CHARACTERISTICS OF UNIVERSITY SPIN-OFFS. THE ROMANIAN SITUATION

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Abstract:
Along the history the interest in entrepreneurship and small firms had an impact on the academic world. The option to create wealth, competitive advantage from the commercialization of research by valorization of the inventions, in what has historically been a non-commercial environment, raised new entrepreneurial challenges.
University spin-offs bring researchers together, creating a context with the purpose of commercializing products.
The objective of this article is to review the available literature on university spin-off and to present the situation of university-spin-offs, funded in Romania with EU grants, between 2007 and 2013.

Keywords: innovation, academic entrepreneurship, university spin-offs, economic growth.

JEL classification: M13, O30, O31, O32.

INTRODUCTION

The evolution catalyst of the economical growth, innovation has a double role: resource-consumer by absorbing the funds from the economy, and resource-provider by commercializing the research results to the final industrial applicators, which in our case are: private companies and state-owned enterprises.
Almost all the international agreements, the National/Regional/Local Development Strategies, European Commission papers foster the idea of innovation and sustainability in all the activity domains of enterprises.
Policy makers and the economical environment are very interested and opened to support and increase the performances of the innovative firms. It is believed that the main source of innovation which contributes to the economic and social welfare and regional development is provided by universities and other public research organisations (Tidd and Bessant, 2011).
In other to satisfy the society's needs, the generation of new ideas, technologies and scientific knowledge are fundamental for a sustainable growth, job creation and the formation of a competitive industrial economy.

To reach economic growth, the research results from the universities and public research organisations have to be somehow commercialized.
The technological transfer is a process developed by the universities and research organizations, through which a patent knowledge system is transferred to other entities capable of materializing the information.
A technological innovation is transferred when it is commercialized into a product or service, which is sold on the market.
The creation of innovative firms requires entrepreneurial skills. Innovative firms are part of a new economy, because they produce the latest technologies and create the new sectors of production.
The creation of a new company requires: to develop a business concept, gain necessary resources and take the right decisions.
The study of entrepreneurship and small businesses has become one of the most popular fields of research in management studies (Landstrom, 2005). Elpida said that entrepreneurship is the process that leads to the emergence and development of new ventures based on the exploitation of new or existing knowledge (Elpida, 2010).
Growth of young companies is the result of a strategic choice made by entrepreneur (how to create and maintain a sustainable competitive advantage, how to manage growth, how to overcome barriers for growth) in a turbulent environment (Bibu and Sala, 2010).
The biggest challenge of the innovative firm is the ability of the new venture during the early stages of growth to become an established firm in a market, capable of earning sustainable profits.
If the entrepreneurs achieve to overcome this transition from one phase of growth to the next, then the success of the company is guaranteed.
Academic institutions have been associated with economical growth. An interesting issue to be discussed is how can universities generate economic returns from government research support?
University research knowledge provides opportunities to develop new or improved products.
Etzkowitz (1983) highlighted the active role of the entrepreneurial university in transferring the academic research.
According to Siegel et al. (2004), to foster a climate of entrepreneurship, university should focus on: reward systems, staffing practices of the technology transfer office (TTO), designing flexible university policies on technology transfer, university resources and working to eliminate cultural and informational barriers that impede the transfer process.
Implementing an effective government strategy for innovation is particularly important as key trends – the spread of global value chains, the increasing importance and mainstreaming of knowledge based capital (KBC), and rapid technological progress, including the rise of the digital economy – are 3 leading to the emergence of a “next production revolution” (OECD, 2015).
The contribution of university to economic development and growth has made policy makers interested in the role of universities as potential vehicles for innovation and employment.
Universities are changing the setting shifting from the role of educational scientific knowledge providers, to a more complex ‘entrepreneurial university model’, which implies knowledge commercialization and active participation in the development of

research-based spin-offs (RBSOs) in the local and regional economy (Etzkowitz et al., 2000).
Rasmussen (2006) talks about the differences between academic entrepreneurship and industrial entrepreneurship.The difference in culture and work practice between university and industry is substantial (Anderson, 2001).
Table 1 above illustrates the differences between the two contexts: academic and capitalist.

