Knowledge implications for the NITEC Program: a preliminary analysis of an innovation program directed at building innovation capabilities in SMEs

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KEYWORDS

knowledge management; innovation program; indirect impacts

ABSTRACT

Economists and others scientists have demonstrated that R&D activities generate widespread benefits enjoyed by consumers and society at large. As a result, the overall economic value of R&D to society often exceeds the economic benefits enjoyed by the innovators as a result of their efforts. Economists describe this phenomena as a positive externality or spillover (Jaffe, 1996) (European Commission, 2005) (Cohen & Levinthal, 2000) (Richard Gray and Stavroula Malla, 2007).

Similarly, one can say that the intended results of specific innovation programs directed at SME are usually complemented by results that were not specifically aimed at. The first type of results, which are the specified objectives of the program, are called direct impacts, and the second type of results are called the indirect impacts of the innovation program.

This paper identifies and analyses the indirect impacts of an innovation program, implemented and financed by the Portuguese state under the aegis of the 6th Portuguese Framework Program, and directed at SMEs. The program, called NITEC, aimed to foster and support the creation of R&D structures inside SMEs, by providing financial support to hire research personnel and acquire research equipment.

This program was conceived to address a key problem in the National Innovation System (NIS) in Portugal: the low level of in-house technology and innovation capabilities in Portuguese firms. This specific program was selected because of its features: 1) the funds are governmental; 2) promotes activities related to R&D; 3) the people involved are expert in the working and research area; 4) the project-base has a limited period of time (maximum five years); 5) each company has its own project. These features are essential to identify knowledge acquisition in the firms which participated in the program, as a main topic being evaluated in the results.

INTRODUCTION

Innovation programs are an integral part of the national innovation systems in the form of technological innovation management actions, knowledge management practices and organizational change operations (Lundvall and Borrás, 2005; Borrás and Fagerberg, 2011). These complex and uncertain processes require specific management, and continuous improvements and investments. Consequently, evaluation tools and methods are required to properly assess these processes and to have a reliable ground on which to make decisions (Papaconstantinou and Polt, 1997; Georghiou and Roessner, 2000; Smith, 2006).

However, in some EU countries, such as Portugal, innovation program assessment and measurement is still a relatively novel activity. Moreover, even in regions with a track record in innovation policy, the evaluation of innovation is far from being straightforward (European Commission, 2005). Innovation is a dynamic and constantly evolving system which is adapting itself to a range of internal and external factors (Georghiou, Rigby and Cameron, 2002; Zahra and George, 2000; Borrás, Fagerberg and Edquist, 2011). It is difficult to know the inherent elements included in the indirect impacts of innovation, but they exist and cannot be neglected when evaluated. There are feedbacks between policies and other innovation related agents that are difficult to measure. Encouraging innovation can stimulate only the direction and intensity of the results, but generally does not produce by itself impacts initially planned.

The indirect impacts are defined as all types of results implicit on the project. Indirect impacts can be related to the same activity generated by the project, provided that they have escaped its initial scope. In this study, only these were considered in the evaluation study of the acquisition of knowledge and transformation processes. Thus, the concept of spillover only refers to the application of new knowledge generated by the project in a different activity in terms of technology or sector, initially unforeseen in the objectives of the project.

Evaluating a program that is transformative of knowledge offers the unprecedented opportunity to explore the process of building-up of that process. Describing the context and implementation of a broad

set of factors is critical, yet inherently challenging, as is assessing their effectiveness. This paper focuses on three characteristics of evaluation activities: 1) the importance of context; 2) the complexity of the interventions; and 3) the identification of the indirect impacts.

Attempts to provide empirical evidence for the existence of such knowledge spanning mechanisms is made in the present study. The goal and the method was to investigate technological learning patterns in terms of knowledge interaction mechanisms through an interview-based exploratory study.

