

# **New Technology-Based Firms creation and growth: the case of the Basque Country**

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## **Abstract**

The innovative capacity of a region, and more accurately, of companies operating in that region, is a key determinant of its capability to enhance the economic development and to upgrade the standard of living of the region. It is widely accepted that one of the indicators of this innovative capacity is the rate of creation of New Technology-Based firms (NTBF). That's why in the last years the necessity has arisen frequently to study in detail the processes of creation and growth of NTBF given their influence in the regional development.

This investigation is a spin-off from a project on New Technology-Based Firms (NTBF) and the role of existing Supporting Institutions in the Basque Country -an autonomous region in the North of Spain- driven by the Knowledge Cluster. The main objective of the project is to deepen in the knowledge of the processes of creation and growth of NTBF in the Basque Country.

The paper reports first findings from a survey of a sample, in the one hand, of New Technology-Based firms, and of Supporting institutions existing in the Basque country- an autonomous region located in the north of Spain- in the other hand. The purpose of this paper is to discuss data concerning to main difficulties and barriers that NTBF face in their development process and at the same time we will discuss the role that supporting institutions are playing in the process. Therefore, the purpose of this paper is to map the situation first, of the Supporting institutions and second, of difficulties and barriers that actually NTBF face, in order to foster a discussion addressing the role that supporting institutions should play in the future to reduce barriers to new enterprise creation and improve general capability of transforming good ideas into viable firms.

*Theme preference:* entrepreneurship, regional development, NTBF, innovation.

## Introduction

The nurturing of small firm formation and growth has become increasingly important to the health of developed economies in general, and to the creation of new innovative industrial sectors in particular. For instance, the Basque Government, in its Science and Technology plan (2001-2004) pointed at the importance of developing more knowledge based industries and improving the capability of creating more technology-based firms. However, it is recognized that the number of New Technology-Based Firms (NTBF) created in this period of time has not met the expected objectives<sup>1</sup>.

The paper reports first findings from a survey of a sample, in the on hand, of New Technology-Based firms, and of Supporting institutions existing in the Basque country- an autonomous region located in the north of Spain- in the other hand. The purpose of this paper is to discuss data concerning to main difficulties and barriers that NTBF face in their development process and at the same time we will discuss the role that supporting institutions are playing in the process. Therefore, the purpose of this paper is to map the situation first, of the Supporting institutions and second, of difficulties and barriers that actually NTBF face, in order to foster a discussion addressing the role that supporting institutions should play in the future to reduce barriers to new enterprise creation and improve general capability of transforming good ideas into viable firms<sup>2 3</sup>.

With this aim, the paper breaks into five sections, including the current introductory section. Based on entrepreneurship literature, in particular literature on technology-based entrepreneurship and the formation and development processes of new firms (Oakey 1995 and Oakey (ed) several volumes). In section 2 the role of Supporting Institutions is discussed as well as the main activities or programs that those institutions might carry out in order to overcome main barriers that NTBF face in each stage of the development process. The third section goes on to provide a overlook of the Basque Supporting Institutions presenting the main conclusions reached in a survey of a sample of theses institutions. Section 4 presents the situation of NTBF in the Basque Country. Special attention is given to the main barriers and difficulties that firms face in the creation stage. The final section concludes by discussing initiatives, which might improve the general capability of the system of creating more and viable new ventures.

## The Stages of Growth of NTBF and the role of Supporting Institutions

In the innovation system literature, the institutions of special concern in the context of development process of NTBF are often characterised as intermediary institutions (Isaksen & Remoe 2001), i.e. their primary role is to mediate or serve as brokers between different actors and provide services in order to facilitate processes of innovation and new venture formation. Science parks, Business Innovation Centres (BIC) or incubators are typical examples of these institutions. Over the last 25 years a large number of different institutions have emerged in the Basque Country, and developing this institutional structure may be regarded as an important

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<sup>1</sup> According to the evaluation provided by the Technology Director of Basque Government in “Creación y gestión de Nuevas empresas de Base Tecnológica” edited by the Cluster of Knowledge in 2002.

