# INTERNATIONAL WORKSHOP ON INNOVATION & ENTREPRENEURSHIP

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## PROCEEDINGS

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# PROCEEDINGS of INTERNATIONAL WORKSHOP ON INNOVATION & ENTREPRENEURSHIP

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# AN INTEGRATED INNOVATION MANAGEMENT FRAMEWORK

Nader Nada[1], Mohamed Kholeif[2], Ahmed Elbadawy[3], and Tugrul Yanik[4]

## Abstract

Through our literature review we realized that the full implementation of innovation framework in many organizations does not appear to take place routinely within management practice and that, where it does, it tends to focus on output measures. Further, from the relatively small number of empirical studies of frameworks in practice, measurement of innovation management appears to be undertaken infrequently as an ad hoc approach, and relies on outdated innovation frameworks. In this paper we introduce an integrated and comprehensive framework that addresses the innovation management at both levels of the firms and projects. We developed a synthesized innovation management framework that consists of eight dimensions including the Innovation Balanced Scorecard (IBS) to measure four categories of innovation Key Performance Indicators (KPI), Open Innovation, and Commercialization. The paper makes two important contributions. First, it takes a step of incorporating a vastly diverse innovation frameworks into a single framework with several newly added dimensions. Second, through the application of this framework to a particular context, practitioners will be able to conduct an evaluation of their own innovation management activity, identify gaps, weaknesses or inadequacies, and also improvement potential.

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**Keywords:** Innovation, Framework, Measurement, Innovation Balanced Scorecard

## 1. Introduction

Innovation is the process of making changes to something established by introducing something new; these changes can be either radical or incremental. Innovation is an important force in creating and sustaining organizational growth. Effective innovation can mean the difference between leading with a particular product, process, service, or business model.

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Innovation framework is about describing how to systematically deliver innovations that add value to customers. (O'Sullivan 2009).

There have been several studies that have investigated the limitations of various innovation approaches and innovation frameworks (Werner and Souder 1997), and of specific measurement framework (Trajtenberg 1990) as they relate to the practice of innovation.

Our initial study and literature review on innovation frameworks showed that there exist a diversity of perceptions, approaches and practices that can be confusing and ambiguous. The consequence of this is the lack of an updated meticulous, comprehensive, and integrated framework covering the range of all activities necessary to generate and manage ideas to turn these ideas into useful added values to customer and new marketable products, services, or business model.

The purpose of this paper is to introduce integrated and comprehensive framework to manage and measure innovation at any type of organization. The next sections of this paper represent our proposed Integrated Innovation Framework (IIF). The framework is based on literature review (e.g. Meitzner 2010, O'Sullivan, 2009, and Adams 2006) and some of our empirical studies at the Arab Academy for Science and Technology. The following sections include eight-key-dimensions model for the IIF and covers the important roles that culture, organizational leadership and structure, strategic alliance, and shared knowledge can have on the organization competitive edge and innovative business model.

The framework is composed of the following eight-key-dimensions: Organization Strategy and Structure and Innovation Culture, Knowledge Management, Innovation Process, Resources for Innovation, Intellectual Property Management and Commercialization (IPMC), Open Innovation and Innovation Network (OIIN), and Innovation Assessment, Figure 1 depicts the Integrated Innovation Framework.

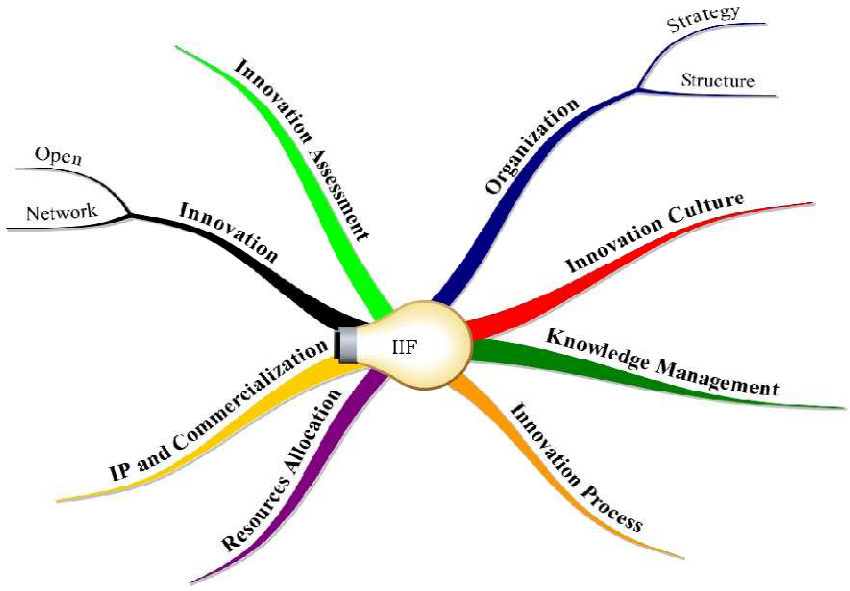


**Figure 1. Integrated Innovation Framework**

## 2. Organization Strategy and Structure

The organization innovation strategy is very vital element of managing innovation success at any organization. It extends not only to creating an organization where innovation can bloom, but also to providing clear direction about the goals, scale and degree of innovation that is required to deliver the strategic and financial goals of the business. This direction needs must be embedded in the corporate plan to ensure that it is resourced and managed with clear accountability for its success.

In creating the master plan for innovation, organization leadership usually works with senior management teams to develop innovation strategy to guide the innovation efforts of their organization. We view innovation strategy as the master plan which sets the goals and direction for innovation, allocates the resources and investment, specifies the measures for success and helps to coordinate all innovation initiatives.

Linked to the corporate plan and growth strategy, the innovation strategy should be designed to: (1) define the strategic arena for innovation, (2) specify the goals and expectations of the innovation effort, (3) reflect the degree of innovativeness desired (3) manage risk and reward (6) allocate people and financial resources

The Organizational innovation as new ways work can be organized, and accomplished within an organization to encourage and promote competitive advantage. It encompasses how organizations, and individuals specifically, manage work processes in such areas as customer relationships, employee performance and retention, and knowledge management. (Fagerberg et al. 2006)

The organizational structure should be built to encourages individuals to think independently and creatively in applying personal knowledge to organizational challenges.

The organizational innovation creation is fundamental to the process of innovation. Innovation constitutes part of the system that produces it. The existing literature on organizational innovation is diverse and not well integrated into a consistent framework. So, organization leadership should come up with a flexible comprehensive innovation organizational framework that can help them to achieve the following preferred organizational innovation strategies: (1) Cross functional team building, (2) Independent and creative thinking, (3) Matrix organizational approach, and (4) Open innovation (Lam 2006)

The value and importance of knowledge and learning within organizational innovation is crucial. If innovation is about change, new ideas, and looking outside of the organization to understand inside and outside environment, then continuous learning is a requirement of any organizational innovation success.

## 3. Innovation Culture

McNemara (2000) considered the organizational culture as the personality of the organization that is comprised of the assumptions, values, norms and tangible signs (artifacts) of organization members and their behaviors.

At the heart of any organizational culture is the need to be innovative at all levels and improve or change a product, process or service. All innovation focused around change - but of course not all change is innovative. ACISSR organizational culture helps individuals to think independently and creatively in applying personal knowledge to organizational challenges. Therefore, organizational culture depends mainly on innovation that supports new ideas, processes and generally new ways of "doing business".

Teece (1998) in his framework suggests that both the formal (governance modes) and informal (cultures and values) structures, as well as firms' external networks, powerfully influence the rate and direction of their innovative activities. Teece also identified four classes of variables which include (1) firm boundaries, (2) internal formal structure, (3) internal informal structure (culture), and (4) external linkages, the researcher also identifies four type corporate governance modes: (1) multi-product integrated hierarchy, (2) high-flex silicon valley type, (3) virtual corporation and (4) conglomerate. He suggests that different organizational arrangements are suited to different types of competitive environments and differing types of innovation.

In order to build an organizational culture that encourages innovation, we need first to create a climate of innovation that is encouraged and supported by senior management. Second, managers should be routinely identifying and bringing together a team that is very interested in innovation and willing to think new ideas and act on them. Third, a culture should be attached to a specific process that will take care of evaluating the innovation teams and identifying what has and hasn't worked as a result of the innovation team activities. Fourth, organization should be very focused on its goals and their core values of such an innovative culture.

The most important mindset of the creative and sustainable innovation culture rely on the management expectation about how to improve organizational structure, processes, products, services, and customer relationships as a core part of the business model.

## 4. Knowledge Management

The road map to organizational innovation depends on the organization ability to impart new knowledge to their employees and in the application of that knowledge. Knowledge should be used for bringing new ways of thinking, and as a corner stone to creativity and a solid route to change and innovation.

The value of learning and knowledge can only be realized once put into practice. If new organizational knowledge doesn't result in change or improvement, either in processes, business outcomes, or increased customers satisfaction or revenues, then its value hasn't been interpreted into success. (Kustoff 2008)

Leadership will make sure of identifying, evaluating , capturing, and sharing the knowledge at all the knowledge layers. In order to satisfy the objectives of each knowledge layer, management will make sure of putting a formal knowledge management schema in place as part of its culture.