The study presented here is structured as follows. The following section describes the innovation programme that was considered in this study. The conceptual framework that guides the interpretation of the case studies is reviewed in section three. Section four develops the hypotheses. Subsequent sections report the results which correspond to a dialogue between ideas and the evidence grounded on the case evaluation. The last section presents the main conclusions, limitations and questions for future research.

1. NITEC Program

The launching of the NITEC (NITEC is an acronym for Research and Technological Development Nuclei in Companies) program is aimed to address a key problem in the National Innovation System (NIS) in Portugal: the low level of in-house technology and innovation capabilities of Portuguese firms.

An additional problem was the weakness of the linkages among the various players in the NIS. Companies with low in-house R&D capabilities had been identified in various policy analyses as an important hindrance to a stronger cooperation among the various actors, namely between Universities and Scientific and Technological (S&T) organisations, on the one hand, and Industry, on the other.

A "NITEC" was defined as a small, permanent team of people fully dedicated to technology endogenisation and development activities, according to a project-based action plan. Those activities were expected to lead to the design of new products, processes and/or systems or to the introduction of significant improvements in existing ones (Portaria n.º 441/2003, 2003; Godinho and Simões, 2013). For financial support purposes, a NITEC should have a maximum of three elements, although companies might establish, at their own expenses, a NITEC with more staff.

The main objectives are the following: (1) to support the creation of in-house R&D competencies in Portuguese companies as well as to encourage companies to enhance such competencies; (2) to support company efforts aimed at improving design and process capabilities as well as the endogenisation of foreign technological knowledge; and (3) to promote company capabilities to develop technologically innovative products and solutions. More specifically, the key objective was the creation (or formalisation) of small R&D groups in companies which had already shown a proclivity to engage into R&D activities or which were undertaking R&D activities on an informal basis. The existence of a dedicated R&D group was expected to make companies more aware of the opportunities stemming from carrying out R&D activities, therefore leading to a steady development of in-house R&D capabilities.

NITECs would contribute to enhance companies' absorptive capabilities as well as their product and process design and adaptation competencies. They were also envisaged as an instrument to develop and strengthen internal and external linkages. From this perspective, NITECs were not just an instrument of technological but also of organisational innovation.

Overall, the NITEC initiative was positively evaluated. It was recognised that the support to the creation of the small R&D teams was justified in terms of public policy, insofar as it had significantly contributed towards a change in Portuguese companies' commitment towards R&D and innovation. It was considered that besides the effect of generating a new managerial perspective with regard to the continued and systematic carrying out of in-house R&D activities, according to NITEC´s coordinator, it contributed towards "an increased capability of companies" to cooperate with S&T organisations.

Figures 1 and 2 show the business activity and the regional distribution of firms that received support from this program. There were a total of 169 SME from different sectors that implemented the NITEC program.

Figure 1: Distribution of companies by business activities

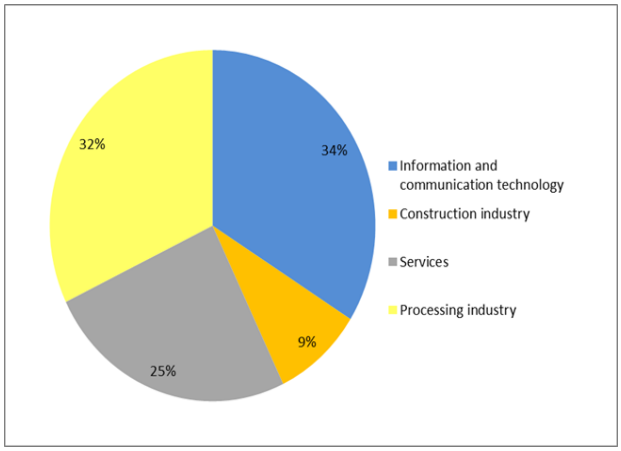
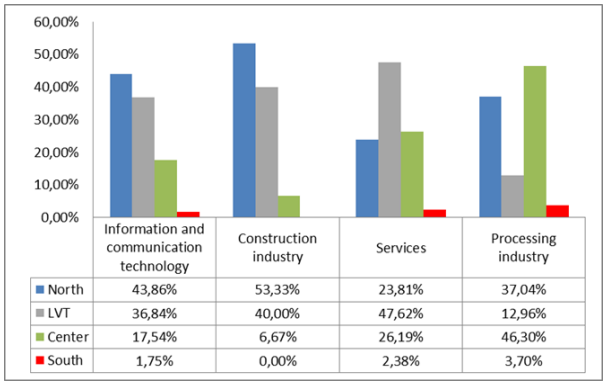