<sup>2</sup> This paper is a spin-off from a project on “The role of Supporting Institutions in the New Technology-Based Firms formation and development” driven by the Knowledge Cluster of the Basque Country. The main objective of the project is to create knowledge on the role of supporting institutions on the process of creation and development of NTBF.

<sup>3</sup> See Appendix 1 for further information on the Knowledge Cluster.

part of recent innovation policy approaches. All these institutions determine the environment where NTBF operate.

The development process of NTBF can be seen a sequence of stages where entrepreneurs undergo from “initiative” to “successful development”. The stage approach is a way of capturing the element of time in the analysis. Its stage can be characterized by the challenges to the entrepreneur and the key environmental factor affecting the development of a venture. Although authors seem to disagree regarding the exact number of stages, most models hypothesise that firms start entrepreneurially and evolves towards professionally administered companies.

In the following section we will discuss the dominant problems in each stage of the development process and present different programs and activities that can be applied to solve them. Although there are different ways to formulate the formation and development process of a NTBF, we will work with a four-stage growth model (Kazanjian & Drazing 1990): Conception and development, Commercialization, Growth and Stability.

#### *Stage 1: Conception and development*

The primary focus of the entrepreneur is on the product development, the securing of adequate financial backing and the identification of market opportunities. Dominant problems of NTBF at this point include construction of a product prototype and selling of the business idea to investors. In this stage, there are many problems or barriers related to conception that reduce the chance for new ventures. Barriers related to:

- Lack of opportunities
- Lack of well qualified entrepreneurs
- Lack of entrepreneurial culture

The existence of the above mentioned problems is what it has taken to different Administrations and Governments worldwide to try to attack its causes, giving rise to activities or programs of the following type:

- Market oriented programs: market deregulation, government purchase programs that prioritize products of high technology, etc.
- Entrepreneurs-supply oriented programs: attraction of entrepreneurs of other regions or countries, creation of pleasant scientific environments to work in (i.e. technology parks...)
- Knowledge enhancement oriented programs: upgrading university capacity and Technological Centres, Supporting programs for the development of new industrial sectors based on emergent technologies, etc.
- Awareness and education programs: oriented to the diffusion of good practices and promotion of the entrepreneurship.

Developing the new idea includes writing a business plan that evaluates all aspects of the economic viability of the business venture including a description and analysis of the business prospects. The business plan is a document that serves simultaneously, like internal mechanism of validation of the feasibility of the project and as later instrument to search for external support (i.e. financial or technical support). In this stage the main difficulties that can arise are related, fundamentally, to the lack of management experience due to the scientific or technical profile of the entrepreneur (i.e. legislation, marketing, accounting, etc). Activities or programs that can help overcoming these problems are related to:

- Programs to advise and to guide the entrepreneur in the process of elaboration of the business plan
- Programs to facilitate the participation of external experts in the process
- Access to adequate financial resources like pre-seed and seed capital

### *Stage 2: Commercialization*

During the commercialization stage, the major focus of new ventures is on commercializing the product itself. The dominant problems at this point include acquiring adequate facilities, establishing a vendor network, and developing product support capability. All this ends at a series of typical problems as the following ones:

Some of the programs carried out by the different administrations are oriented to:

- Simplify proceedings for the creation of a new company
- Accessibility to different resources (financial and facilities) and services in advantageous conditions.
- Training entrepreneurs to enable them its new challenges
- Creating incubators which are organised in order to support and facilitate processes of enterprise creation

### *Stage 3: Growth*

The growth stage is characterized by high growth in both sales and employees. The major problems of the firm at this stage are to produce, sell, and distribute the product in volume while attaining profitability. Important barriers are related to the lack of financial resources to maintain the rapid growth of the enterprise and difficulties in managing internally the effects of the growth (manual managerial procedures are no longer suitable when the size of the company increases). Programs to overcome above-mentioned problems have to do with:

- Training entrepreneurs in new managing techniques; special attention to internationalization.
- Processes of clustering companies of the same industry in order to facilitate the interchange of experiences and best practices
- Access to financial resources

### *Stage 4: Stability*

The growth rate of the firm slows to a level consistent with market growth. The major problems of the firm at this point are to maintain growth momentum and market position. Therefore the entrepreneur should focus on the introduction of second-generation product for acquiring new opportunities and the expansion of the business into new geographic territories and markets. Therefore the programs that can be carried out have to do with:

- Enhancing the innovative capacity of firms.
- Facilitating their internationalization

## Empirical research

In this section we aim to give a description of the situation in the Basque Country, in one hand, of Supporting Institutions, and of NTBF in the other hand.

