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The Relationship between education costs and research and development costs of top companies in Kerman province of Iran

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Abstract

Firms that invest in R&D and at the same time in worker skills (on-the-job training) expected to be more successful in innovation. In competitive world many companies are trying to get good success between their rivals. Companies owners wants to optimize their cost and manage it to achieve to proper level of cost and expenses. One of important factors for analyze the business success is training and its effects on company outputs, many companies are aware from the positive effects of this important parameter and try to use training benefits in their business. Also R&D units are important units in companies and many of them have high concentration on their efforts and performance. In this research we have investigated on 31 companies in Kerman province of Iran that selected as a top industrial units in 2015. we want analyses the relation between job training cost and R&D cost. For this aim we used correlation analyses to calculate the correlation Coefficient. our findings confirm that R&D is more effective when firms have more skilled personnel due to investment in workers training. That is, training reinforces the effect of R&D on the likelihood of innovating, and it may even induce some firms to become innovative.

Keyword: job training cost, R&D cost, Iran companies
1. Introduction

Because of the rapid reconstructions, the need to do things with a higher acceleration and accuracy and to heighten the output is more urgent. Therefore, managers of organizations should try to equip themselves with techniques that help them achieve their goals and to accelerate the reconstruction trend. Innovation (the introduction of a new or significantly improved product, process or method) boosts firm productivity and economic growth. Research and development (R&D) is crucial to the rate of innovation and the capacity to innovate. Yet, R&D is only one of the several mechanisms used to innovate. Firms innovate through a wide range of activities that do not necessarily require formal R&D (Arundel et al., 2008). The role of human capital and more-specific worker skills has become crucial in fostering innovation in modern industries. Industries face now more global competition, a fast and ever-changing technology and shorter product life cycles. In this context, worker skills must be continually updated and training (and, particularly, on-the-job training) enhances these skills. Firms must therefore invest in training. According to the OECD (2010): "Empowering people to innovate relies not only on broad and relevant education, but also on the development of wide-ranging skills that complement formal education". Nelson and Phelps (1966), also emphasize the importance of education in innovation by claiming that "educated people make good innovators, so that education speeds the process of technological diffusion". Even though worker skills are a widely recognized driver of innovation at the firm level, few studies specifically focus on analyzing the empirical relationship between training (or public training policies) and innovation. Most of the empirical literature is concerned with the effect of training on productivity and/or profitability rather than innovation (Jones and Grimshaw, 2012). Training presents a prime opportunity to expand the knowledge base of all employees, but many employers find the development opportunities expensive. Employees also miss out on work time while attending training sessions, which may delay the completion of projects. Despite the potential drawbacks, training and development provides both the company as a whole and the individual employees with benefits that make the cost and time a worthwhile investment. A properly trained employee becomes more informed about procedures for various tasks. The worker confidence is also boosted by training and development. This confidence comes from the fact that the employee is fully aware of his/her roles and responsibilities. It helps the worker carry out the duties in better way and even find new ideas to incorporate in the daily execution of duty. Also R&D activities can be considered as a Simultaneous with training in industrial units. this two important activities are considered as a vital key performance indicators to Achieve success.Among the papers that analyze the relationship between training/skills and innovative performance at the firm level, Laursen and Foss (2003) find that human resources management practices (in particular, internal training and the combination of internal and external training) influence innovation performance positively. Rogers (2004) uses data on Australian firms to investigate the determinants of innovation; he includes training among them, but does not find a significant effect. More recently, Zhou et al. (2011) found evidence that training and R&D have a positive impact on the firm innovation performance. The following table is shown the Parallel mode of operation between training and R&D in the Netherlands, as these investments contribute positively to new product sales. Using data for French firms, Gallié and Legros (2012) also find that training and R&D have a positive impact on the production of innovations. There is little evidence on the role of training in innovation based on Spanish data. Santamaría et al. (2009) explore how the innovation process depends on non-formal R&D activities. Nevertheless, they
do not pay special attention to the role of training and, in particular, they overlook the possible interactions or complementarities between R&D and non-formal R&D activities. Even though R&D and training investments appear to have an impact on innovation and even reinforce each other, little attention has been given to this issue. Emerging literature examines whether different types of knowledge investments reinforce one another. Some papers focus their attention on how the relation between R&D and training affects productivity (Ballot et al., 2001, 2006); or on how skills (among other innovation activities) affect firm profitability (Leiponen, 2005). Nevertheless, to the best of our knowledge, no papers focus on the complementarity between training and R&D as a driver to innovate. It is an interesting open question whether R&D and training require each other to be fully efficient and whether the size of the firms and the industry in which they operate make a difference. Additional observations related to this hierarchical model are the following: The parallel route in research and development (R&D) deals with technology development and transfer, while in the educational system, this is the flow of knowledge and skills. The top-down line of command, with problem definition at the top, aims to create change at the lowest level—the receiver. The feedback loop is missing. The links between the R&D and educational systems are weak. The R&D chain has an institutional divide, where each step is the responsibility of a separate organization.