The implementation and integration of knowledge management will involve several domains such as leadership, strategy, structure, processes, and technology.

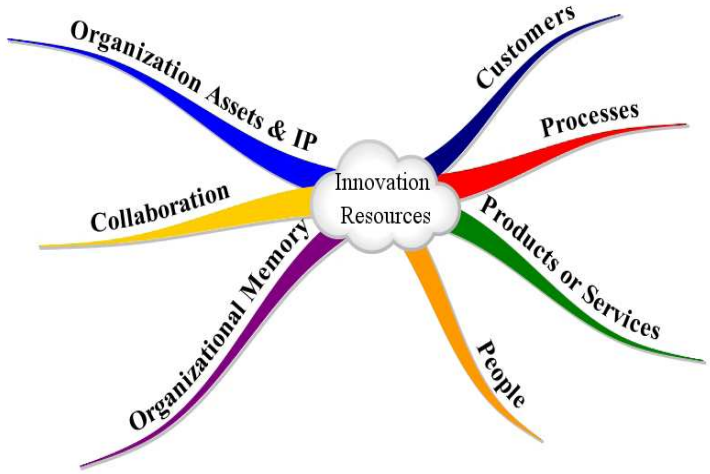


**Figure 2. Knowledge Resources**

Many organizations usually start by focusing on the push of better sharing of existing knowledge e.g. sharing best practices. However, best practices indicate that the creation and conversion of new knowledge through the processes of innovation gives the best long-term pay-off.

Organizations can leverage value through knowledge by concentrating on some of the following seven knowledge resources: customer, processes, products and services, people, organizational memory, collaboration, or organization assets and intellectual capital. (skymre 2009) Figure 2 depicts the knowledge resources.

## 5. Innovation Process

The primary challenges associated with innovation process management include identifying and investing in the best ideas that are in line with the organization innovation strategy in order to assign the right resources, and make the necessary coordination to succeed in achieving the organization objectives. The organization should have structured innovation processes in place to drive transparency, metrics development, or cross-functional collaboration.

Organization team members should be given the opportunities to contribute and to socialize ideas and within the organization As speed and coordination are critical to organization success, an effective collaboration process is essential to turn insights into ideas and action.

Organization should adopt a well defined and validated systematic process such as Stage-Gate innovation process model which has been developed by Cooper (Cooper 2008) or the Design Thinking process.

The Design Thinking Process is a human-centered set of methods and tools that combines approaches found in design and ethnography with technology and business skills. Based on our early experience we recommend using this iterative process to find out about people's hidden needs and match those with what is technologically feasible and what is viable in terms of

business strategy. The results at the end enrich the life of all stakeholders by creating experiences which could be in any form, such as products, services, processes, events and even policies.

Design thinking is a creative process based around the "building up" of ideas. There are no judgments early on in design thinking. This eliminates the fear of failure and encourages maximum input and participation in the ideation and prototype phases. Outside the box thinking is encouraged in these earlier processes since this can often lead to creative solutions.

This paradigm also focuses on a collaborative and iterative style of work and an abductive mode of thinking, compared to practices associated with the more traditional Mathematics/Economics/Psychology (M/E/P) management paradigm (Jones 2008).

The design thinking process has seven stages: define, research, ideate, prototype, choose, implement, and learn (Simon 1969). Within these seven steps, problems can be framed, the right questions can be asked, more ideas can be created, and the best answers can be chosen. The steps aren't linear; they can occur simultaneously and can be repeated. Although design is always subject to personal taste, design thinkers share a common set of values that drive innovation: these values are mainly creativity, ambidextrous thinking, teamwork, end-user focus, curiosity.

## 6. Resources Allocation

From the perspective of its management, it is no longer sufficient to treat innovation as a linear process where resources are channeled at one end, from which emerges a new product or process. The key to organization survival is the acquisition of resources from the external environment

Organization management should develop the necessary capital, infrastructure and human resources to support the application of both preservation and evolution activities. Expectations must be identified for the output of the innovative process and funding needs to be earmarked for the support of spontaneous innovation. The application of innovation must become a requirement for advancement in the organization.

Innovation metrics must be adopted and reported with the fervor and frequency of the typical financial metrics. Intellectual property (density and quality) must be significantly enhanced by the innovation efforts. Innovative activities and outcomes must be integrated into the vision, mission, strategies and objectives of the organization. The innovative work must be rewarded and communicated – strongly – throughout the organization.

The process of selecting innovation projects requires evaluation and resource allocation under uncertain conditions. It is argued that a systematic process guided by clear selection criteria can help optimize the use of limited resources and enhance an organization’s competitive position (Hall and Nauda 1990).

## 7. Intellectual Property (IP) Management and Commercialization

As the invention development work nears completion, an intellectual property management plan needs to be developed. In fact, it is advisable to anticipate this need during the technology development phase and to initiate the development of an IP management program at

this time. Some strategic activities, such as the decision to patent or not, should normally be considered during the development phase.

Patented inventions are the most straightforward, since a patent provides the holder exclusive right to exploit the technology covered by the patent for a set period in a given jurisdiction. Patents are generally obtained for inventions that are key to an important process or product and without which it would be difficult or impossible to duplicate the invention in question. Companies may also patent inventions for defensive purposes, to bar entry to a market by a competitor. The decision to keep or abandon a patent is typically based on the strategic value of the patent to the operation of the business.

Once the scope and usefulness of the intellectual assets are fully understood, they can often be commercialized in a variety of ways. There are several different commercialization or exploitation options, each with its own set of implications. These include: use in the existing business, creating a subsidiary or spin-off business, use in joint ventures, or licensing-out.

**8. Open Innovation and Innovation Network**

At the regional level, the idea of sharing ideas and innovation between companies, universities and other research centers would seem to be very uncommon practice for many institutions. In this context, the idea of opening the closed doors of research for others to learn from would seem foolhardy, and yet, the concept of 'open innovation' has becoming increasingly prominent, necessitating new thinking in both the intellectual property industry and the enterprise boardroom.

The institutions may move to open innovation as a result of major advances in technology and society, which in turn have facilitated the dissemination of information through different mechanisms such as the Internet. Thus, the open innovation model states that since firms cannot stop this phenomenon, they must learn to take advantage of it. Organization, may work on signing open innovation agreements with all interested institution at the local and international levels. .

The capacity for sustained innovation is rooted in a complex set of relationships between the ACISSR

dynamics and the broader setting within which we operate. The organization capabilities are sustained through regional and International communities of universities, research centers and firms and supporting the innovation networks of institutions that share a common knowledge base and benefit from their shared access to a unique set of skills and resources.

Because of the growing complexity of innovation in the knowledge-based economy, there is an increasing degree of specialization and interdependence among firms and institutions. This interdependence forces greater cooperation among firms and research centers located within geographically based clusters. (Holbrook, 2000).

A proper understanding of the role of organization in a cluster of innovation requires a more understanding of the nature of the linkages among firms and research institutions within this

clusters and how the emerging needs of the region influences (and constrains) the community innovation and growth potential.

## 9. Innovation Assessment Balanced Scorecard

One of the ultimate goals the IIF presented in this paper is the construction of inclusive measures of innovation management. The choice of an appropriate R&D measurement metric depends on the user's needs in terms of breadth of innovation measurement, type of R&D being measured, available data and amount of effort the user can afford to allocate and to put into effect (Adams et al. 2006).

Quantifying, evaluating and benchmarking innovation competence and practice is a significant and complex issue for many contemporary organizations (Frenkel et al. 2000). An important challenge is to measure the complex processes that influence the organization's innovation capability, in order that they can be optimally managed (Cordero 1990).

Our proposed innovation assessment approach is to use a balanced scorecard that integrates indicators with strategic objectives and projects in organizations. It is distinctive and inclusive in using four strategic perspectives: finance, customer, processes, and learning.

The successful implementation of the scorecard approach should translate an organization's mission or vision and objectives into a comprehensive set of performance indicators (Kaplan & Norton, 1996).

**Table 1.** Innovation management assessment areas

| Scorecard Category | Assessment Area |
|---|---|
| **Financial** | People<br>Physical and financial resources |
| **Process** | Idea generation<br>Communications<br>Tools<br>Information flows<br>Project efficiency<br>Structure |
| **Learning & Growth** | People<br>Culture<br>Knowledge Management<br>Collaboration<br>Strategic leadership<br>Strategic orientation |
| **Customer** | Market research<br>Market testing<br>Marketing and sales<br>CRM |

Table 1 can be viewed as the basis for a balanced scorecard for innovation management, that is, as a balanced set of areas that need to be assessed in order to gain insight into an organization's capability to manage innovation.

## 10. The IIF Systematic Implementation

The IIF must be carefully designed so that it leads an ongoing series of management decisions, actions, and reviews. According to the results of our literature review, none of the

investigated frameworks has been empirically validated through a computerized system. So, we decided at the Arab Academy for Science and Technology to take further step ahead by partially developing the IIF toolkit system to provide any organization with a tool that can help practitioners to systematically implement, validate, and manage the IIF.

We started with two important subsystems, (1) idea generation, evaluation, and management subsystem and (2) project portfolio management subsystem. Currently, the two subsystems are under investigation and validation in collaboration with Data Management System, one of the leading software development companies in Egypt.