Table 1. Academic context vs. capitalist context

Features	Academic context	Capitalist context
Management	Academic freedom	Hierarchy
Motivation	Prestige, publications	Profit
Role	Knowledge production	Knowledge exploration
Goal	Novelty important	Market accept important
Knowledge	Sharing of knowledge	Protection of knowledge
Cooperation form	Loose relations (couplings)	Formal contracts
Time horizon	Long term	Short term

Source: adapted after (Rasmussen 2006)

Firms are collections of resources and capabilities, and which convert this resources into products or services from which revenue can be obtained. Capabilities are based on developing, carrying, and exchanging information through the firm's human capital.
Transforming an academic idea into an innovative product or service requires resources and capabilities that most universities and academic entrepreneurs lack.
The creation of spin-off companies appears as a mechanism for transferring knowledge and technologies from research organizations to the private sector for commercialization.
Table 1 presents the two contexts that involve the idea of USOs. University spin-offs are emerging from a non-commercial environment (university research) to becoming established as an independent business entity (capitalist setting). During this transformation they undergo, the technology and the human capital involved change the scene from an academic to an industrial setting. The table highlights the differences between the two settings in order to understand the obstacles that spin-offs are facing.
Changing the settings from an academic vision to a business one is very difficult, because there are a lot of factors which need to be changed. Inventors, professors, researchers might have the desire to contribute to employment and national economic development, but they don’t have the pecuniary interest. They are driven by other types of motivational factors, personal ones like: prestige, publication, social recognition.
The entrepreneurs, during their activities as students, professors or researchers at a university, acquire technological knowledge or develop a new technology that will, in the future, be used with the support of the university´s business incubator (or another mechanism) to develop a product or a business concept that will be explored commercially by a new venture.
Economically speaking, university knowledge can embracive many forms of which the most common are namely: technological transfer to existing companies and create new entities (university spin-offs).

The paper is organized as follows: in the next section we will present the literature review concerning the university spin-off, followed by the second section which illustrates the position of Romania concerning innovation and the creation of spin-off between 2007-2015, using European funds.
In the last section we also present the obstacles and the factors, found in the available literature, which can influence the creation of a university spin-off.

2. University spin-off. Definitions and interpretations

2.1. A literature review

There have been several attempts in the academic literature to define university spin-offs, and although they are not all consistent, common features may be identified.
Some studies are much more ambiguous, and more inclusive in their use of the spin-off term. However they are sharing the following features: the technological transfer from the parent organization to the new venture and the transfer of human capital, for example through researchers or students leaving the parent organization to form the new venture.
In the literature spin-offs, also found under 'university spin-outs' or 'research related start-up ventures', are acknowledged as the key drivers of economic change and growth (Bercovitz and Feldman, 2006).
In order to derive a conceptual framework that would enable us to address diversity among USOs, we reviewed papers published since 1996, in general in order to identify the main characteristics.
Analyzing the literature we identified the need to distinguish between the creation and the development of different types of spin-offs.
Originated in a non-commercial environment, university spin-offs are collections of resources and capabilities created by students, graduates or academic staff, which transforms the academic idea into a market-ready product or process innovation.
First of all, a number of studies of university spin-offs are mentioned in the study of technology-based firms. For instance Mustar (1997) found that two of five high-tech enterprises in France were set up by university researchers, while a study by Heirman and Clarysse (2004) estimated that nearly four percent of high-tech and medium-tech companies in the Flanders region of Belgium were research-based start-ups.
The university spin-off phenomenon is not new (Etzkowitz, 2000) and research related to this type of firms is often found under the label of technology-based new firms (or new technology-based firms).
According to Shane (2004), spin-off companies are 108 times more likely than the average new firm to go public and also to create more jobs than the average new business in the United States.

