

Drivers of Innovation in the Portuguese Firms

ABSTRACT:

In the present days, innovation assumes a key role in providing the conditions for economic competitiveness. Organisations face additional challenges in order to achieve their aims and to respond to the environmental changes. These challenges include the adaptation of entrepreneurial activities to multiple environmental pressures and to the rapid changes taking places in the societies these organizations operate.

It's widely accepted that innovation plays a major role in enterprises, as far as economic and financial performance is concerned. However, several firms face important financial constraints that hinder them from engaging in real projects. To that extent, there is a very close and obvious relationship between finance and the entrepreneurial capacity to enter R&D projects.

Decision-making processes are characterised by purposeful coordination of interrelated activities of pre-decision, decision and post-decision stages. Exploring the firms' decision making regarding R&D projects seems to be very relevant in the context of understanding the constraints to the motivation of entrepreneurial innovation and to evaluate in a concise manner what are the factors that play a role in the process.

The study presented in this paper aims at identifying the mechanisms underlying the entrepreneurial process of decision making on innovation. We propose a conceptual framework based upon five innovation-related dimensions: obstacles, sources; co-operation; funding; and the impact on the business performance.

The results were built upon data from a sample of 36 firms which have submitted projects to the Portuguese Agency for Innovation, via the administration of questionnaires. The data was submitted to a number of statistical procedures and resulted in the findings presented in this paper. Among these statistical procedures, a discriminant analysis was useful in determining groups of firms with similar characteristics related to innovation, combined with a set of simple statistical measures.

The results suggest that firms are motivated to enter R&D projects by financial reasons. It was found that increasing profit levels, decreasing costs of production and commercialization, and decreasing costs association with energy and materials are among the most important reasons to innovate. This can be obviously explained by the continuous sought for increasing profit margins on production by entrepreneurs. Regarding the sources of information, suppliers and internal human resources seems to be a key player on the establishment of successful R&D projects. There is also a very important role played by the European Union, and a less important role played by the Portuguese authorities. However, despite the importance of R&D processes in local and regional economies, local and regional institutional actors do not provide funding for financing R&D projects. This paper has identified that there is an important opportunity for regional governments in guaranteeing the conditions for entrepreneurial innovation in Portugal.

The urgent introduction of innovation is a strategic imperative for increasing the competitiveness not only of firms, but also of the country itself. In this context, the various players and institutions with specific responsibilities in this area must be coordinated in a way to create a system that is favours the environment needed for the development of genuine innovation practices. This is particularly relevant in so far as the analysis we have just begun also led to the conclusion that most firms are either not very well informed of the innovation development support programmes or they do not know how to access these programmes. Furthermore, it became clear that most firms do not have accurate information about the different institutions operating within the national system; about how they operate within the system and about how they can obtain their services.

Keywords: Entrepreneurial Innovation, Portuguese SMEs, Decision making processes

1. Introduction

The capacity to innovate is widely recognised one of the main aspects of competitive advantage. In order to meet the market demands, organisations face the increased challenge of constantly adapting their activities to the multiple market pressures and to the continuous change Bouchikhi Kimberly (2001)

agree that firms need to innovate in order to survive. Therefore, innovation is seen as the best strategy to guarantee the firm's continuity (Porter, 1990)

The role of innovation in triggering economic development deserves common acceptance. This discussion has been initiated long time ago, back in the 20th century, when Joseph Schumpeter has recognised in his publications the role of innovation in the performance of both firms and the economy.

Over thirty years ago Freeman (1975: p. 19) argued that innovation represents for some an opportunity – an attractive 'adventure', while, for others it is seen as a threat. Despite its dual contribution to firms, one cannot ignore the impact of innovation in every-day life, neither the social, economical, and moral issues it raises. One can argue against or in support of innovation, but one cannot ignore it.