Figure 2: Distribution of companies by business activities and by region in Portugal



	Information and communication technology	Construction industry	Services	Processing industry
North	43,86%	53,33%	23,81%	37,04%
LVT	36,84%	40,00%	47,62%	12,96%
Center	17,54%	6,67%	26,19%	46,30%
South	1,75%	0,00%	2,38%	3,70%

The figures represent the firms that received support under the NITEC program, and they include firms from the information and communication technology, construction industry, services and processing industry. The services sector represents the commerce and consultancy activities and the processing industry sector consists in the wood, food, energy, metal-mechanic, plastics and electric/electronic activities.

As can be observed in Figure 1, the majority of companies that adhered to the NITEC program were form the information and communication technologies sector. Next, came the processing industry sector, then the services sector and the finally the construction industry. An internal audit of NITEC showed that the projects in the information and communication technologies sector were generally in line with the overall philosophy of the NITEC, which was intrinsically more close to these technologies. As a consequence, this sector was also the more open to absorb the main objectives of NITEC.

In terms of regional distribution, the northern part of Portugal contributed with 53% of the construction industry firms that participated in the programme and with 44% of the information and communication technologies sector firms that participated in NITEC. The Lisbon region (LVT) contributed with 47% of the service firms that participated in the programme, and with 37% of the information and communication technologies sector firms that participated in NITEC. The central region of the country contributed with 46% of the processing sector firms that participated in NITEC, and with 28% of the service sector firms that participated in NITEC. The southern region accounts for 4% of the supported firms in the processing industry and 2% of the firm supported in the ICT and service sectors.

This distribution may somehow reflect the relative weaknesses of some regions in terms of industrial R&D, the North being relatively weaker in terms of the endogenisation of R&D activities in the construction and processing industry, and the centre relatively weaker in the processing industry. The greater participation of service firms from the Lisbon area may reflect a relatively more mature stance from the part of these firms in the Lisbon area compared to service firms in other regions of the country. On the other hand, firms from the ICT sector are predominantly from the North and Lisbon area, reflecting similar trajectories of these companies that are active in a relatively new industrial sector.

3. SPILLOVER IN THE CONTEXT OF THE ABSORPTIVE CAPACITY

The concept of absorptive capacity emphasized the crucial role that knowledge plays in business competitiveness. It emerged as a significant concept in the 1980s, in the field of organizational learning. Cohen and Levinthal (1990) were the first authors to determine a proposal for a definition to build a general theoretical framework around its characteristics in business application. These authors define absorptive capacity as "the ability to identify, assimilate, and apply knowledge from external sources for commercial purpose".

From this perspective, we can derive the implication that the incentive of firms to invest increases with the perception of improvement in the capacity for absorption (Levinthal and Cohen, 1990). Kedia and Bhagat (1988) used the term in the context of technology transfer among nations, and related it to firms' receptions to technological change. It requires a business to evaluate, assimilate and apply knowledge transmitted from another (Lane and Lubatkin, 1998).

The capacity to absorb largely depends on technological abilities, but varies with the sectors in which the receptor firms operate (Zahra and George, 2000; Hamida, 2013; Camisón and Forés, 2010). It is for this reason that companies in certain sectors are more susceptible to developing abilities, to knowledge flows, technological advances and, consequently, the capacity for absorption, and that may depend, among other factors, upon the degree of concentration in the sector (Kedia and Bhagat, 1988; Newey and Shulman, 2004).