### Characteristics of Supporting Institutions for NTBF in the Basque Country

Over the last two decades a large number of different institutions have emerged in the Basque Country, which determine the environment where NTBF operate. The main function of these institutions is to provide specific services in order to facilitate the development of the new business activity. In this section we aim to map the type of services that each institution offer to NTBF. In this context, 86 different intermediary institutions have been identified, as it is shown in Table 1:

Table 1: Number of Supporting Institutions

| <b>Supporting institutions</b>  | <b>Number</b> |
|---------------------------------|---------------|
| Research and Technology Centres | 50            |
| Universities                    | 4             |
| Business Innovation Centres     | 5             |
| Technology parks                | 4             |
| Public administration           | 4             |
| Consultancy firms               | 10            |
| Financial entities              | 9             |
| <b>TOTAL</b>                    | <b>86</b>     |

We should point out that Research and Technology Centres dominate the structure of supporting institutions.

The following section is based on data obtained through a survey of a representative sample on Supporting Institutions located in the Basque Country. The data set consists of 39 Supporting Institutions; the sample is cross sectional as it is s shown in Figure 1.

Figure 1: Breakdown of Supporting Instructions in the sample

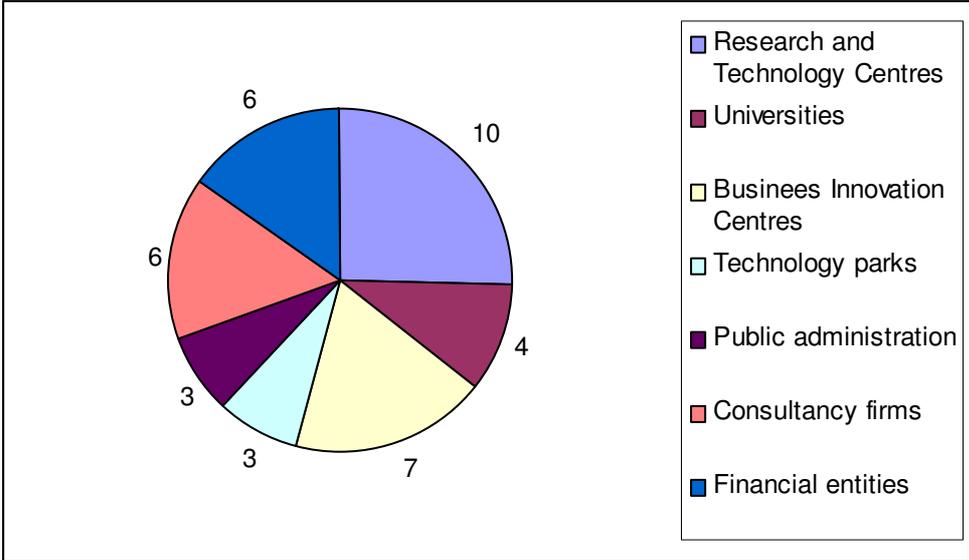
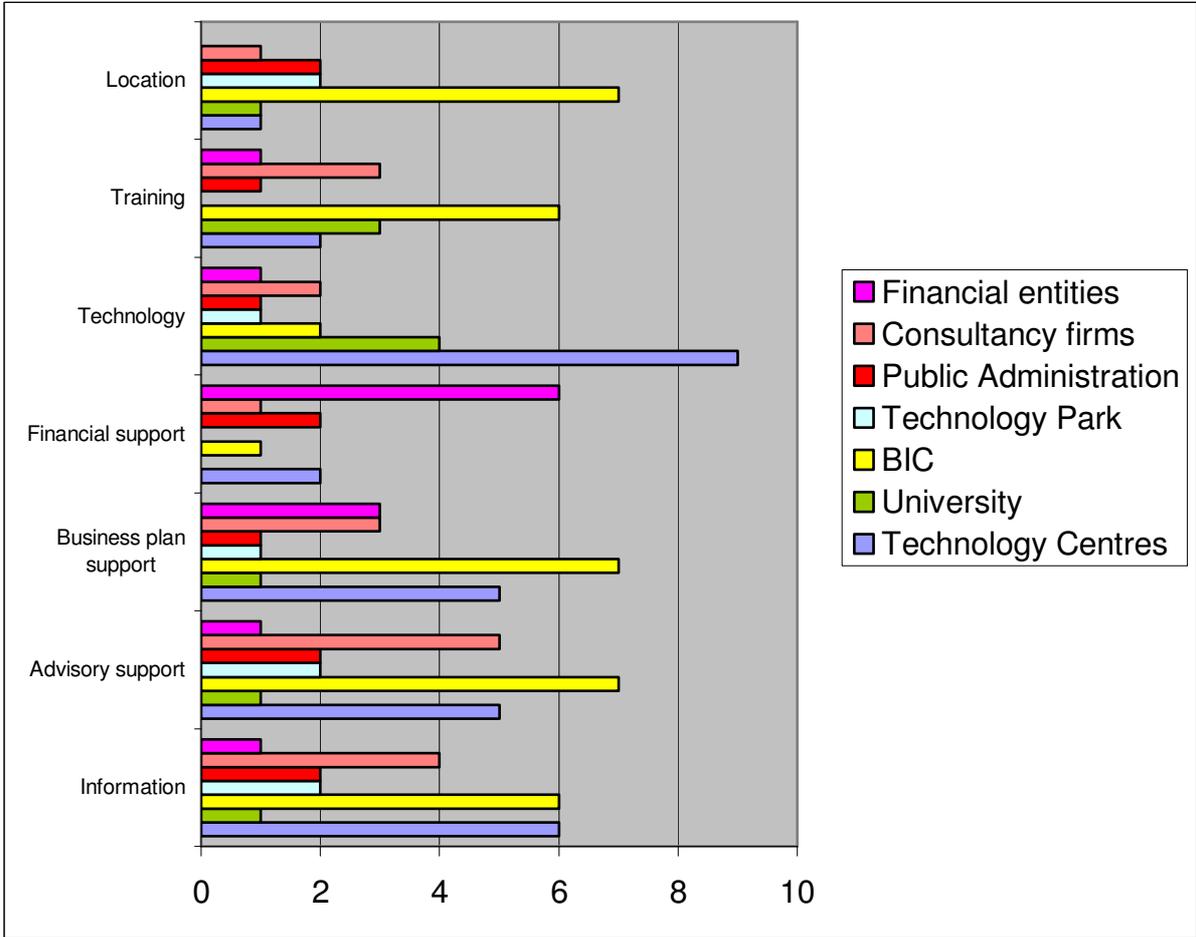


Figure 2 shows a breakdown of services offered by the different Supporting Institutions. In general the mentioned institutions all offer an ample variety of services, though some of them stand out in a particular service.

Figure 2: Services provided by Supporting Institutions



- **Information and support:** Research and Technology Centres, Public Administration and BIC are mainly offering this kind of services
- **Advisory support in the development process:** i.e. advise in the paperwork that has to be done to create a new enterprise. All the institutions supply this kind of service although BIC play an important role in this sense.
- **Business plan:** basically consist on the advice during writing down the business plan. BIC and Technology Centres stands out in these kind of activities
- **Financial support:** mainly given by Financial entities and Public administration
- **Technology support:** Technology Centres and University are the most remarkable offer providers.
- **Training:** it is very important the role that are playing BICs on the training of entrepreneurs, followed by University and Consultancy firms
- **Location and facilities:** this kind of services are mainly offered by Technology parks and BICs