Nowadays, the importance of innovation as a fundamental factor in entrepreneurial competitiveness is increasingly considered by researchers, who recognize that innovation capacity is the main competitive advantage and that it can improve the competitive advantage of firms in the markets they operate (e.g. Dacorso, 2000, Kaufmann & Tödting, 2001; Dantas, 2001; Tidd *et al*, 2005; Marques, 2006; Sarkar, 2007; Gupta, 2008).

This increased search for innovation is, according to Clark & Wheelwright (1993) a result of a global process due to the growing competition in international markets, the diversification of consumers' demands, and of the increasing availability of technology for innovation in both products and production processes.

In this context, Nayak (1991) points out the importance of product innovation for the growth of profits, demonstrating that the product portfolio management is fundamental for the firms' competitiveness. However, innovation based activities, (R&D, marketing, and data collection on technologies) are expensive because they imply direct costs, and opportunity costs (due to the allocation of resources that could be used in productive activities otherwise) (Marques, 2006). There are a large number of firms that face importance financial constraints which hinder them from engaging in real and profitable projects. Thus there is a clear and very close relationship between finance and the entrepreneurial capacity to enter R&D projects.

Despite the existing obstacles, the introduction of innovation in business is a strategic imperative in order to increase competitiveness, not only in firms but also in the whole economy. Innovation represents a very important role in firms in what concerns both the financial and economic performance and the economic and financial ratios, which provide an important input for the process of decision making.

In line with these theoretical contributions, several studies have been conducted within entrepreneurial strategy in order to understand in which way innovation processes develop. Authors such as Prahalad & Hamel (1990); Ansoff (1993); Kotler (1997); Schewe & Hiam (1998); Grant (1998); Porter (1998); Aaker (1998 a and b); Engel *et al.* (2000); and Gupta (2008) have demonstrated that the future of organizations depends on the success of innovations. However innovation implies investments with no-guarantee return because there is a high probability of failure associated.

In this context, the different actors and institutions must develop coordinated action in order to create a system that favours an environment that supports the genuine practice of innovation. This is particularly relevant for the analysis we have developed, which has also led to the conclusion that most firms are now well informed about innovation development supporting programmes, or they do not know how to access to these programmes (Braga *et al*, 2009).

Furthermore, it has emerged from this research the clear idea that most firms do not have the necessary information about the different institutions operating in the national system at the innovation supporting level. They also lack information about how these institutions work or how to access to their services.

Heerkens (2006) argues that an innovator faces, very often, decisions and choices. Therefore, the concepts of innovation and decision are narrowly linked, and this association has been studied over the last years by several authors (e.g. Vossen & Nooteboom, 1996; Dacorso, 2000; Kleinknecht & Mohnen, 2002; Kessler, 2004; Heerkens, 2006). We hope that this research contributes with an analysis of the fundamental factors on the determinants of innovation decision making processes. In light with this aim, the research has developed around a number of questions: (i) what factors contribute to the process of decision making in Portuguese firms involved in innovation processes? (ii) How do Portuguese entrepreneurs appreciate the role of economic and financial ratios in the decision making process? (iii) what are the obstacles to the entrepreneurial process of innovation? (iv) which are the relevant sources of information to support innovation decision making; (v) what is the nature of co-operation for innovation; and (vi) which funding sources are available to support entrepreneurial innovation?

This research has used a questionnaire developed by the authors, based on the Community Innovation Survey (CIS) and the data was collected from entrepreneurs or managers of firms which have applied to the Portuguese Innovation Agency programmes. This study is organised as follows: section 2 presents the theoretical framework on which the questionnaire has been based; the third section presents the methodology; and section four presents the results.

2. The Decision Making Process in Entrepreneurial Innovation

The innovation process as been studies over the last decades, but only recently a full understanding of this complex phenomenon has been achieved, including the different factors tat can affect the direction, velocity and characteristics of innovation. The scientific literature is unanimous in considering that innovation is divided between strategy and the economic and financial motives. This study is mainly based on the financial and economical motives and therefore it aims at identifying which financial ratios mostly influence the decision making process in innovation. It also seeks to identify which of these ratios are most commonly used by firms to take their innovation decisions.