2. Literature Review

In recent years, it is observed that interest towards R&D and job training has been increasing in knowledge-based developing economies. When Iranian Statistical Institute’s data is examined, it is understood that share of gross domestic expenditure on R&D and training in gross domestic product (GDP) has increased and R&D activities with training activities have become much more important over the years as in many developing countries. This increase is also supported by public incentives. The interaction between all these concepts empowers the employees and makes them professionally qualified; the human resources skills make up a major section of the processes such as training and development, employment and organization relationship. In today's turbulent world, the organization’s goals depend on the ability of employees to perform duties and adapt to a changing environment. Almost all companies have job training costs but some of them don’t have R&D costs. It shows that we can analyses it as a subject. Training of human resources with organizational change and the environment can cause to individuals, their activities effectively and continue to add the efficiency. Therefore, training, ongoing and planned efforts by the management, staff competency levels and to improve organizational performance (khanmohammediotaqsara, 2011). It is claimed that a 5 percentage point increase in participation levels of sector-wide training is associated with a 4 per cent increase in productivity (measured by gross value added per worker) for many companies there is not defined any cost as research for development Dearden et al. (2000). Accordingly, there is a call on employers to increase their demand for skills at all levels: from senior management to those engaged in routine activities (Learning and Skills Council (LSC), 2007). IT innovations lead to improvements in internal processes, coordination, and decision making, while R&D leads to significant changes in products, services, and markets served by a firm (Brynjolfsson, 1998). Construction employers often claim that training provides a positive contribution to their productivity performance and profitability (City and Guilds, 2006; Employer Panel Consultation, 2006;
Winterbotham & Carter, 2006). Similarly, Cosh et al. (2003) found that half the businesses they surveyed, which included manufacturing, financial and business services companies, felt that training had increased their turnover and profit margin. Other research found that companies receiving training grant assistance increased their number of training hours and reduced their product scrap rate (Holzer et al., 1993). Furthermore, Clements and Josiam (1995) demonstrated that the financial gains of training outweighed the cost. They followed a framework developed by Swanson and Gradous (1990) that provides a step-by-step guidance for evaluating the financial benefits of training. The recent decades have witnessed drastic changes in every organizational life; therefore, almost all human institutions have modified the process of their production of value, service providing, and upgraded the skills of their human resources as well as undergoing widespread restructuring. The area of human resources and human expertise proved to be a major issue and underlying reason of competition among the organizations. (Swanson & Holton, 2001).

Although there is an association between HRM practices (including training) and performance, there is a failure to show that HRM causes higher performance (Guest et al., 2003). The role of human has become the focus of the attention to the researcher and business sectors managers that the organizations need to develop their human resources to sustain their competitive edge. (Drucker, 1994, Steward, 1994, Quinn, Anderson & Finkelstein, 1996). Yew, L. T. (2011) States that Providing career development opportunities via training and development of employees is increasingly recognized as an important aspect of best human resource management practices. There is no doubt that in spite of careful training and guidance some managers will be better at conducting performance review meetings than others. Armestrong, (2006). Barzegar, Farjad.(2011) had summed of some major effects of training as improving the quantity and quality of output, enhancing the probability of organization success, decreasing the processes risks, and decreasing the organization costs, effects on R&D, improving the management and some more impacts.

It is currently believed by scholars and experts in science teaching and learning skills required in specialized As an inevitable necessity of social importance and has a special place in the macro expansion. This is especially important in the specific form of this problem comes from the people to help educate Will be able to grow with its unlimited ability to realize their work in the field. In recent years, productivity in the countries discussed and what was important in scientific circles and in academic and administrative circles to speak of the productivity, and Dramatic changes in style and way of life and entering the information age and knowledge, development of human societies to use the new tools of information technology subject areas are made. Perhaps it can be seen as less than human, that the mass associated with information technology tools are not experienced at least one and perhaps not unique to the level of literacy in the information age is measured with Myzantvanayy people in the Use of Information Technology. (Inelmen, 2011). According to Schumpeter view, success in The firm performance depends on the entrepreneur’s creativity and the unpredictability of their innovations. In other words, innovative firms gain monopoly power, thanks to R&D activities. This condition can be related with other activities such as training (Erkan ÖZTÜRK, 2015)
3. Methodology

This research is a descriptive-correlation research in which the relation among the variables has been investigated without making any changes in them. The research is a field study and the data were gathered by means of a quantitative questionnaire.

4. Instrument

A simple questionnaire has been designed and was sent from the Kerman industry mine and trade organization as a governmental organization to 31 top companies via mail in 2015. Data were gathered as a quantitative numbers of companies cost in job training and R&D.

5. Data Analysis Method

Data were analyzed by means of SPSS and Excel. Firstly, Relationships between variables was drawn by Excel and The regression formula was obtained. Then, systematic correlation was used for specifying the variables' relations.

6. Results

For addressing the aim of this paper, the quantitative research approach has been selected by using a survey. Data including the costs of job training and also R&D costs of companies. Then the correlation coefficient between these two concepts has been calculated.

Hypothesis : There is a Significance relation between job training costs and R&D costs.

\[
\begin{align*}
\text{H0: } & \rho = 0 \\
\text{H1: } & \rho \neq 0
\end{align*}
\]

Analytical results for first hypothesis proved that there is a significance relationship between the job training cost and the R&D costs. For obtaining this correlation coefficient, the spearman coefficient was applied. By using SPSS software, it was found that the spearman coefficient is 0.57 (see table 1). In this hypothesis, the significance level is 0.03 which is less than 0.05. Therefore there is significant relationship between job training costs and R&D costs.

We can see regression formula of relationship between this two parameters as follow:

\[ y = 7.746x + 23565 \]
\[ R^2 = 0.157 \]

also diagram of relationships between job training costs and R&D costs is shown as following :
6. Discussion & Conclusion

There is wide consensus on the key roles played by R&D and human capital. Nevertheless previous studies have not paid enough attention on how the relationship between these two investments affect innovation. The main contribution of our paper is that it considers the joint effect of R&D and training to
explore whether both investments reinforce each other, and whether there is even a complementarily effect. In analyzing this relationship, we explore whether the effects differ according to the type of industry and the firm size. It was found in this research that there is a significant relationship between job training costs and R&D cost. According to results we can conclude that companies with more job training cost have more R&D costs. It can be related to companies level in industry and their aims. In practice, these results need to be considered by the Kerman province industrial companies. It is important that company’s owners have a proper insight for their expenditures.

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