Zahra and George (2000) performed a review and reconceptualization of the concept of absorptive capacity that differed from the traditional concept of Cohen and Levinthal. According to the authors, absorptive capacity is a dynamic capacity embedded in a firm's routine and processes, which promotes organizational change and evolution. The authors also argued that established absorptive capacity had four dimensions, which they grouped in two main categories: 1) potential capacities, which may be translated in knowledge acquisition and assimilation and, 2) realized capacities, which represent transformation and exploitation of knowledge.

The concept takes into account a new determinant and a new perspective regarding the development of corporate competitiveness. It stresses knowledge, which is equivalent to a firm's experience, and it is important for developing absorptive capacity, but the authors highlight other points, and argue that external knowledge sources

and complementary external knowledge are equally important.

In other words, if for a firm scientific and industrial knowledge is important for driving technological change, then the firm needs to be able to develop both types of capacities. Probably, a firm with a good level of scientific absorptive capacity will be better able to exploit the knowledge from other firm agents.

This paper intends to contribute to the debate on innovation policies, assessing the indirect impacts of an important program, the NITEC program. This program is a Portuguese initiative in innovation for the SME and, at the same time, initiates a new modality of public intervention, supported by international partnerships.

4. HYPOTHESES

The above discussion supports the formulation of two hypotheses concerning the nature of knowledge on innovation programs directed at Portuguese SMEs. In general, the NITEC program achieved its main objectives and it exceeded earlier expectations of the project. Knowledge transfer can be the basis for the generation of new products and knowledge confirming the argument by Zahra and George (2000) about absorptive capacity.

The previous assumptions are the fundaments for the proposed model and produced two hypotheses:

Hypotheses 1: The objectives of an innovation program may not be achieved, but they may cause unexpected results that are important for the increase in innovation capacity of the targeted agents.

Hypotheses 2: The increase in absorptive capacity of the agent can produce impacts that are more important than the programmed innovation itself.

Our hypotheses were used in a two phased approach. First, we focus on the conditions that the NITEC program influenced previously in order to orient the firms. Second, we addressed the conditions associated with absorptive capacity that depends on the knowledge transfer variable.

5. METHODOLOGY

In order to empirically analyse how companies are changing their innovation activities, in this study we chose a multiple case study approach, as this is particularly appropriate for studying complex acquisition knowledge (Eisenhardt, 1989; Yin 2013). The case study methodology responds to the need to explore a complex reality and the partners' behavioural patterns in the process of building the partnership.

There are considerable instances in the use of case study to determine the impact of technology development programs (Bozeman and Klein 1999). These studies can give an indication not only of the extent of program success or failure but the reasons for success or failure. A case study can also serve to document success to stakeholders and funding agents, and it provides a sense of context and richness of detail that exceeds virtually every other approach to analysis (Eisenhardt 1989; Bozeman and Klein, 1999; Youtie et al. 1999; Yin 2013).

As part of each company case study, we compiled a detailed background analysis, through a semi-structured interview guide. The evaluation conducted nine face-to-face interviews with executives of enterprises that participated in the NITEC program. The data was collected during the end of 2012 and the beginning of 2013, and involved interviews to the Head Manager of Innovation of the enterprise.

The interview guide was produced on the basis of the BETA evaluation methodology (Bach, 2002). It was elaborated to capture the impacts of NITEC, and according to the following variables: 1. Network capacity in R&D; 2. Business affairs; 3. Organizational capacity; 4. Exchange capacity; 5. Capacity building in S&T; 6. Human resources and capacity building.

Considering the nature of the program and as an ex post evaluation, we consider that there was a minimum time lag for the effects to take place, which was at least five to six years. This is so because after this period, a new and more complete perspective concerning the knowledge impact of the project would probably have emerged. It reflects the relevance of evaluating the program after a long time.