2.1 Innovation: The Concept

Over the last years there has been a growing interest around the concept of innovation. The word innovation has been increasingly used, both in business and in the academia, to the point that the term has been adopted in modern societies and it is now part of the common vocabulary. Any individual, organisation or institution would suggest a unique definition for innovation, depending on its past experience. Therefore, it is very difficult to suggest a generally accepted definition of innovation, that is simple and precise and that can be applied to all situations, and to all research purposes (Rogers, 1998).

If one looks for the definition of innovation in a dictionary one will find it associated to change, revolution, novelty, or originality. Departing from the Etymological origin of the word innovation, the concept is associated to a process of renovation. Therefore, one can define the concept of innovation as the act of renewing, conceiving novelties or allowing the change. But is this the definition used in the diverse fields of knowledge in which the word innovation is actually used?

The literature on the subject ends up on the theories of Schumpeter, considered by many the mentor of the concept in economic theory. Schumpeter (1942) defined the concept according to two different aspects: (1) the implementation of equipment, purchased to another firm, in a new productive process; the sale of a new product (created by someone else) being no place for a innovative and creative effort; (2) the commercialization of new products or the implementation of new processes developed by the firm. He defines five types of innovation activities: (1) introduction of a new product or qualitative change in an existing product; (2) a new process of innovation in the industry; (3) the openness of a new market; (4) the development of new sources raw materials supply; and (5) organizational change.

Besides this definition of Schumpeter, there are other definitions used by different authors that one should mention. OECD (1980) considers innovation as the introduction of a new product or method of production, as much as the openness of a new market, or the improvement of existing products and processes. Tidd et al. (2005) refers that innovation is associated to technological change at two levels: innovation in products (change in the characteristics of the products the firm has to offer); and process innovation (changes in the creation and circuit of distribution. With similar proposes for the definition of innovation one can find a large number of other authors (e.g. Abernathy & Utterback, 1988; OCDE, 1992, 1997, Freire, 2000).

Engel et al. (2000) argue that innovation is any idea or product perceived by the potential consumer as a different one. Freire (2000) defines innovation as the process of creation and introduction of something new in the organisation or in the market. This is not a single act, but rather a global process that occurs along the time. It cannot be restricted to the introduction of new ideas, but it must also include its application, being this the main different between invention and innovation.

The confusion between invention and innovation is very common. However, several authors make a clear distinction between the two, such as Schumpeter (1934). According to him, the invention is the idea, draft or model for a product, process or system, new or improved, but which is not yet materialised in the market. Innovation only takes place when the product is actually introduced in the market. Rosegger (1986: p.9) adds that inventions do not produce technical or economical results. These are necessary but not sufficient for technological change. A large number of inventions never become innovations since they lack the materialisation of the idea and they are never introduced in the market. Freire (2000) also

refers to a utility perspective. In his point of view, the invention is independent of the use, while innovation presupposes the use of the invention in the internal or external context of the firm. Barata (1992) distinguishes the two concepts, considering that invention is the scientific development (or the empirical realisation) of something new, which is able to generate a new or improved product or process, allowing innovation.

OECD (1994) approaches innovation from a technological perspective. Thus, innovation is seen as a product with technological characteristics or with a use different from the previous. Innovation can be based on new technologies or derived from the use of new knowledge.

From the organisation perspective Tushman & Nadler (1997) define innovation as the creation of a product, service or process that is new for a business model, as long as it is efficient and requires the merger of market needs.

As one can see, it is common to find a wide range of innovation concepts in the literature, which hinders the emergence of a unified concept. This study considers innovation of products as the introduction of a new or improved product in what concerns its characteristics, technical specifications, software or other incorporated materials. Innovation has to be new for the firm, although it has not to be necessarily new to the market. It may have been developed within or outside the firm. Superficial changes and the sale of innovation created by other firms is not considered as innovation. The process of innovation corresponds to the adoption of new methods of production, or with a significant improvement, as much as the adoption of new supply and distribution methods. The result of the process of innovation must have an impact on the production or distribution of products and services; the quality or the costs of production. Innovation can be developed by the firm or externally, however, changes impacting solely on the organisational and management structure cannot be considered as innovation.

