of their physical investments, particularly those made in ICT through innovation. In this context, company investment in worker training is fundamental and the use of virtual training methods seems a particularly attractive option.

The use of e-learning makes it possible to make a profit more easily from investing in worker training, allowing a company to invest in training those workers that do not even have a permanent bond with it. Moreover, salary level and business size are not significant variables when it comes to taking the decision to invest in the training of a company's human resources. Therefore, e-learning constitutes a way to encourage investment in workers' training in small companies. This circumstance is particularly relevant in the Catalan and Spanish cases where the business sector is largely composed of small companies.

If there is only one analysis of the factors that lead companies to invest in worker training from an aggregated point of view, without distinguishing the training method, we could conclude that companies tend to train the youngest workers, the academically better qualified and paid, and those with indefinite contracts. Consequently, there would be a tendency to progressively increase the gap between large competitive companies, with intensive and innovative digital uses, highly-qualified workers and high salaries and other companies. Hence, what Crespo & Sanz (2000) already pointed out would be confirmed. That is to say, if we add the massive introduction of digital technologies in the company to the lower probability of training for workers with a lower level of education, this can mean the practical exclusion to the system of continuous training for less qualified workers due to the loss of incentives to train them by the company.

However, a deeper analysis of such a decision, which considers the training method used, allows us to conclude that this gap does not necessarily broaden, but can be reduced through the use of e-learning. The massive introduction of ICT constitutes a source of new challenges, but it also brings new solutions. In particular, its application in the training area allows for a reduction in costs and a creation of positive synergies between the digitized work context and the training context, so that even for small companies it becomes profitable to invest in training those workers without indefinite contracts.

In conclusion, investment and productive use of information and communication technologies (ICT) are radically transforming business activity. In fact, they are consolidating a new strategic, organizational and productive model that re-orientates business activity towards the intensive use of ICT, innovation and a

network decentralization of the elements of value. This new productive model, based on adaptability is, at the same time, transforming the formative and experience prerequisites of the work force and requiring them to constantly update their skills and abilities (Youndt et al., 1996; Carnoy, 2000). Therefore, there is a need to develop training processes that allow worker knowledge to be updated (Castells, 1996). In this context, e-learning has become an essential training methodology for companies, assuring a perfect symbiosis between work and training. E-learning creates a virtuous circle where investment in digital technologies feeds an advanced and innovative use of such technologies, which in turn leads to value added per worker and feeds the probability of a company investing in worker training. And all this, regardless of company size, worker salary level and even of a temporary relationship between employees and the company.

Limitations, generalization and future research

The main limitation of this study is that it refers to a specific economy, the Catalan one. However, this is one of the more important regions for the European economy. The generalizations made based on the conclusions obtained should take into account the specific economic characteristics which were part of the study.

To minimize this weakness, it would be interesting to perform this study in other economic areas in the future, in particular in those where the use of e-learning is more widely spread.

Similarly, in the future we would like to analyze the relative survival rate of those companies which invest in training using e-learning as opposed to those who invest in face-to-face training or those who do not invest in worker training.

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