## Conclusion

- Over the last decades a large number of different institutions have emerged and developing this institutional structure may be regarded an important effort done by Basque Government in order to improve general environmental conditions where NTBF operate
- The Supporting Institutions for NTBF in the Basque Country is ample, as much by the number of agents implied as by the type of services that they offer. These services cover a large range of necessities that NTBF face. Despite improvement points are detected, since NTBF continues having important problems related to financing and commercialization, most of the times due to technician profile or to the lack of business expertise of the entrepreneurial team.
- There is also a need for a greater coordination and network among the agents involved in order to reduce existing rivalry among them, i.e. increasing the specialization of each one in a type of services.
- Supporting activities display a smaller intensity as the company becomes bigger. It might be a gap between firm's necessities and offered services by support institution that should be taken in account while defining future supporting programs.
- It is necessary to deepen in the collaboration and networking among all the agents concerned in the creation and development process: already existing NTBF, Technology centres, universities and so on

## The situation of NTBF in the Basque Country

In this section we aim to discuss data concerning to main difficulties and barriers that NTBF face in their development process. The data set consists of 43 Basque NTBF that responded positively to a questionnaire that allowed to collect information related to main difficulties and barriers that NTBF face in the development process<sup>4</sup>.

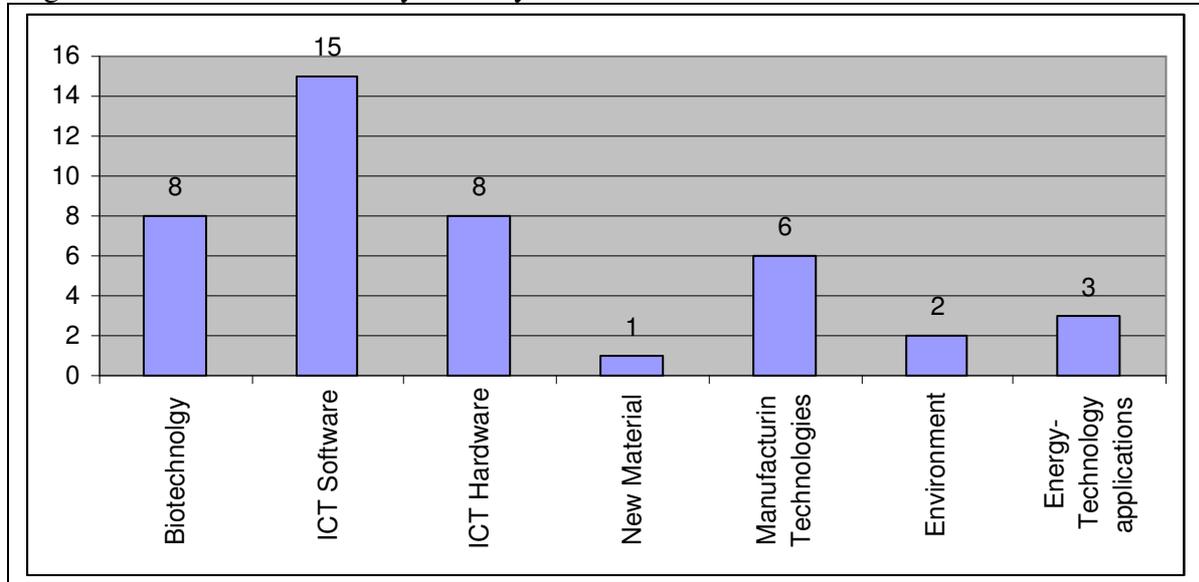
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<sup>4</sup> Data is not statistically significant, therefore the analysis follows a qualitative approach.

Basic figures:

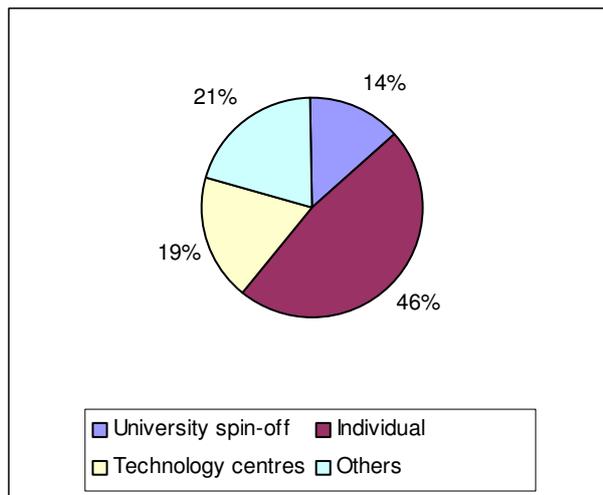
- More than 50% of firms in the sample belong to the ICT sector (15 ICT-software and ICT-Hardware); 8 are related to Biotechnology, 6 Manufacturing Technology; 3 Energy-Technology applications and 2 Environment (See Figure 3)