2.2 Innovation: Barriers, Sources, Co-operation and Funding

There are several factors acting as barriers for innovation to become a generalised practice in the Portuguese entrepreneurship context.

In this context, Therrien (2002) has verified that the two major impediments to innovation are inability to encourage staff to get involved in projects aiming to develop innovations on an on-going basis; and the production requirements and high costs of developing new or significantly improved products or processes.

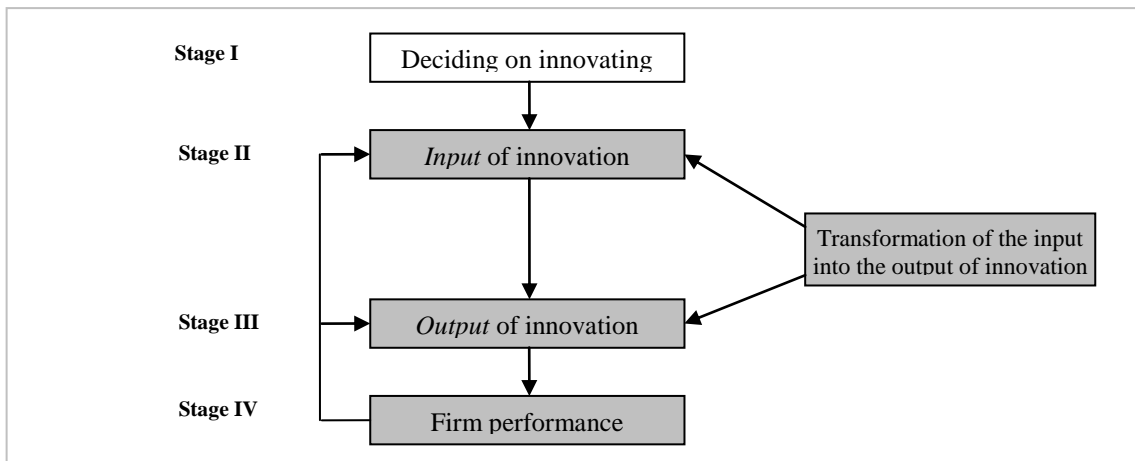
Dantas (2001) suggests that the main obstacles to innovation are mostly endogenous to the firms. Among these obstacles one can highlight the following: the size of firms and their endowment of productive resources (technological, financial and human); the concept of entrepreneurship among entrepreneurs (namely the importance of employees within the organisation, measures to support the creativity, and the necessity of organisational structures that provide an efficient support to innovate). Exogenous factors include the role of the governmental intervention (such as the educational system, and the national effort in R&D).

In our study, several barriers were considered as factors hindering innovation: economical factors (perception of excessive economic risks; high costs of innovation, lack of appropriate external funding sources); internal factors (internal organisation of the firm with low flexibility, lack of specialised labour, lack of information on technology and on the markets); other factors (regulation and norms, lack of openness of customers to innovation, small market size).

Despite the process of innovation being particularly demanding, firms do not have to act in isolation. They can (and should) take advantage of the available opportunities in the local environment that will possibly allow minimising risk and investment levels Dantas (2001) Thus, the firm can search for information available to support the development of their projects, i.e. it can use a number of sources of innovation. Most authors divide the sources of innovation in internal and external (Freire, 2000; Dantas, 2001).

The process of innovation goes through a number of stages, which are equally important for the success of innovation itself. The figure below shows these stages.

Figure 1 Stages of the innovation process



Source: Marques (2006), pp.7

In this study, despite the internal (within the firm or within the group) and external sources (customers, suppliers, competitors) of innovation we have sought to enquire companies about other institutions (universities or other institutions of higher education, government laboratories, R&D centres, or private and public non-profit organisations), or other sources of innovation (such as conferences, professional and scientific congresses, exhibitions, consulting firms).