6. RESULTS

The high degree of positive externalities is related to NITEC vocation to be a technological capability program with an important inducement potential inside and outside enterprises. The empirical observation that indirect impacts exists ratifies criticism of the linear model of innovation, since this model does not consider and not allow for those effects (Borrás and Fagerberg, 2011). This model gives theoretical support to most of the ex ante evaluation analysis done by firms and laboratories (Georghiou, 1998). In this case, the effects are expected to result from the project's initial objectives. However, the indirect impacts, i.e. knowledge acquisition and networking are much more frequent as a result in this program, which means that there are results that were not expected from the project's initial objectives. All the enterprises of the sample have strong indirect impacts. Table 1 shows the relationship between the variables that were addressed and operationalized in the interview guide.

In Table 1 the row labels are the variables that are categorized in five broad groups: transfer capacity, capacities in S&T, networking capacity in R&D, organizational capacity and visibility in commercial relations. The five groups were divided into others

subgroups, which reveals or measures the interpretation of the impacts of the NITEC program.

The percentages refer to the frequency of responses. The responses were inferred from the analysis of the interviews. The answers were classified according to the nature and subjective or perceived importance of the impact of the program on the relevant variable. In Table 1 there are three possible answers. “Not” means that the variable was not influenced when the firm introduced the project supported by NITEC. “Yes” means that the variable was influenced when the firm introduced the project supported by NITEC. “Doesn’t know” means that the influence on the variable cannot be linked to the NITEC programme.

According to Table 1, the variables that involves transfer capacity (learning, codified knowledge, dedication to reading, knowledge transfer, and codified knowledge transfer) were considered by 100% of all interviewee responses as being influenced by the programme. Overall, 82% of the answers confirm that Knowledge Transfer Capacity was influenced by the program. Other variables were also considered as being highly impacted by the programme. They include Visibility in Commercial Relations with 68% of answers acknowledging direct influence of the NITEC programme, Networking Capacity in R&D, with 83% of answers reporting influence directly to the NITEC, and Organizational Capacity, with 77% of answers asserting influence of the program.

This reinforces the idea argued above (Levinthal and Cohen, 1990; Lane and Lubatkin, 1998) that absorptive capacity is a key process in understanding practices among companies and their partners.

All firms and practitioners responded very positively, considering that the development phase of the project and the learning that occurred generated knowledge at the organizational level that increased the absorptive capacity of the organization, and the consequence of that process was not limited to the internal aspects of the firm, but it was reflected in the partnerships that the firm established at the technological, academic and commercial levels, thus establishing the grounds on which the network was formed.

It was expected that patent licensing, know-how or technical assistance contracts would transfer new knowledge created by the project. However, this was not a very frequent form of technological transfer between enterprises and theirs partners. Most of it happened outside these contractual arrangements. It means that the indirect impacts exceeded the border area provided in the NITEC.

Table 1: Summary of the descriptive of the variables used in the study.