## 11. Contribution

Our literature review on innovation frameworks showed that there exists a diversity of perceptions, approaches and practices that can be confusing and ambiguous. The consequence of this is the lack of an updated meticulous, comprehensive, and integrated framework covering the range of all activities necessary to generate and manage ideas and turn these ideas into useful added values to customer and new marketable products, services, or business model.

In this paper we introduced an integrated and comprehensive framework to manage and measure innovation at any type of organization.

The framework is composed of the eight-key-dimensions: Organization Strategy and Structure and Innovation Culture, Knowledge Management, Innovation Process, Resources for Innovation, Intellectual Property Management and Commercialization (IPMC), Open Innovation and Innovation Network (OIIN), and Innovation Assessment.

The IIF is a synthesized framework which put emphasis on three newly introduced dimensions: Intellectual Property and Commercialization, Open Innovation-Innovation Networks, and the Innovation Balanced Scorecard (IBS) to measure four categories of innovation KPI. Additionally, we partially developed the IIF toolkit system to help any organization to systematically implement, validate, and manage the IIF.

The IIF helps practitioners to conduct an evaluation of their own innovation management activity, identify gaps, weaknesses or inadequacies, and also improvement potential. The IIF implementation will support the organization effort to discover and maximize the important roles that culture, organizational leadership and structure, strategic alliance, and shared knowledge on the organization competitive edge and their innovative business model

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# CRISES, INNOVATION AND ENTREPRENERSHIP: CASE OF TURKEY

Gül Ş.Huyugüzel Kışla[5], A. Ayşen Kaya[6]

**Abstract**

Entrepreneurship and innovation are the two important concepts that foster each other. Especially, the countries who have the ability of being competitive and innovative are the ones whose entrepreneurial identities are overbeared. Entrepreneurship which is defined as taking risks, catching up the innovations, utilizing the opportunities, and bringing those processes into action supports the countries' competitiveness all over the world. On the other side, the economic crisis occurred in the past and the latest financial crisis effect the enterprises negatively in the worldwide. The fluctuations in the financial markets and the fewer financing options have effected especially the Small and Medium Enterprises (SMEs) negatively. Besides, the economic crisis and the unfavorable future perspectives have influenced firm's entrepreneurial behavior badly. From this point of view, the changes of the Turkish firms' attitudes toward the entrepreneurship and innovation before and after the crises will be discussed in this study. Furthermore, the effect of the latest economic crises on the other countries will be examined. Finally, with the help of the SWOT analysis, some policy implications for Turkey will be made in the light of the entrepreneurship.

**Keywords:** Crisis, Entrepreneurship, Innovations.

## 1. Introduction

While the borders among the countries decrease with the globalization, some economies have better economic position with the help of the different technology and innovation policies applied. OECD (2005) defines innovation as the development, deployment and economic utilization of new products, processes and services. The entrepreneurs and firms begin to seize

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upon global business opportunities by commercializing new products and processes faster than their competitors in order to raise the wealth of the nations (OECD, 2005). In many developed countries, successful innovation policies are performed in order to achieve high growth rates, better life conditions and so forth. Of course these innovation policies need to be supported with the governmental decisions, networks between firms and the universities and other public and private institutions.

Within the context of the industrialization, the rising importance of the mass production and economies of scale led to increases in the firms' scale. From the 19th century to World War II, big companies dominated in the national and international markets. In these years, Small and Medium Enterprises (SMEs) were of secondary importance. However, the economic crisis occurred after 1970s and the rising importance of Information and Communication Technologies (ICTs) generate changes in the attitudes towards to SMEs. According to some researchers, the crises that occurred after 1970 period arose from the mass production, namely Fordist production system. Hence, the big companies began to downsize and leave their non-competitive process to the small ones (i.e.outsourcing). Correspondingly, the consumers' demands to the differentiated products have increased and production technologies have been more elastic. So, the economies of scale have losen its significance with respect to early stages. In the light of these developments, the importance of the SMEs has increased (Taymaz and et.al, 2008,p. 14).

SME's undertake lots of important roles like being engine of the growth, creating the elasticity in the market, and supporting the employment. In the economies, whether it is developed or developing, SMEs represents the higher share of the total in many industries and they contribute to the economies via creating employment and generating value added. On the other side, their important contribution to the economies comes from their innovative capacities. As a matter of fact that borders among the countries have now been invisible. In such a global scale, firms have to be innovative in order to compete with each other. Whether it is a process innovation, product innovation or organizational innovation, the firms have to give importance to this issue. The reason is that while some firms have the advantage of doing innovative activities, they can use this opportunities in their production process, marketing process or in their organizational structure. Hence, their competitive capacity is bigger than the old fashion ones and their primary goal can be achieved, i.e. maximizing their profits. As globalization reshapes the international economic landscape and technological improvements bring about uncertainty, the entrepreneurship will help to support the economies when they face some political, social and economic hardships (OECD, 2008, p.7). Nonetheless, whether it is innovative or entrepreneurial, SMEs have important contributions to the economy. From this point, in this study, we will give information about the entrepreneurship in the concept of its importance and Turkish entrepreneurial experience. After this, we will mention about the effect of the economic crisis on the SMEs in the light of Turkish case and other countries. Finally, we will conclude the study with the help of the SWOT analysis concerned the entrepreneurship in Turkey.

## 2. The Importance of Entrepreneurship

According to OECD (2010), *entrepreneurship* is a phenomenon associated with entrepreneurial activity, namely enterprising human action in pursuit of the generation of value through the creation or expansion of economic activity by identifying and exploiting new products, processes of markets. It may occur through new business creation or within SMEs, large firms and the public and nonprofit sectors. Particularly, it involves both the impulse to create and innovate and the recognition of innovation from others and the desire to implement innovation (*e.g.* starting a new venture, finding new markets, introducing new organisational models) and motivate others to succeed in its implementation. In order to be a successful entrepreneur, there are some characteristics that have to be acquired. First of all, an entrepreneur has to identify and extract relevant knowledge. Second one is related with the ability that includes strategic thinking, self-confidence and contentious with the challenges and uncertainties. Last one is about attitudes; an entrepreneur has to attune him/herself to the changes and be open for the improvements in the work environment (OECD, 2010, p. 167-8). In addition, Drucker (1985) expanded Schumpeter's (1949) assertion that "*when we speak of the entrepreneur we do not mean so much a physical person as we do a function*" and described entrepreneurship as being a "behaviour rather than a personality trait". From this point of view, an entrepreneur can be thought as the full scope of actions (Golden et.al,2003, p.5).

According to Carree and Thurik (2002), entrepreneurship is an ill-defined, multidimensional concept. Also, there are various intermediate variables or linkages to explain how entrepreneurship influences economic growth. This can be shown in the figure below.

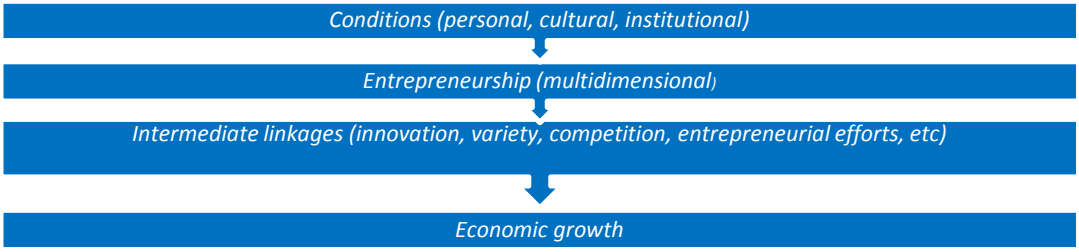


**Figure 1.** Introductory Framework (Source: Carree and Thurik, 2002, p. 4.)

Actually, when necessary conditions are provided, with the help of the entrepreneurship and innovation, economic growth would be inevitable. Carree and Thurik (2002) draw a framework for linking entrepreneurship to economic growth given below.

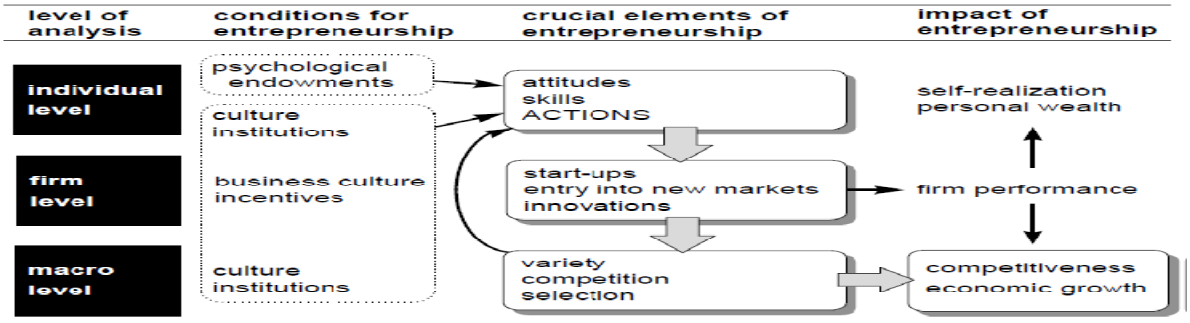

**Figure 2.** Framework for Linking Entrepreneurship to Economic Growth (Source: Carree and Thurik, 200, p. 21. )

With the improvements in the entrepreneurship, economic activities can be stimulated and new job opportunities can be created in order to decrease the umemployment phenomenon. Especially, the countries where the cyclical fluctuations and recessions are occurred in the past have to give importance to the entrepreneurship and innovation (Gürol and Bal, 2009). Whether entrepreneurship is achieved by starting up new business or generate innovations in the different stages of the economic activities, the impact would be more than expected. In the information age, many of the most successful entrepreneurs have been those that commercialised innovations like Bill Gates at Microsoft, Larry Ellison at Oracle, Steve Jobs at Apple or Jeff Bezos at Amazon.com (Golden et.al, 2003, p. 6). Furthermore, in Ripsas' (1998) study, he showed an important summary table about the role of the entrepreneur in the history. According to table 1, every philosopher had their own explanation to examine the concept of entrepreneur.