In order to put forward research projects, different institutions are, more often, led to engage in co-operative relationships, given the increasing business competition (even at an international level) and the rising costs of research in most industries. According to Tidd, Bessant and (2005) there is not an optimal type of co-operation. In fact, the technological characteristics of the market decrease the number of options available. In light with these arguments, our purpose was to investigate whether Portuguese SMEs use co-operative mechanisms towards innovation projects and to learn about the importance that research partners in engaging in joint innovation related projects (e.g. other companies within the same group, suppliers, customers, competitors, consulting firms, universities and other high education institutions, governmental laboratories, R&C centres, non-profit private organizations, and R&D firms). In order to support their innovation activities, firms use some forms of public funding from: local and regional authorities, government, or the European Union.

3. Methodology

3.1. Data

Access to the population (for the purpose of this study) was done through the Portuguese Innovation Agency, and it considered all the firms taking part in innovation projects. The total number of firms amounts to 98. Given the limited number of firms, it was decided to include the whole population in the study, although some were not included because they had close down meanwhile or their addresses could not be found in the time frame. The sample was stratified by the number of workers (size), location and sector.

Data was gathered through questionnaires sent to 96 firms, from which a response was received from 36 firms, corresponding to a response rate of 37,5%.

Table 1 Research characteristics

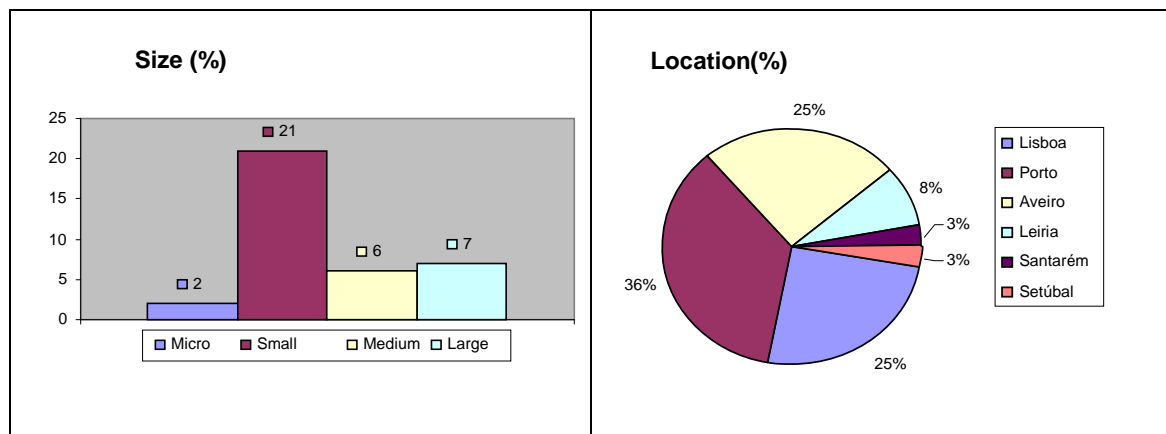
Industry	Manufacturing
Population	116 firms
Inquired	96 firms
Respondents	36 (Response rate: 37,5%)
Type of questions	Closed questions using a Likert scale.
Method of data collection	Questionnaire sent by mail and by e-mail
Statistical methods	Factorial analysis of principal components; Linear Regression model
Data analysis software	SPSS 16.0

The Figure below shows how the sample was distributed in terms of size and location and the table provides an indication of the firm distribution by industry.

Table2 Characterisation of the sample

		Sector	
Textiles	2,8	Large retailers	11,1
Chemicals and oil production	22,2	Transports, travelling and tourism	11,1
Equipment machinery	25,0	Telecommunications and post	2,8
Medical equipment	13,9	Other services activities	11,1

Figure 2 Sample Characterisation (size and location)



Source: Elaborated by the authors

The table shows that most of firms are small organisations and are located in Lisboa, Porto or Aveiro. Not surprisingly, about half of the firms operate in the chemicals or equipment industry, where innovation seems to play a larger role than in other sectors. Despite the fact that innovation can take place in any sector of activity, some of them are more open to innovation, or at least take advantage of innovation support programmes more actively. These are probably sectors in which innovation plays a more important role in terms of competition and competitiveness.