Table 2. Spin-offs definitions

Definition	*Term used*	*Purpose*	*Parent organization*	*Structure*	*Reference*
A spin-off is a mechanism in which governments seek to generate economic impact from their R&D, by transferring technology from the R&D function to a commercial organization. A spin-off involves: technology originator, the entrepreneur, the R&D organization itself, and the venture investor.	*spin-off*	*generate economic impact by transferring technology*	*R&D function*	*technology originator, the entrepreneur , the R&D organization itself, and the venture investor*	*(Roberts and Malone, 1996)*
" ... SMEs set up to exploit research findings"	*SME*	*exploit research finding*			*(Mustar, 1997)*
new company that is formed (1) by individuals who were former employees of a parent organization, and (2) with a core technology that is transferred from a parent organization	*new company*	*technological transfer*		*former employees*	*(Rogers and Steffensen, 1999)*
"... new firms created to exploit commercially some knowledge, technology or research results developed within a university."	*new firms*	*exploit commercially some knowledge, technology or research results*	*university*		*(Pirnay et al., 2003:355)*

"..university high-tech spinouts are ventures founded by employees of the university around a core technological innovation which had initially been developed at the university."	*a venture university high-tech spinouts*	*technological innovation*	*university*	*employees of the university*	*(Vohora et al., 2004)*
a technology transfer mechanism because it is usually formed in order to commercialize a technology that originated in a government R&D laboratory, a university research centre or a private R&D organization.		*a technology transfer mechanism*	*government R&D laboratory, the University, the University research centre a private R&D organization*		*(Rogers and Takegami 2001)*
A spinout involves: -the transfer of a core technology from an academic institution into a new company. -the founding member(s) may include the inventor academic(s) who may or may not be currently affiliated with the academic institution.	*spinout*	*the transfer of a core technology*	*academic institution*	*inventor academic(s) who may or may not be currently affiliated with the academic institution*	*(Nicolaou and Birley 2003)*
"... a university spin-off is a new company formed to exploit a piece of intellectual property created in an academic institution." " university spin-offs are an important subset of start-up firms because	*university spinoffs subset of start-up*	*exploit a piece of intellectual property created*	*academic institution*		*(Shane,2004)*

they are an economically powerful group of high-technology companies".				
"A university spin-off is defined as a new venture which is initiated in a university context and based on technology developed within a university.	*university spinoff new venture*	*university*		*(Rasmussen, 2006)*
"...USO are founded by one or more academic inventors (faculty or student or staff), who may (or may not) be currently affiliated with the academic institution and/or the firm, and is created based on a license or other agreement with an academic institution to transfer a core technology."	*USO*	*academic institution*	*more academic inventors (faculty or student or staff), who may (or may not) be currently affiliated with the academic institution and/or the firm*	*(Zahra et. al., 2007)*
"…a university spin-off involves the transfer of a core technology from an academic institution into a new company. The founding member(s) may include the inventor academic(s) who may or may not be currently affiliated with the academic."	*university spin-off*	*academic institution*	*inventor academic(s) who may or may not be currently affiliated with the academic institution*	*(O'Shea, et.al.,2008)*

Academic spin-offs are very special start-up companies that are founded by an academic inventor with the aim to exploit technological knowledge that originated within a University setting in order to develop products or services.	*very special start-up companies*	*aim to exploit technological knowledge*	*university setting*	*academic inventor*	*(Bigliardi et. al 2013)*

Source: Own processing

Even though these definitions are useful for defining the topic, they have weaknesses.
First of all, the founders of the university spin-off: students, academics, and external entrepreneurs may be involved in developing technologies, but also they might leave the university environment.

The second weakness is that such definitions do not explain clearly the fact that the parent organization can be: government R&D laboratory, the University, the University research centre, a private R&D organization. What about public and private universities, can they both create university spin-offs?