Count of Respostas	Column Labels			
Row Labels	Not	Doesn't know	Yes	Grand Total
Transfer Capacity	18%	0%	82%	100%
Knowledge absorption	11%	0%	89%	100%
Learning	0%	0%	100%	100%
Codified knowledge	0%	0%	100%	100%
Tacit knowledge	25%	0%	75%	100%
Dedication to reading	0%	0%	100%	100%
Participation in conferences	22%	0%	78%	100%
Scientific production	44%	0%	56%	100%
Patents	78%	0%	22%	100%
Knowledge transfer	0%	0%	100%	100%
Codified knowledge transfer	0%	0%	100%	100%
Capacities in S&T	21%	0%	79%	100%
Equipment installations	11%	0%	89%	100%
Interdisciplinary	56%	0%	44%	100%
Change in the managment method	11%	0%	89%	100%
Organizational changes	11%	0%	89%	100%
Level to integrators	22%	0%	78%	100%
New managment method	11%	0%	89%	100%
New quality method	29%	0%	71%	100%
Networking capacity in R&D	11%	0%	89%	100%
Reliability	0%	0%	100%	100%
Meetings	11%	0%	89%	100%
know-who	100%	0%	0%	100%
New partners	13%	0%	88%	100%
Sharing equipments	0%	0%	100%	100%
Organizational capacity	23%	0%	77%	100%
Interdisciplinary	44%	0%	56%	100%
Layout change	22%	0%	78%	100%
Change in the managment method	22%	0%	78%	100%
Change quality method	29%	0%	71%	100%
Organizational changes	11%	0%	89%	100%
Level to integrators	11%	0%	89%	100%
Polyvalence	22%	0%	78%	100%
Visibility commercial relations	29%	2%	68%	100%
Commercial relations	13%	13%	75%	100%
New financial sources	57%	0%	43%	100%
New suppliers	56%	0%	44%	100%
New markets	11%	0%	89%	100%
Reputation	13%	0%	88%	100%
Grand Total	21%	0%	79%	100%

The most frequent indirect impact is on Transfer Capacity, a proxy for knowledge transfer, revealing its importance for program evaluation and policy-making. All the evaluated enterprises had this kind of impact. The concentration of technological transfer effects for enterprises indicates that it was by means of a free and informal process of transfer of product and process technology to suppliers that it appropriated the gains of innovation. The external actors (academic, commercial and technological) capitalized these gains by launching new products or new services into the market, and in the form of scientific publications. The technological transfer procedure is known as spill-over in the economic literature.

These results validate and confirm the hypotheses 2, which argues that the increase in absorptive capacity can make an impact more important than the programmed innovation itself. According to the authors Zahra and George (2000) what occurs within the firm is also important for the economy as a whole and recognize that the fundamental knowledge necessary to the firm's growth exists in its tacit form and is learned by experience, and this interaction forms the concept of absorption capacity.

Pavitt (2000) complements this idea arguing that the firm is an organization and the resources that it manages are the factors driving their growth. Management resources are specific and on them are deposited the knowledge and the experience, with emphasis on

information, on the network, on the tacit knowledge and the know-how.

Hypotheses 1 cannot be totally validated, since the main objectives of the program were achieved. On the other hand, the program created results that exceeded its objectives, meaning that there was an involuntary transfer of ideas and techniques. This occurred because the program assumed a central role in endogenous processes, although this aspect was a main objective of NITEC. In any case, the NITEC program contributed to increase the focus on technology development capabilities, even if innovation actually did not, or would not, materialize. The main purpose of the program was to create the ability to deal with them.

Table 2 presents a second set of results concerning the above mentioned variables that attempt to measure the intensity of the indirect impacts of innovation programmes. Table 2 focus the attention on the new partners and the technology transfer specifically concerned to exploit the knowledge generated by NITEC.

Table 2: New partners and technology transfer to specifically exploit the knowledge generated by the programme NITEC.

Count of Answers	Column Lab					
Row Labels	Increased	Indiferent	Indirect 1	Indirect 2	Indirect 3	Grand Total
Transfer Capacity	-	-	-	100%	-	100%
Tacit Knowledge	-	-	-	100%	-	100%
Capacidade em C&T	-	-	-	-	100%	100%
New quality method	-	-	-	-	100%	100%
Networking capacity in R&D	40%	40%	10%	-	10%	100%
Reliability	-	-	100%	-	-	100%
know-who	50%	50%	-	-	-	100%
New partners	-	-	-	-	100%	100%
Organizational capacity	-	-	-	-	100%	100%
Change quality method	-	-	-	-	100%	100%
Visibility commercial relations	-	-	-	-	100%	100%
Commercial relations	-	-	-	-	100%	100%
New financial sources	-	-	-	-	100%	100%
Reputation	-	-	-	-	100%	100%
Grand Total	21,05%	21,05%	5,26%	5,26%	47,37%	100,00%