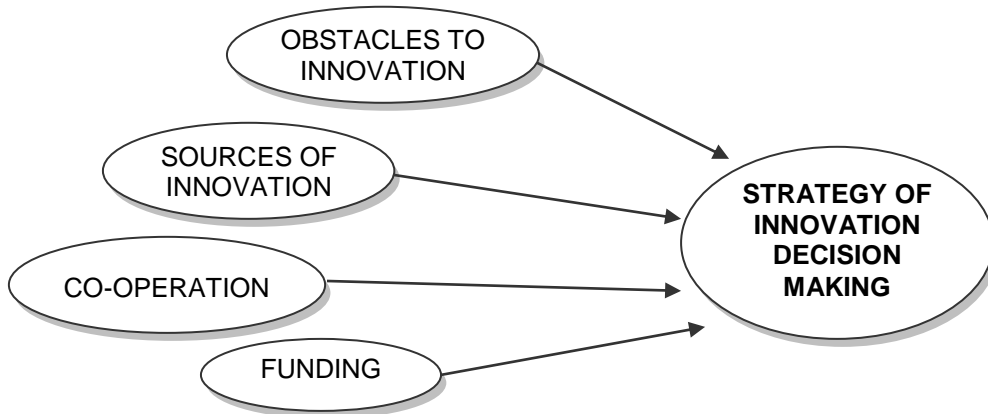
3.2. Investigation Model and Research Hypothesis

This study aims at providing a theoretical and empirical analysis of the importance of the decision making process in entrepreneurial innovation, considering the role of economical and financial ratios used in such decision making process. In order to do that, a conceptual model was used, in order to attain the objectives of this research.

In light with the literature review, one can safely state that the entrepreneurial decision making regarding innovation is influenced by a set of factors of economical and financial order. The studies described in

sections 2.1 and 2.2 resulted in a research model with the following dimensions: (i) Obstacles; (2) Sources of innovation; (iii) Co-operation; (iv) Innovation funding; (v) the strategy of innovation decision making. In this context, the conceptual model that has based the empirical study is shown in Figure 1, below.