All the definitions have in common in describing university spin-offs is the origin of the innovative product/ process/service that serves as the main revenue source.

From our perspective, it is not desirable to define a restrictive definition of university spin-off firms by reducing the group of actors and institutions included in the research framework, but it is important to mention that the technology transfer should have a university patent as a starting point.

The logic of university spin-off agreed upon, is new entrepreneurial firms, which transfers technology (patent) from their parent organization (university), with the purpose of obtaining profit, by commercialization of an innovative product.

From a dynamic perspective it is important to understand the changing relationship between a university spin-off and its parent organization.

In our opinion some definitions mentioned above (like: O'Shea, R.et.al., 2008, Nicolaou and Birley, 2003) are unclear, because they consider every firm as a university spin-off so long as it is founded by academic inventor, which can be or not be affiliated to the university.

However, this definition, in turn, is also problematic because it implies that the majority of all existing firms should be classified as university spin-offs, based on the premise that they were started by someone with a university degree.

Furthermore, in Figure 1 we described the process of a university spin-off

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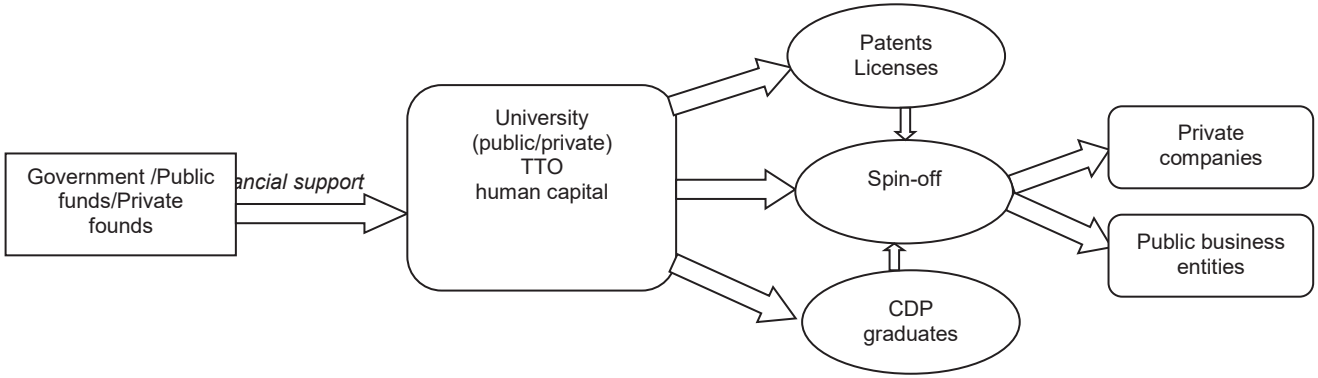

Figure 1.The university spin-off mechanism
Source: made by authors

In conclusion, the academic spin-offs are focusing on a technology transfer system that converts into application in society.

2.2. Typologies and particularities

In 1997, Autio develops a model which classifies technology-based firms into science-based firms and engineering-based firms. Also he discusses the roles and impacts of technology-based firms (NTBFs) in a small open economy by providing details on the changing population of NTBFs in Finland between 1986 and 1993.
Radosevich (1995) classifies spin-offs from the perspective of the entrepreneurial skills in:

- inventor entrepreneur, which involve laboratory employees who are commercializing the inventions;
- surrogate entrepreneur, which involve entrepreneurs who are not the inventors.

Nicolaou and Birley (2003) underline 3 types of spin-offs:

- orthodox spin-off both the academic inventor(s) and the technology are spinning out from the academic institution;
- hybrid spin-off involves the technology spinning out, while the academic(s) retains their university position;
- technology spin-offs: technology spins out, while the academic(s) maintains no off operative connection with the newly established firm.