**Table 1.** Role of the Entrepreneur in the History of Economic Theory (Source: Ripsas, 1998, p. 106.)

| | |
|---|---|
| 1. The entrepreneur is the person who assumes the risk associated with uncertainty *(e.g., Cantillon, Thünen, Mill, Hawley, Knight, Mises, Cole, Shakle)*. | 2. The entrepreneur is the person who supplies financial capital *(e.g., Smith, Turgot, Böhm-Bawerk, Pigou, Mises)*. |
| 3. The entrepreneur is an innovator *(e.g., Baudeau, Bentham, Thünen, Schmoller, Sombart, Weber, Schumpeter)*. | 4. The entrepreneur is a decision maker *(e.g., Cantillon, Menger, Marschall, Wieser, Amasa Walker, Francis Walker, Keynes, Mises, Shakle, Cole, Schultz)*. |
| 5 The entrepreneur is an industrial leader *(e.g., Say, Sain-Simon, Amasa Walker, Francis Walker, Marshall, Wieser, Sombart, Weber, Schumpeter)*. | 6 The entrepreneur is a manager or super-intendent *(e.g., Say, Mill, Marshall, Menger)*. |
| 7. The entrepreneur is an organizer and coordinator of economic ressources *(e.g., Say, Walras, Wieser, Schmoller, Sombart, Weber, Clark, Davenport, Schumpeter, Coase)*. | 8. The entrepreneur is the owner of an enterprise *(e.g., Quesnay, Wieser, Pigou, Hawley)*. |
| 9 The entrepreneur is an employer of factors of production *(e.g., Amasa Walker, Francis Walker, Wiesr, Keynes)*. | 10 The entrepreneur is a contractor *(e.g., Bentham)*. |
| 11. The entrepreneur is an arbitrageur *(e.g., Cantillon, Walras, Kirzner)*. | 12. The entrepreneur is an allocator of ressources among alternative uses *(e.g., Cantillon, Kirzner, Schultz)*. |

In the literature, generally Scumpeter's defition has been adopted because of the rising importance of the innovation. Actually, in the economic crisis periods, entrepreneurship has gained additional attention because of its ability of bringing dynamism to the economy. The creative destruction as an idea of Schumpeter, occurs in the crises periods; less efficient firms exit the industry, while more efficient ones emerge and expand. In order to have a sustained growth, policy makers all agree to improve entrepreneurship whether with the financial supports, educational supports or organizational supports. Entrepreneurship can be measured by new firm creation or self-employment rates. When new firms are entering to the industry, they usually introduce innovative products, processes and organizational structures to the overall economy (OECD, 200, p.7). The common advantages of the entrepreneurship are that new firms help to boost employment and output in the less developed regions. Also, in some countries women entrepreneurship is supported with some policies applied in order to facilitate the participation (OECD, 2008). On the other hand, entrepreneurial countries gain competitiveness in the global era. Today, the entrepreneurial countries are the ones who are the innovative and technology-based ones. According to Çetindamar (2005), the contribution of entrepreneurship to economic

welfare is succeeded through three ways, namely by increasing employment, creating and diffusing Technologies and developing new and differentiated business models, processes and techniques.

## 3. Entrepreneurship in Turkey

In the context of the development of the entrepreneurship, Turkey has passed through different stages involved different industry policies. From 1923 to until today, the policies applied are "incentives to private entrepreneurhip", "statism","transition to liberal economy", "planned economy", and outward-oriented liberal economy (İGİAD, 2008). However, the importance of the SMEs has been realized in the 2000s with the increasing competition among the countries. According to Napier and et.al (2004) Turkish SMEs have played an imperative role in the privatisation wave speeding up the development with their flexibility and private sector involvement. Also, by taking an important part in cross-border activities and networks, SMEs facilitate a significant bridge-building process between Turkey and members of the European Union. In addition, a developing SME sector could also play a key role in overcoming the deep regional disparities characterizing the Turkish economy and SMEs serve as the principal "training ground" for entrepreneurial activity and pave the way for increased innovative activity. On the other hand, SMEs remain weak when innovative capacities are compared with the large companies. Indeed, the proportion of innovative activities increases with the firm sizes. Large companies more capable to carry out innovative activities compared to SMEs. This situation is not true only for Turkey, but also true for the European countries either (Naiper et.al., 2004, p. 64). It is also supported by Schumpeter's study[7]. According to him, large companies are more important as innovators compared to smaller ones (Hagedoorn, 1996, p. 889). However, the ability of the implementing changes and their flexible structure make SMEs one step ahead in the crisis periods. Here, the innovation performances of SMEs and large firms for Turkey are given in the figure below.

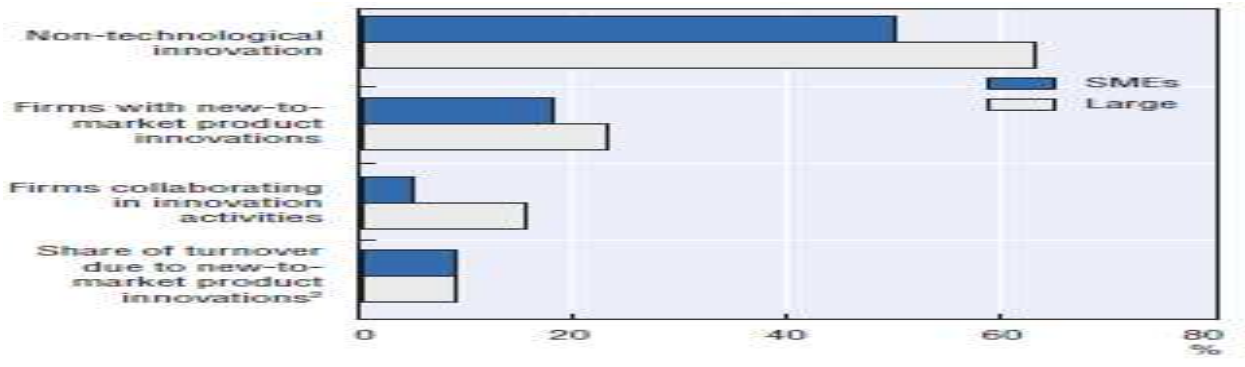


**Figure 3.** Innovation Performances of SMEs and Large Firms, 2004-2006. (Source: OECD, 2010, p. 105)

[7] For further reading, see Schumpeter, J. A. (1934,1980), The Theory of Economic Development. Oxford University Press: London.

In Turkey, the importance of the entrepreneurship through the SMEs has newly realized. Since the measurement of the entrepreneurship is quite difficult, a concensus between the organizations hasn't been achieved yet. For example, OECD uses number of self-employed as a proxy for the entrepreneur while GEM (Global Economic Monitor) uses the number of entrepreneurs who establish companies per 100 adults as an indication of a country's entrepreneurship (Çetindamar, 2005,p. 190). In order to draw a picture of Turkey's entrepreneurship structure, some available data and figures will be given in this part.

GEM classifies countries like factor-driving economies, efficiency-driven economies and innovation- driven economies. Turkey is labelled as efficiency-driven economies. This classification follows the 2008 Global Competitiveness Report and is relevant to entrepreneurship in relation to economic development (GEM, 2008,p. 5). According to GEM (2007), the percentage of a population engaged in setting up or running their own businesses is another way of gauging a country's entrepreneurial activity. It can be realized that, the percentage owners of established businesses and owners of new businesses in Turkey is quite higher than nascent entrepreneur. On the other hand, in some high-income countries or innovation-driven economies like United State, Finland and Iceland, the percentage of nascent entrepreneurs is high compared to Turkey.