In this table there are five possible answers: “Increased” means that the capability to be on networks increased after the termination of the NITEC program. ”Indifferent” means that the capability to be integrated in networks neither increased nor decreased after the termination of the NITEC program. “Indirect 1” means that the relationships between partners that already existed prior to the NITEC program have strengthened due to indirect impacts from NITEC. ”Indirect 2” indicates instances where the partners were the biggest beneficiaries of the impacts. “Indirect 3” means that the impact was not directly related to the NITEC programme, but it contributed to the development of other tools and operations.

In table 2, we emphasize the commercial effects, which were very important, especially for the Information Technology sector. They occur because the execution of the project allowed better knowledge on commercial partners and increased competition. In general, these effects arose from modifications introduced in some high technology equipment or the implantation of a Quality Management System to standardize the service. In this case, the NITEC contributed to increase the commercial partnership. The commercial effects were an important outcome. They were related to the interactive learning that happened with suppliers even when they were not directly involved in the project.

2. CONCLUSIONS

The NITEC was a very large program that ended six years before the beginning of this evaluation study, namely in 2006. The assessment of the indirect impacts of NITEC involved a great methodological challenge and required a considerable effort for in terms of conceptualization and data collection.

The results offer valuable information regarding the innovation process in Portugal at the time. The study gave a real idea of what indirect outcomes of a large technological program are, a relatively under researched and previously unknown terrain, and confirms the magnitude of the importance of indirect impacts, in particular those related to knowledge transfer, and the need to consider them in future evaluations. This first study offers the opportunity of providing inputs to similar evaluation studies of other large technological programs in Portugal, enlarging the knowledge base about the efficiency of these public policy tools.

The study case methodology gave the opportunity of recognizing more accurately the nature of knowledge acquisition in the context of NITEC. We identified clearly the importance to have a fully dedicated team to technological and other innovation activities inside the enterprise that contribute meaningfully to the total effects of the innovation process within the firm. It confirmed our hypotheses that the increase in absorptive capacity had more impact than the innovation project itself.

The second observation is in relation to the hypotheses 2 and highlights the relevance of the learning process accomplished during the project. The resulting effects are not usually quantified or identified by traditional evaluation methodologies. The case study enabled to identify a special commercial effect originating in the relationship with suppliers.

Our study also revealed that national and international universities and technological institutes were important partners in the program, and they provided significant impacts, displaying a positive and articulate capability to help the Portuguese enterprises.

The study revealed that the NITEC program generated important externalities. It was relevant to clarify the link between absorptive capacity and indirect impact. The

case study allowed us to describe the type of indirect impact generated by a technological program.

A limitation of the study was the impossibility to make a survey to research the 150 companies, because of resource constrains and also because some of those who worked in the firms during the implementation of the NITEC programme had moved to another firm, and it was impossible to obtain data on the program. In other cases, the company closed or did not have the NITEC department in the company.

This paper contributes to the discussion about the mechanisms that would contribute to the evaluating process. In future work it would be important to have a comparative approach, researching the modes of technological learning of firms in other similar programs, and to capture the most important indirect impacts and establishing, in a more general framework, their main determinants.

7. REFERENCES

Bach, L. (2002) Bureau d'économie théorique et appliquée - BETA methodology. University of Strasbourg/CNRS, France.

Bojica, A.M. and Fuentes, M.D.M.F. (2012) Knowledge acquisition and corporate entrepreneurship: Insights from Spanish SMEs in the ICT sector. Journal of World Business, Vol 47 , No. 3, pp.397-408.

Borrás S. and Fagerberg, J.. E.C. (2011) Introduction to special issue on learning, innovation systems and policy in honour of Bengt-Åke Lundvall. Science and Public Policy, Vol 38, No. 9, pp.666–668.