Figure 3 Research model

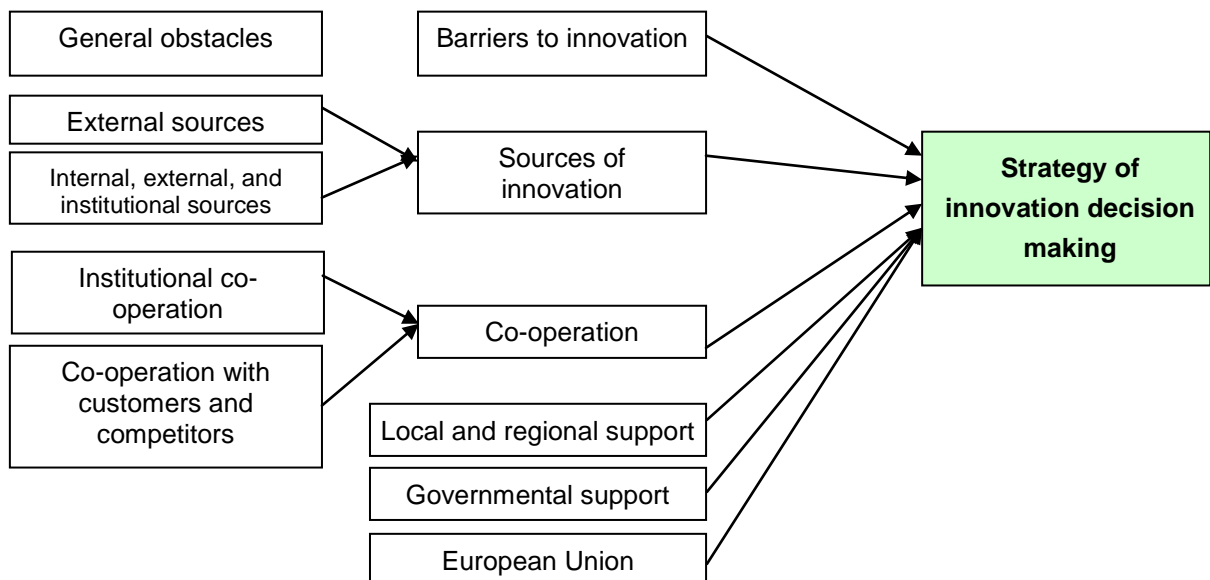


4. Results of the study

In order to identify the factors that influence the innovation strategy of firms, we have used a factorial analysis of the items contained in the questionnaire. The aim of applying this statistical technique was to obtain a small number of factors that can be used to identify the structural relationships between the innovation strategies defined by firms and the barriers to innovation, sources of innovation, co-operation and funding.

The results of the factorial analysis can be found in Fig. 2.

Figure 4 Empirical Model: Results of factorial analysis



The data was analysed with factorial analysis resulting in the three groups shown in the table below. Although initially the factorial analysis provided four different groups, one of them has shown to be statistically non significant.

Table 3 Motivations for the deciding to innovate.

	Strategies in decision making (β_s)		
	Profit and social impact	New markets, Operational costs reduction	New products and staff costs reduction
<i>Obstacles</i>	- 0,317*	----	0,178
<i>Sources</i>			
External	- 0,370**	----	0,355*
Internal, external and Institutional	0,165	----	0,499*
<i>Co-operation</i>			
Institutional	- 0,059	----	0,212
Customers and competitors	0,026	----	-0,599*
<i>Funding</i>			
Regional	---	----	----
National	- 0,613**	----	0,894*
European	0,647**	----	- 0,193
Constant	0,106	----	- 0,304
R(0,931),	0,845	0,362	0,901
R ² (0,866)	0,616	0,131	0,692
R ² Adjusted (0,854)	0,569	- 0,087	0,665

* Significant at 1%; ** significant at 5%; *** significant at 10%;

The table shows that there are important differences in the approach to innovation processes by the different type of groups. The sample was divided into 3 groups. Each of these groups is driven by different motivations to enter innovation-related programmes: Group I engages in innovation projects in order to increase profit or to cause a social impact; Group II seeks new markets and to reduce operational costs through innovation; and group III aims at discovering new products and the reduction of employment costs. In this section we will present a brief description of the motivations for each group.

The firms that seek new markets and operational costs reduction also prefer to use internal capital to fund their innovation. However, if they would consider accessing to external funding as a way to engage innovation projects, they would prefer European support programmes rather than relying on regional or national governments (or institutions as sources of funding). Despite presenting the results for this group they are only indicative. There is no statistical significant to support the conclusions obtained to this group, given the statistics of the model.

Group III sees the reduction of staff costs or the introduction of new products as the ultimate aim of innovation. These firms prefer external of institutional sources of funding to using internal capital. As much as in the previous group, these firms also prefer to fund innovation by accessing to European sources.