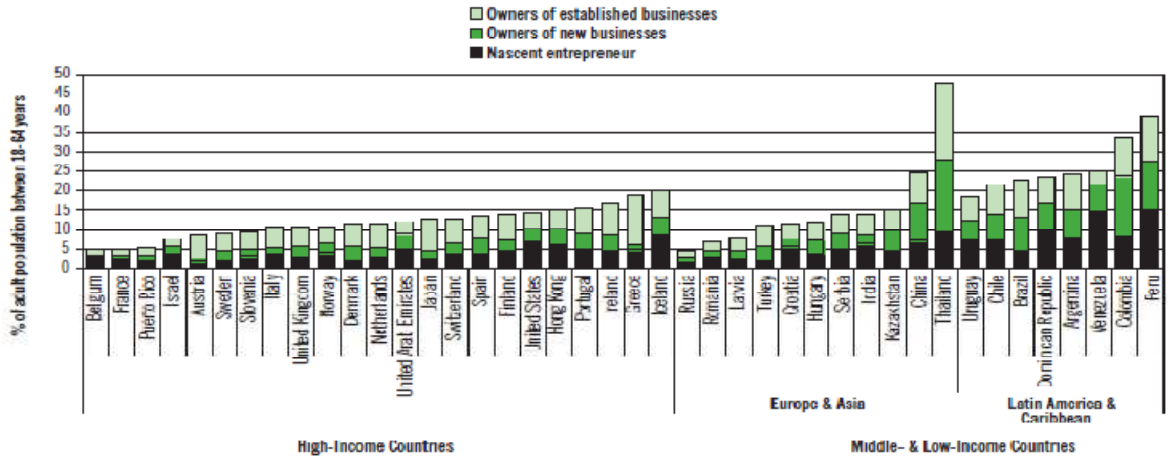


**Figure 4.** Share of Population That is in Different Stages of Engagement in Owner-Managed Businesses, 2007 (Source: GEM, 2007, p. 16.)

As mentioned above, self-employment rate is another indicator for the measurement of the entrepreneurship even though there has't been a consensus between the researchers. On the other hand, it is commonly used because of its function of practicality and most of the countries can announce self-employment data. Self-employment rates address a number of issues, such as the level of entrepreneurship across countries, the link between entrepreneurship and growth, and the relationship between taxation and entrepreneurship. A self-employed person is someone who independently operates his/her business, without being subjected to the control of a supervisor.

He/she does not have an employer, and is fully responsible for making the operational decisions to ensure the wellbeing and survival of the organizational unit (Bjuggren, 2010, p. 4). The numbers related to the self-employment rates are presented in figure 5.

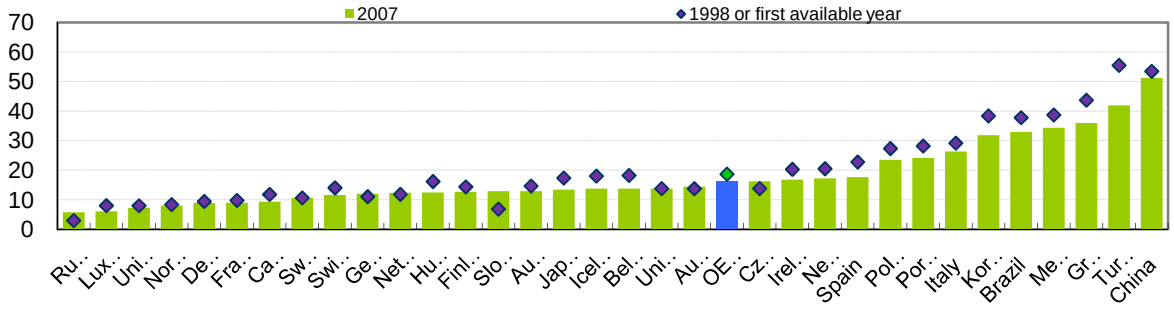


**Figure 5.** Self-Employment Rates[8], Total (Source: OECD FactBook, 2009.)

More particularly, there is a sustained decrease in self-employment rates from 1990 to 2008 except the economic crisis periods like 1994, 2001. In the transition from period 1993 to 1994, the self-employment increased from 57.8% to 59.1%. From 2000 to 2001, the self-employment rate increased by 1.4 point. [9]

**Table 2.** Self-Employment in Non-Agricultural Employment (Source: OECD, 2009.)

| | % of self-employed in non-agricultural employment | | | | | % of self-employed in female non-agricultural employment | | | | % of women in total non-agricultural self-employment | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Country | Years 70 | Years 80 | Years 90 | Years 2000 | Latest | Years 70 | Years 80 | Years 90 | Years 2000 | Years 70 | Years 80 | Years 90 | Years 2000 |
| Turkey | 29.2 | 24.2 | 25.2 | 25.6 | 25.6 | 36.4 | 14.5 | 15.5 | 15.5 | 14.9 | 6.8 | 9 | 18.4 |

In addition, the percentage of self-employment in non-agricultural total employment has been nearly stable from the years of 1970s to now, whereas female self-employment has decreased from 1970s to 1980s and percentage of self-employed in female non-agricultural employment hasn't change. According to Çetindamar (2005), the high levels of the self-employment comes from the limited job availability, so individuals start a business because of their needs of income generation.

On the other hand, there are some important facts about doing business in Turkey. For an entrepreneur, there is 6 prosedures, six days to start a business. Also, the cost and minimum capital required as a percentage of GNI per capita is respectively, 14,2 and 9,5. Starting a business dosn't take some much time but it is more costly compared to East Europe and Central Asia (8.3%) and OECD average (4.7%). When Turkey and the other countries subject to comparison in the concept of the barriers to entrepreneurship, it can be easly observed that Turkey is nearly the most restrictive country. Although there are improvements between the

[8] Self-employment rates contain information on the total number of non-employed, including employers, self-employed, members of production cooperatives and persons helping in the family business.
[9] For further information, please look at "OECD Factbook 2010: Economic, Environmental and Social Statistics ".

period 1998 and period 2008, Turkey has still faced challenging regulations and rules. According to Global Competitiveness Report (2009), the most important problematic factor for doing business is tax regulations. the second one is access to financing and the third one is tax rates. Inefficient government bureaucracy and policy instability are also included as the forth and fifth problematic factor.

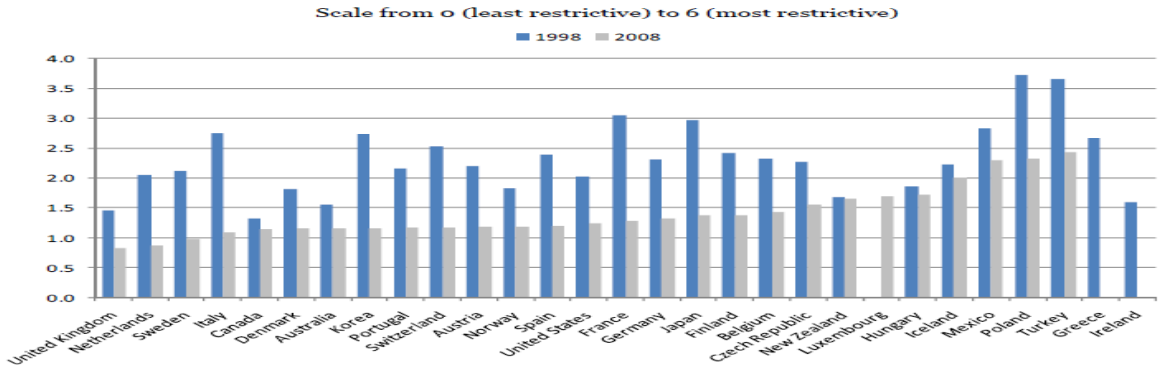


**Figure 6.** Barriers to Entrepreneurship, 2008 and 1998. (Source: OECD, 2009, p. 53.)

In addition, there are some other facts about the entrepreneurship issues in Turkey. For example, Turkey's place in the "ease of access to loans" is 75th in 133 countries. When we talk about innovative but risky projects which are held by entrepreneurs, the venture capital availability is more serious. In 2008-2009, the place of Turkey, is 107 out of 133 countries. So, these numbers support the idea that the primary problems for the entrepreneurs are of financial problems. The Research and Development (R&D) expenditures are also low compared to other countries. Turkey is 76th and 67th in the case of the university-industry collaboration in R&D.

## 4. The Effect of Crisis on Entrepreneurship

### 4.1. Case of Turkey

In the crises periods, the entrepreneurs can face some problems when they collect debts and they put their produced goods and services to the market. The fatal scenario would be for the entrepreneur is not to afford the costs and debts, hence facing bankrupts in this situation. It is very important to take precautions like allocating resources efficiently, decreasing costs before a possible crisis (IGIAD, 2008). By looking from the macroeconomic side of the crises, the possible consequences would be generally falling economic growth rates and employment levels. On the other hand, for the entrepreneurs, there would be decreases in their innovative activities. In the crises periods, the ability of the SMEs and large companies has differentiated. The adaptive skill of the SMEs like flexibility is useful in getting through the possible effect of the crises. On the other hand, large firms have to lay out a specific number of employees in order to

decrease the costs. SMEs and entrepreneurs'access to short-term and lon-term financing is quite difficult in the time of financial and economic crisis. There would be increasing risks, decreased liquidity and decreasing economic growth rates in the crises period. SMEs have some structural disadvantages. Some of them can be listed below;

- ✓ Because of their small size, they can't easily downsize,
- ✓ Their financial structure is weaker and they have lower capitalization compared to large firms,
- ✓ Their financial sources (like equity capital and credits) are inadequate (OECD, 2009, p.15).