Research undertaken by Scholten et al. (2001) classifies spin-offs from the perspective of the extent to which the venture has to establish external relationships as being:

- *exploitative spin-off*, which is addressing an established environment accustomed to the technology;
- *explorative spin-off*, which addressing a new environment that is not familiar with the new technologies, products or services.

Upstill and Symington (2002) classify spin-offs from the perspective of the method of technology transfer adopted:

- direct spin-offs: companies involving a research organization and former staff of the parent organization;
- indirect spin-offs: companies established by former staff of the parent organization to exploit its tacit knowledge;
- technology transfer companies: companies based primarily on the intellectual property from the parent organization.

Pirnay et al. (2003) classifies spin-offs from the perspective of type of knowledge involved in:

- Type I- involving codified knowledge and researchers;
- Type II- involving tacit knowledge and researchers;
- Type III- involving codified knowledge and students;
- Type IV- involving tacit knowledge and students.

Bathel (2010) classifies spin-offs from origin of the founders in:

- sponsored spin-offs are the result of particular university research projects, and apply specific knowledge inputs in the development of their initial core technology;
- unsponsored spin-offs, which find their foundation in decentralized idea

development outside of the university setting, almost entirely rely on generic broad knowledge bases for the development of innovative products and services, which have enabled the firm-formation process.

Zahra said that the development of academic spin offs and corporate spin-offs different from the "knowledge conversion capability" (KCC) perspective, which it represents the capacity to transform research and scientific discoveries into successful products and goods that are efficiently and quickly commercialized to create value (Zahra et. all.2007).

From our point of view the typologies mentioned above present weakness, because many spin-off cases can belong to several types at the same time. The spin-off typologies as we found them in the literature are useful for defining the concept of university spin-off, and to see that their definition situates them at a certain point in time based on being in a close proximity with an university.

Romanian law provides the existence of two types of spin-offs:

- the total assets and liabilities of a company, ceasing to exist, are split up between two or more already existing or new companies;
- partial spin-off: only part of the assets and liabilities of a company, continuing to exist, are transferred to two or more already existing or new companies.

Also Mustar et al. (2006: 290) conclude in their review that there is ''an important gap in our comprehensive understanding of the diversity of RRSOs'' (research-based spin-offs).

3. European support framework for spin-offs

3.1. Innovation- sustainable growth in Romania

According to the Innobarometer 2015 "The innovation trends at EU enterprise", between the 2nd and 20th of February a survey was conducted in the 28 EU Member States as well as in Switzerland and the United States on 14 118 respondents.

The survey shows clearly that the main problems for the commercialisation of innovative goods or services in Romania are: the established competitors (65%), the lack of financial resources (67%), the cost or complexity of meeting regulations or standards (42%), 49(%) lack of human resources, (36%) administrative or legal issues, low demand for the innovative goods or services (50%), lack of marketing expertise (41%), weak distributions channels (39%), difficulties in maintaining intellectual property rights (19%).

According to the survey in Romania the contribution to the development of innovation in companies was due to: (98%) to management, (80%) to employees of the company contributed to the development of ideas for innovations, other companies (49%), (58%) individual consumers, (23%) public sector organizations, 14% to universities or research organizations.

In contrast the survey highlights that in Denmark, public sector organizations (22%) and universities or research organizations (25%) are considered to register the highest scores in comparison with other countries.

The survey shows that support for training staff in how to promote and market goods and services would be the type of public support with most positive impact.