Figure 3: NTBF breakdown by industry



- The period between 2000-2005 is especially active in the appearance of new ventures, coinciding with the boom of *dotcom* companies. More of 60% of companies of the sample were created during these period of time. Biotechnology sector seems that begins to take off in the Basque Country; in fact, 7 of the 8 companies in this group were created after 2000.
- As regard the source of new ventures, nearly 50% of the NTBF in the sample has the origin in individual initiatives (20). The second group of source of new ventures are Technology Centres (8). University has gained relative importance (with 6 university spin-off in the sample). According to these results, there is still a lack of entrepreneurial culture in Basque Science and Technology system. Much effort must be done to enhance entrepreneurship in the system.

Figure 4: Origin of NTBF



- A consolidation effect is inferred by the data on Table 2. Firms that have been on the market for a longer period show an increase in employment and turnover.

Table 2: Basic figures by date of set-up

|  | TOTAL     | Origin      |           |           |
|--|-----------|-------------|-----------|-----------|
|  |           | Before 1994 | 1994-1999 | From 2000 |
| <b>NTBF</b>                                  | <b>43</b> | <b>5</b>    | <b>10</b> | <b>28</b> |
| Average employment 2004                      | 14        | 21          | 22        | 10        |
| Average Turnover 2004                        | 1492      | 3133        | 2576      | 830       |
| Average R&D investment 2004 (thousand euros) | 318       | 322         | 591       | 249       |
| R&D expenditure (% over turnover)            | 21%       | 10%         | 23%       | 30%       |

- Barriers and difficulties faced in the development process

The three main difficulties encountered are, in order of importance: lack of financial resources, barriers to commercialization and the lack of qualified human resources. More specifically:

- Barriers to financial resources are the main difficulty for 44% of the sample NTBF. The absence of risk capital and the difficulties to finance the long-term loans are some of the reasons underlined in this sense. In this first group commercialization difficulties stand out related to the lack of business expertise.
- Secondly, the most outstanding difficulty is related to the process of commercialization and the difficulties involved in reaching the market with such

innovative products, which require extra time for penetration. The lack of qualified human resources appears as an important aspect in this second group of barriers.

- Finally, the high uncertainty that NTBF face is pointed out as an important difficulty.

Table 3: Barriers in the development process

| Difficulty 1          | N. Firms | %   | Difficulty 2          | N. Firms | %    |
|-----------------------|----------|-----|-----------------------|----------|------|
| Financial             | 19       | 44  | Financial             | 8        | 19%  |
| Commercialization     | 11       | 26  | Commercialization     | 12       | 28%  |
| Technology            | 1        | 2   | Technology            | 3        | 7%   |
| Paperwork             | 4        | 9   | Paperwork             | 1        | 2%   |
| Human resources.      | 4        | 9   | Human resources.      | 6        | 14%  |
| Institutional support | 1        | 2   | Institutional support | 1        | 2%   |
| Location, facilities  | 1        | 2   | Location, facilities  | 1        | 2%   |
| Others                | 2        | 5   | Others                | 11       | 26%  |
| Total                 | 43       | 100 | Total                 | 43       | 100% |

| Difficulty 3          | N. Firms | %    |
|-----------------------|----------|------|
| Financial             | 6        | 14%  |
| Commercialization     | 5        | 12%  |
| Human resources       | 5        | 12%  |
| Institutional support | 1        | 2%   |
| High uncertainty      | 8        | 19%  |
| Other                 | 13       | 30%  |
| NR                    | 5        | 12%  |
| Total                 | 43       | 100% |

➤ Key factors in the creation phase

- In the first place, 51% of the NTBF consider the entrepreneurial team characteristics as the main key factor. Level of motivation, drive and personal effort devoted to the project are outstanding aspects underlined by the companies.
- Secondly, a third of the companies considers the institutional support as a key aspect
- The answers referred to the third key aspect are diverse. Figures emphasize the importance of having a well-defined target market and mastering the technology used, in addition to the institutional support provided.