In particular, Turkey has recently experienced economic crises in 1994, 2000 and 2001. Huge number of people lost their jobs in 1994 and 2001 but double women entrepreneurs as a small part of the overall entrepreneurs had to go bankrupts. The number of the women entrepreneurs who went bankrupts was 11000 in 1994 and 14000 in 2001. On the other hand, men entrepreneurs took advantage of the crisis in 1994. The number of men closing business decreased from 160000 to 152000. On the other hand, the negative effect was felt more deeply in 2001. The number of men entrepreneurs who went bankrupts increased from 28000 to 34000. Unfortunately, the data for men and women entrepreneurs has't been updated by SIS for the latest financial crisis (2008), the discrimination between women and men entrepreneurs couldn't be done. However, 9.8 % of the people losing their jobs are the ones who went to bankrupts. Therefore, the number of people who went bankrupts is approximately 262000 including both women and men.

### 4.2. Case of Other Countries

All over the world, countries have experienced economic crises regularly. These crises can be classified as real economic crises, banking crises, financial crises, monetary crises or external debt crises. The possible consequences of the crises no matter what type is occured can be an increase in the umployment rate and/or overall price level, a decrease in the production capacity, instability, low growth rate and fluctuations in the financial markets. The latest financial crisis has nearly affected the whole economies in the worldwide because it has been remarkable for its intensity and breadth (Lerner, 2010,p. 6). Of course, the latest financial crisis had an important effect on the innovative entrepreneurship. Mostly, the financial decisions of the investors' had changed because of the uncertainty in the financial markets. According to Lerner (2010), venture capital industry has also been affected badly. For example, venture-capital investment decreased 30% in the forth quarter of 2008 to its lowest level since 2005. On the other hand, it was quite difficult to find money from the other sources like pension funds, university endowments and rich investors for new entrepreneurial activities (Lerner, 2010,p. 7). Investors have chosen the existing companies to fund rather than the new start-ups. Also, the entrepreneurs have hardly used credits from the banks.

There is a summary table about the impact of the crisis on SME and entrepreneurship financing. According to this table, the financial crisis affected SMEs in three ways, namely; demand size, working capital and payment delays and exits (insolvencies and bankrupts). The related table is given below.

**Table 3.** Experienced or expected impacts of the crisis on SME and entrepreneurship financing[10] (Source: OECD, 2009, p. 24.)

| | Impacts on SMEs (Cf. Table 1) | | | SME demand for credit (Cf. Annex 2) | | |
|---|---|---|---|---|---|---|
| | Demand | Working capital & Payment delays | Exits (Insolven-cies and bankrupt-cies) | Total | Short-term | Long-term |
| **OECD** | | | | | | |
| Australia | | + | | | | |
| Austria | | | = | | | |
| Belgium | - - - | + + | + | - | | - |
| Canada | - - | + | - | + | | |
| Czech Republic | | | = | | | |
| Denmark | | | + + | | | |
| Finland | - - | + + | + | | | |
| France | | + | + | - - - | | |
| Germany | - | | = | - | | - - |
| Greece | - - - | + | = | | | |
| Hungary | | | + | | + | - |
| Ireland | | | + + + | | | |
| Italy | - | + | + + | - | = | - |
| Japan | - | + | | | | |
| Korea | - | + | | | + | - |
| Luxembourg | - | + | + | - | | |
| Mexico | - | + | | | | |
| Netherlands | - | + | - - | | | |
| New Zealand | - - | + + | + | | | - - |
| Poland | - | | | + | | |
| Spain | | | + + + | | | |
| Switzerland | | | = | | | |
| UK | - - | + | + | - - | + | - - - |
| USA | - - | | | - - - | + | - - - |
| EC | | | | - - | - - | - - - |
| **Non OECD** | | | | | | |
| Chile | - | | | | | |
| Estonia | | | = | | | |
| Romania | | | | | | |
| Russia | + | + | | | | |
| Slovenia | | | = | | | |
| Thailand | | | | | | |

According to OECD (2009), most of the countries have experienced payment delays on receivables and therefore a decrease of working capital occured. For example, In New Zealand, the share of enterprises waiting over 60 days for payment has risen from 4.8 % to 29.5 % between February 2007 and 2008. On the other hand, the insolvency rates increased showing SMEs' rising inability to obtain short-term financing. In Korea, for example banks haven't given credit to those SMEs whose credit ratings are low. In addition, in the financial markets, the private funds coinvesting with the public funds avoided from investment activities.

## 5. Conclusion

SMEs and entrepreneurs play important roles like generating employment, economic growth and being a source of the innovation. However, the global financial crisis effected the SMEs in different aspects. The striking impact came from the financial areas. Turkey took lessons from

[10] "+" signs (depending on the intensity) indicate that an experienced or expected increase on the impacts for the indicators in each column. A "=" sign indicates no change, and one and "-" signs indicate an expected or experienced decrease.

the former crises occurred in 1994,2000-2001 and with the help of the strong side of the banks, the possible effects of the global financial crisis has lessened. However, as a developing country, there are some strengths, weaknesses, opportunities and threats for the Turkish economy.

*Strenghts:* 1) The existence of an entrepreneurial culture. 2) The increasing support to the innovative activities by the public-related organizations (like TUBITAK-TEYDEB, KOSGEB, TTGV and others) and non-governmental organizations (i.e. TUSIAD, IGIAD). 3) The existence of a dynamic and export-oriented private sector. 4) the strong structure of the banks. 5) The newly existence of entreprenurial education.

*Weakness:*1) Weak innovation performances and R&D activities. 2) Inadequate venture capital system. 3) Tax regulations. 4) Difficulty in protecting the intellectual property rights. 5) Low level of women entrepreneurship. 6) Low levels of the colloboration between universities and private sector.

*Opportunities:* 1) improvements in the education system. 2) support master and doctorate thesis which are related with the industry.3) support for the establishment of the techno-parks and incubators to provide incentives for the companies.4) targeting to increase the economic competitiveness.

*Threats:* 1) Lack of regional and sectoral approaches to innovation policy making. 2) Insufficient number of financial institutions for supporting the innovative activities. 3) The inefficient allocation of the funds through the firms (Crehan and Jones, 2003, p. 65-69; OECD, 2009)

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# THE RELATIONSHIP BETWEEN ENTREPRENEURAL PROCLIVITY AND PERFORMANCE

Shahnaz Nayebzadeh[11], Mahmood Moein Aldin[12], Ebrahim Mansouri[13]

**Abstract**

Stan Davis and Christopher Meyer in their book "Blur: The Speed of Change in the Connected Economy" stated that scholars consider the world of today as noncontinious age. By noncontinious age it means that bygone solutions and previous experiences are not any longer appropriate for current and future problems of the company. The attitudes should be changed and the tendency of the company should be toward finding new strategies in order to produce the goods and services by the minimum costs and with the best quality in a way that empowers the company to compete in the world market of today and be the winner of this competition. Thus a determination entrepreneurship must be established within the organization.

Exploring the relationship between entrepreneurial proclivity and performance in manufacturing firms has been evaluated in this research project and the attempt was to determine the extent of the entrepreneurial proclivity in those companies accepted in IRAN stock exchange, measuring the six performance measures and study the relationship between entrepreneurial proclivity and performance. For this purpose, required information about the mentioned companies was

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collected from highest marketing authorities through some international questionnaire forms. Main variables of the research are entrepreneurial proclivity, and performance measures includes of Economic Value Added (EVA) and Refined Economic Value Added (REVA) as economic performance measures, market share and Market Value Added (MVA) as market performance measures, and Return On Assets( ROA) and Return On Equity ( ROE) as financial performance measures. Research method is correlation research with applied and provisional use. Implications of the results and a future research agenda are also offered.

**Keyword**: Entrepreneurial Proclivity, Economic Value Added (EVA), Refined Economic Value Added (REVA), Market Share, Market Value Added (MVA), Return On Assets (ROA), Return On Equity (ROE)

## 1. Introduction

The field of competitive strategy is largely defined by the work of Michael Porter (1980, 1990). In his 1980 book, Porter showed how the inherent attractiveness of a given industry was a function not only of the behavior of players in that industry, but also of the relative bargaining power of the adjacent industries (those from which it bought and those to which it sold), the potential threat of new entrants to that industry, and the potential threat of substitute products. Stated slightly different, he essentially broadened the concept of competition, so that rather than just viewing immediate rivals as competitors, the company should also see suppliers, customers, and potential rivals as competitors. Moreover, he also made it very clear that competition should be viewed as a good thing—a conclusion that applies to the entire competitive arena. In his 1990 book, Porter took these ideas further by looking at the relative competitiveness of different countries and industrial regions around the world. Again the approach was built on the idea that competition is healthy, as a stimulus for productivity growth and innovation. Taken as a whole, Porter's theory of competitive strategy provides valuable insights into the drivers of competitiveness. In a benign environment with few competitors and undiscerning customers, a company can be lazy and still very profitable, but it will never improve. In a volatile environment with many competitors, demanding customers, and top-quality suppliers, a company must become extremely competitive and entrepreneurial just to survive (Birkinshawa et al., 2005)

Entrepreneurship, which typically leads to new product introduction or market entry, creates value through association with the discovery and exploitation of profitable business opportunities, (Shane and Venkataraman, 2000; Lumpkin and Dess, 1996). In addition, entrepreneurial activities also create value when they facilitate 'access relationships' to resources and capabilities that are strategic to competitiveness and performance (Stuart, 2000).