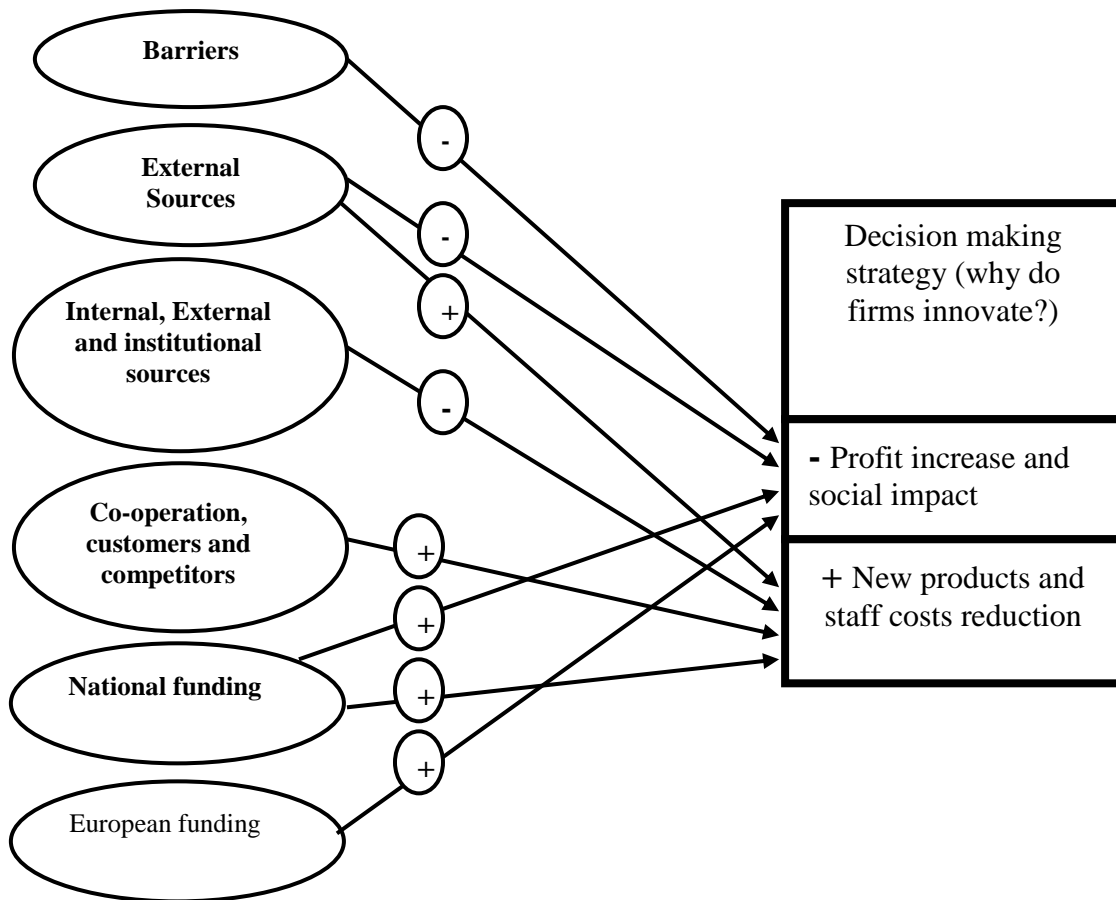
Innovation is seen by most firms as a way to reduce costs: production and commercialisation and energy costs. However, as expected profit is on the top of the motivations, supporting the argument that entrepreneurs are ultimately motivated by profits.

Despite the fact that the Portuguese entrepreneurship is mostly constituted by small scale firms, our sample contained a number of large firms. However, no differences were found in terms of the size of the firm, and therefore, the results presented in this paper represent the Portuguese firms, regardless of their size.

5. Conclusions

This study has shown that Portuguese entrepreneurs foresee different motivations to engage innovation projects. The decision making is a central process previous to the actual process of innovation and determines the characteristics of the innovation process

Figure 5: Empirical Model



Firms are motivated by different financial aspects when they enter innovation processes, as well as they seek different objectives. Although some of them recognise the importance of innovation for the business to the extent that they use internal funding, others only enter external funding innovation programmes.

It can be widely accepted that firms recognise in the EU a reliable source of funding for innovation, preferring this source in detriment of national programmes.

As it would be expected, the ultimate aim of innovation is the profits increase. The responses have been very clear in supporting this argument. However, other motives have also been pointed out such as costs reduction, and the improvement of the quality of their products. Therefore, one can claim that the financial results are on the top list of the motivations that lead entrepreneurs to innovate.

This study has analysed the role of different forms of funding in determining the financial reasons for innovation. However, different institutions provide similar innovation supporting funding, making available different types of information. To that extent, the quality and quantity of information provided by the institutions funding innovation can be very important in the study of why firms prefer some institutions in detriment of others.

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