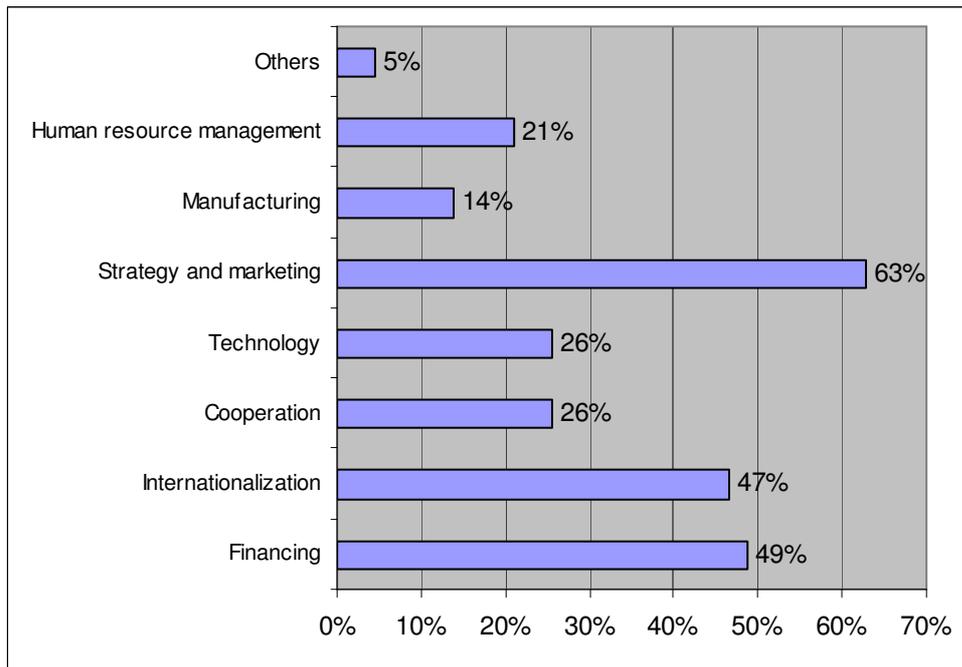
Table 4: Key factors in the creation phase

| <b>Key factor 1</b>                         | <b>N. Enterprises</b> | <b>%</b> | <b>Key factor 2</b>                         | <b>N. Enterprises</b> | <b>%</b> |
|---|-----------------------|----------|---|-----------------------|----------|
| Previous experience of entrepreneurial team | 3                     | 7        | Previous experience of entrepreneurial team | 2                     | 5        |
| Entrepreneurial team characteristics        | 22                    | 51       | Entrepreneurial team characteristics        | 11                    | 26       |
| Well defined market                         | 6                     | 14       | Well defined market                         | 4                     | 9        |
| Institutional support                       | 6                     | 14       | Institutional support                       | 13                    | 30       |
| Financial statement                         | 1                     | 2        | Financial statement                         | 0                     | 0        |
| Technology                                  | 3                     | 7        | Technology                                  | 3                     | 7        |
| Others                                      | 2                     | 5        | Others                                      | 8                     | 19       |
| NR  | 0                     | 0        | NR  | 2                     | 5        |
| Total                                       | 43                    | 100      | Total                                       | 43                    | 100      |

| <b>Key factor 3</b>                         | <b>N. Enterprises</b> | <b>%</b> |
|---|-----------------------|----------|
| Previous experience of entrepreneurial team | 1                     | 2        |
| Entrepreneurial team characteristics        | 4                     | 9        |
| Well defined market                         | 5                     | 12       |
| Institutional support                       | 8                     | 19       |
| Financial statement                         | 2                     | 5        |
| Technology                                  | 6                     | 14       |
| Others                                      | 9                     | 21       |
| NR  | 8                     | 18       |
| Total                                       | 43                    | 100%     |

- The NTBF in the sample have been in contact with different supporting institutions. In this sense, 42% of the NTBF have received the support from more than one institution.
- Firms were also asked about their training/educational needs to grow successfully. There seems to be a need for a greater knowledge and education on strategy and marketing fields. At the same time, nearly half of the firms would like to get more education on financing and internationalization.