Exploring the relationship between entrepreneurial proclivity and performance in manufacturing firms has been evaluated in this research project and the attempt was to determine the extent of the entrepreneurial proclivity in those companies accepted in IRAN stock exchange, measuring the six performance measures and study the relationship between entrepreneurial proclivity and Economic Value Added (EVA) and Refined Economic Value Added (REVA) as economic performance measures, market share and Market Value Added (MVA) as market performance

measures, and Return On Assets( ROA) and Return On Equity ( ROE) as financial performance measures.

## 2. Entrepreneurial proclivity

Many definitions of entrepreneurship have been provided in the literature. Some of these see firms themselves as the actors of the entrepreneurial effort and outline the entrepreneurial attribute these organizations should possess (Miller, 1983; Covin and Miles 1999). Other conceptualizations of corporate entrepreneurship more specifically refer to the action of individuals (or groups of individuals) within the firm (Sharma and Chrisman, 1999).

Contributions adopting the first kind of definition usually translate the characteristics of the individual entrepreneur to the firm-level. It is the case, for example, of the definition provided by Miller (1983) that identifies risk taking attitude and proactiveness as two of the three traits characterizing the entrepreneurial firm. Lumpkin and Dess (1996) added autonomy and competitive aggressiveness to the original Miller's dimensions. Studies focusing on individuals within the organization usually consider the activities that are performed by these players that might eventually show the characteristics of individual entrepreneurs. Jones and Butler (1992), for example, suggested that corporate entrepreneurship resides in the entrepreneurial behavior of managers. In an attempt to provide a framework that could be applicable to both corporate entrepreneurship and to the broader field of entrepreneurship, Stevenson and Jarrillo (1990) define entrepreneurship as "a process by which individuals, either on their own or inside organizations, pursue opportunities without regard to the resources they currently control (p.23)".In this definition the pursuit of opportunities, independently from the actual control of resources, is presented as the central activity of all the entrepreneurial effort. This conceptualization of entrepreneurship is consistent with the one by Venkataraman (1997), who conceptualizes it as the discovery, the evaluation and the exploitation of future goods and services.

Ten years after Stevenson and Jarrillo's contribution, Shane and Venkataraman (2000) point out that research on entrepreneurship has failed to consider it as a nexus of two phenomena: the presence of opportunities and the presence of enterprising individuals, as it focused mainly on the nature entrepreneur individuals. In Stevenson and Jarrillo's view, the definition of entrepreneurship can be easily extended to firms, whose entrepreneurial characteristics are based on their ability to pursue opportunities, regardless of the resources they currently control. More specifically, they suggest that "the level of entrepreneurship within the firms is critically dependent on the attitude of the individuals within the firms below the ranks of top management (p.24)". It is, therefore, the ability of individuals within the firm to pursue opportunities that defines the ability of the whole organization to be entrepreneurial.

entrepreneurship defines in terms of three components: innovativeness (i.e., introducing novel goods, services, or technology, and to develop new markets), proactiveness (i.e., seeking novel ways both to bring an entrepreneurial concept to fruition), and constructive risk taking (i.e., making reasonable decisions when faced with environmental uncertainties, systematically mitigating risk factors) (Covin and Slevin, 1991; Miles and Arnold, 1991, Matsuno et al.,2002).

Entrepreneurship was viewed as a dynamic capability, which allows the organization to ‘‘reconfigure internal and external competencies to address rapidly changing environments’’ (Teece et al., 1997, p. 516). Miles and Arnold (1991, p. 51) provide support for the view of entrepreneurship as a dynamic capability, suggesting that ‘‘without entrepreneurship, business ...would be neither dynamic nor adaptive’’. Similarly, Slater and Narver (1995) argue that entrepreneurial values are an important driver of product development and reformulation, innovation in manufacturing and channel design, and new approaches to competitive strategy. This paper considers entrepreneurship as an organizational capability, which has an undeniable effect on business performance.

**3. Business Performance**

A strategic entrepreneurship perspective, grounded in the resource-based view of the firm, provides recognition of the resources required to exploit growth opportunities in order to create and sustain competitive advantage (Ireland, Hitt, & Sirman, 2003).The entrepreneurship literature has drawn on a resource-based view to explore the contribution of entrepreneurship to organizational performance. Dess et al. (1999), for example, argue that entrepreneurship is a key driver of organizational transformation and strategic renewal through the creation and combination of organizational resources. Similarly, Zahra et al. (1999, p. 169) suggest that entrepreneurial activities can provide a ‘‘foundation for building new competencies or revitalizing existing ones’’. Indeed, Stevenson and Gumpert’s (1985) view of entrepreneurs as being skilled in the use of resources (e.g., financial capital, intellectual capital, skills, competencies) is consistent with this emerging perspective. Entrepreneurs, Stevenson argued, are concerned primarily with improving the firm’s ability to use, exploit and/or extract value from available resources. In this study, the comprehensive set of performance measures which were divided into three categories: economic performance, market performance, and financial performance and their relationship with entrepreneurial proclivity were examined.

**4. Hypothesis**

Economic performance:

H1: The greater the entrepreneurial proclivity of the organization, the greater the economic performance measures

H1a: The greater the entrepreneurial proclivity of the organization, the greater the EVA measure

H2b: The greater the entrepreneurial proclivity of the organization, the greater the REVA measure

Market performance

H2a: The greater the entrepreneurial proclivity of the organization, the greater the market share measure

H2b: The greater the entrepreneurial proclivity of the organization, the greater the MVA measure

Financial performance

H3: The greater the entrepreneurial proclivity of the organization, the greater the financial performance measures

H3 a: The greater the entrepreneurial proclivity of the organization, the greater the ROA measure

H3b: The greater the entrepreneurial proclivity of the organization, the greater the ROE measure

## 5. Research Methodology

### 5.1. Scale and measurement

In this paper, we consider entrepreneurship as an organizational capability, which has an undeniable effect on business performance. We adopted a three-dimensional scale (i.e., innovativeness, constructive risk taking, and proactiveness) of entrepreneurship (7 items) from Matsuno, Mentzer and Ozsomer (2002). For all questions the five-point Likert-type scale anchors were used (1 = strongly agree; 5 = strongly disagree).

To measure financial performance (ROE, ROA) and market performance (market share, MVA) and economic performance (EVA, REVA) for 5 years from 2004 to 2008 the formal documents in Iran Stock Exchange were used.

### 5.2. Performance measure's formula

The formula for calculating economic performance measures are as follows:
EVA = Net Operating Profit after Taxes (NOPAT) - (Capital * Cost of Capital)

REVA= Net Operating Profit after Taxes at the end of period t (NOPAT) - (weighted-average cost of capital* total market value of the firm's assets at the end of period t-1)

The formula for calculating financial performance measures are as follows:

ROE = Net Income/Shareholder's Equity

ROA = Net Income/Total Assets

The formula for calculating market performance measures are as follows:

MVA= Companies market value – Shareholder's Equity

Market Share= Company's sales / Total sales of the industry

### 5.3. Data

A postal survey was conducted to collect information from all manufacturing firms in Iran Stock Exchange whose performance criteria for 5 years from 2004 to 2008 exist in formal documents. A self-administered questionnaire, a letter from the head officer of management department at Azad University, a personalized instruction cover letter explaining the purpose of the survey and a return envelope were sent to the marketing director/manager of the selected organizations. The general manager or the head of marketing was treated as the key informant. This approach implicitly assumes that the key informant's individual opinion accurately provides a good indication of their organization's entrepreneurship in our questionnaire. Respondents were assured of their anonymity and offered a copy of the aggregate results of the survey. To further enhance the response rate, every 4 weeks after the initial mailing, a follow-up letter with a questionnaire was mailed. The rate of response (57%) were received and used.

## 6. Results

As the purpose of this paper has been exploring the relationship between entrepreneurship and business performance, we examined the entrepreneurship in manufacturing firms and also determined the relationship between this proclivity and the comprehensive set of performance measures which were divided into three categories: economic performance, market performance, and financial performance.

The obtained result from the population of this research indicates that there is no relationship between entrepreneurial proclivity of the organization and most of the performance variables; Among the measures of business performance including EVA, REVA, ROA, ROE, MVA, and market share, entrepreneurial proclivity has a straight relationship with only return on equity.

Achieving the above mentioned results by conducting this research project shows that criteria of evaluating financial performance such as ROE based on accounting data is still considered in stock market of Iran and can be used as a reliable criterion in evaluating the performance of businesses. On the other hand, despite Stewart's claim, the criteria of evaluating economic performance such as EVA and REVA are not enough vigorous in expositing the economic performance of companies; these results are in accordance with many previously done researches of Iran's stock market.

## 7. Discussion

The Second Industrial Revolution (Landes, 1969; Atkeson and Kehoe, 2001), driven by inventions such as electricity and the internal combustion engine, was a highly entrepreneurial period in business history. This revolution was most conspicuous in the United States, although several European countries also produced many innovations in this period (Landes, 1969). The Second Industrial Revolution, while basically concentrated between 1860 and the early 1900s, gave rise to innovations in all walks of life, over an even longer period of time (Atkeson and Kehoe, 2001).