Likewise companies in Romania, on the other hand, are less likely than those in Hungary to say training (15% vs. 17%), meeting regulations or standards (8% vs. 12%) or accessing or reinforcing online selling (6% vs. 16%) accessing or reinforcing their presence in export markets (6% vs. 21%) would have the most positive impact.
In 15 Member States, companies argue that training staff how to promote and market goods or services would have the most positive impact, and this is of Belgium (31%), Portugal (30%) and Spain (29%).
When asked if the companies had any involvement with public procurement half of the companies in each Member State say they have never investigated or submitted a tender. This is the case of Estonia (76%), Spain, Romania (both 74%) and Malta (73%) vs. Ireland (50%), Croatia and Belgium (both 51%).
According to the Global Competitiveness Report 2015-2016 (World Economic Forum, 2015) from the stages of development perspective and the weighted index, Romania together with Croatia and Hungary are all at the transition from stage 2 to stage 3.
Fostering sustainable growth, innovation is considered the 12th pillar of the competitiveness.
It involves sufficient investment in research and development (R&D), the presence of high-quality scientific research institutions; extensive collaboration in research between universities and industry; and the protection of intellectual property.
Being in the same stage of development, Romania ranks 84th out of 140 economies for innovation, while Hungary, the Czech Republic rank much higher position: 72th, 63$^{th.}$
Overall The Global Competitiveness Index in detail shows that, Romania is situated below Hungary and above Croatia in ranking the positions out of 140 participants: for university – industry collaboration for R&D (71th vs. 36th vs. 81th), availability of scientists and engineers (57th vs. 51th vs. 78th), for no. procedures to start a business ranked (38th vs. 22th vs. 76th).
At the same time, according to the Innovation Union Scoreboard 2015, Romania ranks 38th in the EU for R&D public sector, linkages and entrepreneurship 9th, with 13 public- private scientific co-publications per million population (Innovation Union Scoreboard, 2015).
Considered a modest innovator, Romania's performance has declined due to a dramatic decrease between 2013 and 2014 (in particular due to a very strong decrease in Sales of new innovative products (-21%) with the performance level relative to the EU dropping from 46% to 37%.
Performing well below the average of the EU, Romania registered the lowest values in linkages and entrepreneurship dimension and the PCT patent applications indicator.

3.2. European funds focused on research in Romania

In 2007, Romania joined the European Union, and policy makers focused their attention on acceding EU funds to improve their capacity in R&D and innovation absorption. However, in spite of the big amounts of money allocated for financing the creation of innovative companies, major problems were identified in their implementation process, due to different internal and external factors that acted as

obstacles.
At a national, regional level policy makers each year are allocating substantial amount of resources to promote the creation of university spin-off firms.
If the academic literature shows that university spin-offs in other countries appeared in 1995-1996, in Romania this concept appeared only in August 2008. Nowadays the number of this type of initiatives at universities in Romania is very low.
The Government Ordinance no. 3823/2015, Art. 6, Al d) of Ministry of Education and Scientific Research defines “spin-offs as new companies that are created based on the result of a research project of a public R&D organization or a university”.
The main objective of the National Strategy for Research and Development of Romania is that by 2020 Romania will be regionally and globally competitive through innovation supported by research and development, thus generating wellbeing and prosperity for its citizens.”
Even though The Innovation Union Competitiveness Report 2011: Country Profile – Romania (European Commission, 2011) shows that R&D intensity has increased from 0.37% in 2000 to 0.48% in 2009, Romania still remains one of the lowest ranked countries in Europe for R&D intensity. Investment in R&D has been significantly impacted by the economic downturn; however a target of 2.0% R&D intensity as a percentage of GDP is being targeted by 2020.
Between 2007-2013, the creation of university spin-offs in Romania was fostered by the European Regional Development Fund (ERDF) Operational programme for Romania, entitled "Operational Programme Increase of Economic Competitiveness". The budget for the period 2007-2013 was around EUR 3 billion.
The purpose of the program was to strengthen the R&D cooperation between research institutes/universities, and firms as the basis for the future development of enterprises’ international competitiveness.
The objective of the Priority Axis 2: Research, Technological Development and Innovation for Competitiveness is focused on: increase of R&D capacity, stimulation of cooperation between RDI institutions and enterprises, and facilitating the enterprises’ access to RDI.
The low level of funding (both public, and private) for research, technological development, and innovation (RDI) had as direct results the obsolete RDI infrastructure, the decreasing number and increasing average age of researchers, and the low performance of RDI activities. The lack of funding also hindered enterprises’ access to RDI activities and technology transfer.
The purpose of this program was to strengthen the relationship between R&D institutions and enterprises by stimulating technology transfer , the creating and reinforcement of high-tech firms and the development of poles of excellence/competitiveness.
One of the key intervention of the program is RDI support for enterprises, is focusing on:

- Support for high-tech start-ups and spin-offs
- Development of R&D infrastructure in enterprises and creation of new R&D jobs
- Promoting innovation in enterprises Innovation through R&D.

The three indicative operations mentioned above where chosen to increase the private investments in RDI activities, to reduce the high technological and

competitiveness gaps. A cause of the expressed by the low level of innovation in enterprises, the reduced capacity of enterprises to absorb R&D results, and the slow development of R&D activities in enterprises.
The target for the output supported high-tech startups and spin-offs forecasted to be reached in 2015 is a number of 50 startups and spin-offs (Table 3).

Table 3. Indicators of high-tech startups and spin-offs

Indicators		2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Innovative start-ups	Realized	0	0	5	2	-	-	-	-	-	7
	Target	0	5	5	5	5	5	4	0	0	29
Innovative spin-offs	Realized	0	0	4	11	-	-	-	-	-	15
	Target	0	0	5	5	5	5	1	0	0	21

Source: www.poscce.research.ro/.../informatii.../informatii-ref-

As table 3 illustrates, Romania didn't archive the target of the output indicators: only 15 innovative spin offs out of 21, and 7 innovative start-ups out of 29. This proves in Romania, universities are facing problems regarding the creation of spin-offs.
We consider that the causes that explain the low performance of this indicator are a lot of obstacles, from which the most important are: lack of entrepreneurial skills and the bureaucracy.

3. Obstacles and factors to support the economical growth of academic spin-offs

In the academic literature we can find a lot of *obstacles* directly related to resources and capabilities in in the creation of a university spin-off.
Geenhuizen (2009) identified different types of obstacles, seen as ''problematic situations in gaining resources'': market-related, financial and management obstacles (figure 2). He described that market-related obstacles occur most often, with financial and management obstacles in the second and third place, respectively.

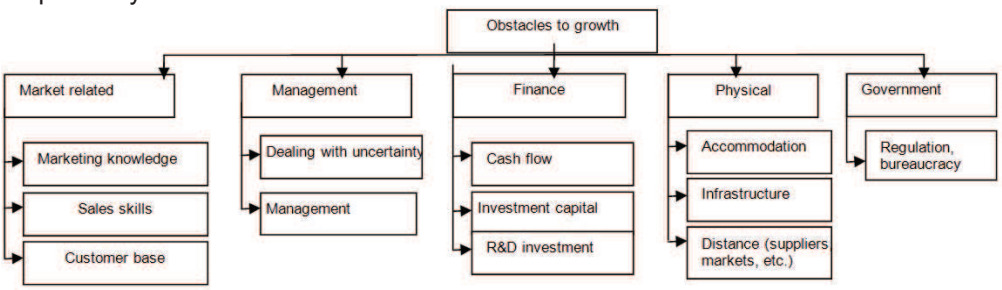

Figure 2. The nature of obstacles
Source: adapted after Geenhuizen (2009)