Figure 5: Areas in which further training is needed



- Finally, most of the companies (82%) admit to have information about the supporting services offered by different institutions provided by Basque, Spanish either European institutions

## Conclusion

- The period between 2000-2005 is especially active in the appearance of new ventures, coinciding with the boom of *dotcom* companies. More of 60% of companies of the sample were created during these period of time. Biotechnology sector seems that begins to take off in the Basque Country; in fact, 7 of the 8 companies in this group were created after 2000.
- Two out of three NTBF has the origin in individual initiatives (20). The second group of source of new ventures are Technology Centres (8). University has gained relative importance (with 6 university spin-off in the sample). There is still a lack of entrepreneurial culture in Basque Science and Technology system. Much effort must be done to enhance entrepreneurship in the system.
- Nevertheless the entrepreneurs have been in contact with different supporting institutions during the creation process. In this sense, 42% of the NTBF have received some support from more than one institution.
- Most of the companies (82%) admit to have information about the supporting services offered by different institutions from Basque Country, Spain either Europe.
- Barriers to financial resources are the main difficulty for 44% of the sample NTBF. The absence of risk capital and the difficulties to finance long-term loans are some of the reasons underlined in this sense. Much effort should be done in order to create new formulas to cover the financial needs of NTBF.
- The 51% of the NTBF consider the entrepreneurial team characteristics as the main key factor. Level of motivation, drive and personal effort devoted to the project are outstanding aspects by the companies.

- 63% of the NBTF need better education on strategy and marketing to tackle with challenges in the commercialization and growth phases.
- Taking in account, in one hand, barriers related to commercialization plus the technician profile of many of the entrepreneurs, and the necessity of further education on marketing and strategy fields, in the other hand: What can be done to improve this cross-section?

## **CONCLUDING REMARKS**

The important role that Supporting Institutions may play in the development process of new ventures has been addressed in this paper. The need of greater coordination among existing institutions has been underlined in order to avoid overlapping in the offered services. Future policy programs should be oriented to increase the consistency of the supporting system.

The creation of suitable environmental conditions requires a wholehearted support to build new infrastructures and necessary services in order to improve the general capability of the supporting institutions of transforming knowledge into viable ventures.

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## **Appendix 1**

### **About the Knowledge Cluster for Business Management ([www.clusterconocimiento.com](http://www.clusterconocimiento.com))**

Basque Government applies cluster policy and initiatives since the beginning of the nineties. It was in 1996, that the Knowledge Cluster was formed with the purpose of promoting, stimulating and supporting the development and application of management knowledge. The final objective of this Cluster is to improve the competitiveness of firms and institutions operating in the Autonomous Community of the Basque Country. To do this, the Knowledge Cluster concentrates on facilitating communication and permanent cooperation among the different agents related to the creation, modelling, application and diffusion of knowledge in business management within the Basque Country.

The Cluster gathers to put all business management-related agents together, incorporating on one hand, those seeking management services and knowledge (fundamentally companies) and, on the other hand, those offering these services (university, training centres for executives, consultancies, technology centres, etc.), in addition to public institutions.

Since 1997 the Knowledge Cluster works on supporting the creation of NTBF, creating Reflection Forums and facilitating the exchange of knowledge among different actors implies in the process of new ventures formation.

The Cluster represents a space in which ideas, experiences and actions related to knowledge in business management can be exchanged. This, in turn, contributes to the learning and diffusion of all those tools, thereby contributing to improving competitiveness in both companies and their managers. In this context, it acts as a catalyst of relationships, innovation forum and meeting place between universities, consultancies, companies and public institutions.