Bozeman, B. and Klein, H.K. (1999) The case study as research heuristic: lessons from the R&D value mapping project. Evaluation and Program Planning, Vol. 22, No. 1, pp.91–103.

Camisón, C. and Forés, B. (2010) Knowledge absorptive capacity: New insights for its conceptualization and measurement. Journal of Business Research, Vol. 63, No. 7, pp.707–715.

Cohen, W.M. and Levinthal, D.A. (2000) Absorptive Capacity: A New Perspective on Learning and Innovation. Chapter 3. pp. 39–67.

Eisenhardt, K.M. (1989) Building Theories from Case Study Research. The Academy of Management Review, Vol. 14, No. 4, p.532-550.

European Commission (2005) Evaluation EU Expenditures Programmes: A Guide to Ex Post and Intermediate Evaluation. , (May), pp.1–15.

Georghiou, L. (1998) Issues in the Evaluation of Innovation and Technology Policy. OECD, Vol.4, No. 1, pp.37–51.

Georghiou, L., Rigby, J. and Cameron, H. (2002) Assessing the Socio-economic Impacts of the Framework Programme. Policy Research in Engineering Science and Technology PREST, University of Manchester, England.

Georghiou, L. and Roessner, D. (2000) Evaluating technology programs: tools and methods. Research Policy, Vol. 29, No.5, pp.657–678.

Godinho, M.M. and Simões, V.C. (2013) ERAWATCH Country Reports 2011 :Portugal. Luxembourg

Hamida, L. (2013) Are there regional spillovers from FDI in the Swiss manufacturing industry? International Business Review, Vol. 22, No. 4, pp.754–769.

Kedia, B.L. and Bhagat, R.S. (1988) Cultural Constraints on Transfer of Technology Across Nations: Implications for Research in International and Comparative Management. Academy of Management Review, Vol.13, No. 4, pp.559–571.

Lane, P.J. and Lubatkin, M. (1998) Relative Absorpitve Capacity and Interorganizational Learning, Vol. 19, pp.461–477.

Levinthal, D. and Cohen, J. (1990) Absorptive Capacity. A New Perspective On Learning And Innovation, Vol. 35, pp.128–153.

Lundvall, B. and Borrás, S. (2005) Science, Technology, and Innovation Policy. In R. R. Fagerberg, Mowery, D. C. and Nelson, ed. The Oxford Handbook of Innovation. Oxford: Oxford University, pp. 599–631.

Newey, L. and Shulman, A. (2004) Systemic absorptive capacity: creating early-to-market returns through R&D alliances. R&D Management, Vol. 34, pp.495–504.

Papaconstantinou, G. and Polt, W. (1997) Policy Evaluation in Innovation and Technology : An overviiew by. In pp. 9 -14.

Pavitt, k. (2001) Can the large penrosian firm cope with the dynamics of technology? Science and technology policy research: eletronic working paper series. No. 68, p. 1-18.

Portaria n.o 441/2003, Ministério das Finanças e da Economia.(2003) Regulamento de execução do sistema de incentivos à criação de núcleos de investigação e desenvolvimento tecnológico no sector empresarial. Lisboa.

Smith, K. (2006) Measuring Innovation. In J. Fagerberg, D. Mowery, & R. Nelson, eds. The Oxford Handbook of Innovation. USA: Oxford University, p. pp.148.

Yin, R.K. (2013) Case Study Research: Design and Methods 5a ed., London: SAGE Publications.

Youtie, J., Bozeman, B. and Shapira, P. (1999) Using an evaluability assessment to select methods for evaluating state technology development programs: the case of the Georgia Research Alliance. Evaluation and Program Planning, Vol. 22, No. 1, pp.55–64.

Zahra, S.A. and George, G. (2000) Absorptive capacity: a review and reconceptualization. Academy of Management Proceedings & Membership Directory, Vol. 8, pp.K1–K6.