Understanding how universities can promote the establishment and growth of spin-offs requires detailed knowledge about how these firms develop and the type of conditions and support that facilitate their success.
Academic spin-offs have a historical relationship with university such as their professors previously or former colleagues, which can could to a recommendation and intermediation to potential industrial partners or investors.
From Shane point of view (2014) the technology licensing officers play an important role in the creation of university spinoffs.
Prior research indicates that faculty members with ties to investors or business, or industry experience, are more likely to engage in spinoff activity.
Spin-offs, companies with strong future perspective are facing obstacles in obtaining financial resources [Shane, 2004; Siegel et al., 2003]. From Wright et al. (2006) point of view, spin-offs are very risky because of their inability to obtain funding in order to continue with their innovation activity.
The firms are different taking into consideration the following terms: the type of resources, the business model and the institutional relationship/background.
The spin-offs biggest obstacle consists in the facts that evolve from an initial idea in a non-commercial environment to becoming established as a competitive firm.
Clarysse et al. (2005) highlight the problems of conflicts between stakeholder objectives with regard to the type of ventures they wish to create and the resources they seek to commit.
In order to understand the mechanism of these firms it is important to understand the nature of these firms. From Steffensen et al. (2000) an important factor in the success of the spin-offs is the degree of support received.
From Krabel and Mueller (2009) perspective the creation of a spin-off depends on the patenting activity of the scientist, entrepreneurial experience, the personal opinions about the benefits of commercializing research and close personal ties to industry.
Shane (2014) shows that in technology licensing officers vision the best inventor for opening a spin-off needs to have the main characteristic of an entrepreneur: male, immigrant, with industry experience, and easy to work with.
Elpida' s opinion (2010), we can find the supportive *factors* : in the beginning of the university spin-off development are:

- *Market Needs*- a critical factor for sustainable success of the spin-off is to connect the new concept with adequate market needs.
- *Human capital* plays. Skills and experiences of the entrepreneurial inventors are indispensible for a successful commercialization of the invention.
- *Policy makers*- are encouraging research-based universities to increase the rate of spin-off formation.
- *Legislation*: At local, regional, national or even global level legislation can influence the spin-off creation. The environment can foster entrepreneurship through the tax and regulatory environment for new businesses, insolvency law reforms and promoting efficient financial markets in all member states.
- *Nature of capital***.** Having the idea or invention is not enough, finance becomes critical for a spin-off company. As external source financing we find venture capital and business angels financing**.**

- *Bridging Institutions*: technological parks, incubators, innovation centers, develop and encourage the process of diffusion and transfer of knowledge and technology.

Incubators play a very important role for the academic spin-offs because of the following reasons: cheap and flexible accommodation, including shared services and access to pre-seed capital, programs for improving the entrepreneurial capabilities of founders/managers.

Conclusions

Successful businesses are conditioned both quick and easy access to knowledge as skilled labour, technical and specialized social support and the clear identification of suppliers, customers and innovative solutions.

Universities must become more active players in the Romanian economy based on knowledge, able to respond effectively to market demands. In economically advanced countries, prestigious universities have a key role in their growth. Consequently, the economic-university relationship is of strategic importance and of public interest needed to be developed and continuously streamlined by appropriate government policies.

The more inventors are linked with the private sector the more their interest in creation of spinoffs raises.

The most important key elements in creation of an academic spin-off are: entrepreneurs, resources and opportunity. In order to increase the economical rate, universities have to prepare the graduates, the future managers, to develop the right competences in order to create spin-offs and start-ups.

The lack of entrepreneurial skills is considered to be a barrier in promoting the academic entrepreneurship and dilutes any positive effects of spin-off investments and programs.

Studies show that universities with closer ties to industry tend to generate greater numbers of spin-offs and exhibit more entrepreneurial activity.

Although Romanian universities, especially public ones, should access EU funds for R&D projects, the current low absorption degree and the problems manifested as well as the certainty that the funding will reappear in the next financial programming period (2014 – 2020), underlies the necessity to study R&D projects' implementation framework and the factors that determine its success or failure.

The incubator acts as mediator or a direct supplier of resources without substantial costs.

In order to become more profitable and more well-known the academic spin-offs has to be included in a business incubator. In this way likelihood of failure is reduced and the business incubator in provides an ideal environment to create, exploit, and share knowledge.

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