The growth in scale economies and the managerial revolution that took place in the decades preceding 1970 were forces that pushed the rate of business ownership downward, suppressing entry of new businesses and other entrepreneurial ventures. In spite of these forces, the economic success of this interim period can however be traced back to individual entrepreneurs. In support of this point, Purrington and Bettcher (2001) tracked the entrepreneurial roots of America's largest corporations at the close of the twentieth century. In particular, they found that out of the *Fortune 200* companies listed in 1997, 197 were either directly (101) or indirectly (96) tracked back to one or more entrepreneurial founders.

The speed of scientific discoveries, technical inventions and ensuing innovations during the second half of the 19th century was remarkable, rivaling or possibly even surpassing that of the so-called "new" economy of the late twentieth century. A sampling of the innovations put to market between 1851 and 1910, and predominantly still in use in the early 21st century, include automobiles, airplanes, telephones, photography, the cinema, the typewriter, electric light, the refrigerator and many other electrical household appliances, aspirin, vaccines, plastics, the safety pin, the zipper, jeans, and toilet paper. One source of dissemination somewhat unique to that period was the popularity of world exhibitions in both America and Europe. In a period where international communication was still quite primitive by today's standards, these international fairs played an extremely important role in the diffusion and adoption of new innovations. Later, photography and other newer technologies reduced the need for physical display of wares. Also, these fairs came into being at a time of relative calm and political stability among different nation states.

The late 19th and early 20th century was also a period of high entry rates of new businesses. Many of the companies to dominate commerce for the majority of the twentieth century, such as General Electric, American Telephone and Telegraph (AT&T), General Motors and Boeing, were new entrants to business during this period, becoming listed on the stock market rather quickly upon their initial founding and creating lasting value (Jovanovic and Rousseau, 2001).

The world of today, at the beginning of third millennium, along with the second industrial revolution, the growth in scale economies and the managerial revolution, and the speed of scientific discoveries and technical inventions has encountered us to unexpected and unpredictable challenges which resulted in ever-increasing importance of entrepreneurship; energy crisis and energy revolution which are today considered as the most important concerns of business managers has increased the requirement for innovativeness (i.e., introducing novel goods, services, or technology, and to develop new markets), proactiveness (i.e., seeking novel ways both to bring an entrepreneurial concept to fruition), and constructive risk taking (i.e., making reasonable decisions when faced with environmental uncertainties, systematically mitigating risk factors) as entrepreneurship as an organizational capability criteria. On the other hand, gaining more appropriate criteria for assessing the performance can help the businesses toward achieving competitive abilities based on entrepreneurial proclivity in the turbulent world of today and subsequently manifest the extent of organizations' progress toward achieving higher levels of entrepreneurship in comparison to other organizations.

## 8. Recommendations for Future Studies

Many researches are required to be done in the field of the relationship between entrepreneurial proclivity and business performance in which some of the most important title of them is mentioned below:

-A significant title for future researches can be studying the fact that whether the relationship of some variables of business performance with entrepreneurial proclivity is more important than the other variables and whether we can represent any special preference for them.

- What were considered in this research were the current conditions of the industry in the field of the relationship between entrepreneurial proclivity and business performance, but finding the possible techniques of reinforcing the entrepreneurial proclivity can be a good subject for future researches as well.

- The other title which is recommended for further researches is studying the relationship between entrepreneurial proclivity and the other performance criteria.

- Considering the business environment and the extent of its effect on the relationship between entrepreneurial proclivity and business performance there is also another remarkable point and subject for doing future researches. In other words, determining the environmental influencing factors on this relationship in dynamic and variant environment of today can be regarded as a very significant issue in determining the destiny of companies.

-The research in a set of Iranian industries has provided some results that can be generalized about the active firms of the same industries. However, researches in the countries with the same industrial structure like Iran can introduce a model on entrepreneurship in the Middle East or even Asia.

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# SCHUMPETERIAN LEGACY: HOW INNOVATION AND ENTREPRENEURSHIP RELATE AND WHERE THEY DIFFER.

Muhammad Ejaz

**Abstract**

As literature in innovation and entrepreneurship has been growing due to multidisciplinary nature of the fields, there has been a need to clarify some of the interrelated issues. This paper discusses some of the concepts that dominate the landscape of both these fields. When it comes to innovation, researchers have been agreed to a large extend on the concept of novelty or new combinations introduced by Schumpeter. However, the area of entrepreneurship has been influenced by a number of scholars that creates a challenge for setting the direction of the field. Launching of enterprise has usually been reserved for the field of entrepreneurship. But, mechanisms applied for the growth of firm have been overlapping. Furthermore, eentrepreneurship highlights the role of individual entrepreneur in forging networks, while innovation highlights organizational collaboration.

**Keywords:** Innovation, entrepreneurship, networking, enterprise

## 1. Introduction

Entrepreneurship and innovation have rapidly been emerging as a field of research for the last two decades. Researchers with different disciplinary backgrounds have been entering the fields. Their entrance has been enriching the field with multidisciplinary knowledge and research traditions. This multidisciplinary development has provided the field of entrepreneurship and innovation with multiple opportunities and diverse challenges. Among the challenges, one of the big challenges is complex and multi faced relationships between innovation and

entrepreneurship. As both fields have been hugely influenced by Josef Schumpeter, it has remained a big challenge to draw distinctive boundaries that can provide them with separate identities. When it comes to innovation, there are different like minded academic groups who are looking to phenomenon of innovation through their disciplinary lenses. But, still they have been committed to father of innovation Schumpeter and his view of creative destruction and new combination of existence resources. The most notable difference could be identified in Schmookler`s scholarly work (1966) who disagreed with Schumpeter's "technology push" concept of innovation and advocated "demand pull" view of innovation. However, both have uniformity on the basic principles of creative destruction and new combinations of resources. One the contrary to innovation, field of entrepreneurship has different school of thoughts with many different scholars. In the field of economics, Schumpeter and Kirzner have received significant attention due to their contradictory views on entrepreneur. While Kirzner (1973) tried to connect the concept of entrepreneurship with the previous knowledge in the area, Schumpeter's perception of entrepreneur or innovator has resulted to blurring of boundaries between entrepreneurship and innovation. Recognising the need for a specific conceptual paper, the motivation for elaborating on interrelated phenomena is two fold. First, few efforts have been made to clarify these two concepts in relation to Schumpeter. Second, the paper would describe relationships and core areas where they differ.

## 2. Conceptual background

Given the nature of entrepreneurship and innovation, this section reviews the concepts and work undertaken by different researchers.

### 2.1 Entrepreneur and innovator as a person

When it comes to the phenomenon of entrepreneur as a person, there are two famous scholars, Schumpeter and Kirsner who looked to this phenomenon in two different ways. This difference could be traced back to their scholarly work. Schumpeter viewed entrepreneur as an opportunity creator (Schumpeter, 1912). He has been regarded as the first scholar who highlighted the role of innovator or entrepreneur as the main driver of economic growth. In his view, innovator or entrepreneur triggers economic growth by bringing qualitative knowledge to the current economic system. The initiatives undertaken by innovator create destruction, which means that innovator "revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one (Schumpeter, 1942, (1975), p.92). This goes beyond the idea of producing something which has already been developed by someone at somewhere. Innovator's initiative of creative destruction results in the form of new products, new services, new ways of producing, new sources of supply, identification and exploitation of new markets and new modes of organizing business. His or her innovations bring about changes in the market, consumers` behavior and the way businesses are organized and run. This way of looking to entrepreneur or innovator highlights the importance of creativity and innovation. Entrepreneur or innovator creates something new which is previously unknown to market and customers. This role faces a

lot of resistance from a number of actors and forces and entrepreneur or innovator has to fight in order to achieve prescribed aims (Fagerberg, 2005). Thus, entrepreneurs or innovators are very committed and motivated when they undertake initiative under the clouds of uncertainty. In most of the cases, the capabilities of the products and services have remained relatively easy to judge, but their success and failure in the market and how they are going to shape the social practices, is difficult to predict beforehand (Chesbrough, 2003). Thus, according to Schumpeterian line of reasoning, innovator differs both from capitalist and manager who pursue stable norms and routines in order to maximize returns. Innovator acts independently and creates new rules of the game by keeping in mind internal and external changes and requirements. All the important changes take place when innovator performs a role. He or she is the central and the main actor around which the whole cycle of business activities and changes takes shape. Schumpeter's focus on individual innovator or entrepreneur has been named as "Schumpeter mark 1" (Fagerberg, 2005). His approach of assigning innovator the role of a major actor of change and innovation could be traced to his Austro-Hungarian background where economic activities were taking place in small companies. One distinct feature of Schumpeter's entrepreneur is his or her desire for innovation. Entrepreneur's commercialization of ideas is not limited to financial gains, but he or she aspires to acquire social gains too.

In contrary to Schumpeter, Kirzner perceives entrepreneur as a capitalist who identifies the opportunities and exploits them (Lanstrøm, 2005). Even though Kirzner has remained the most famous researcher who attributed entrepreneur as capitalist, this line of reasoning can be traced to Cantillon. According to Cantillon (approx. 1680-1734, in Lanstrøm 2005) "Discrepancies between demand and supply in a market create opportunities for buying cheaply and selling at a high price and that this sort of arbitrage would bring equilibrium to the competitive market" (p.28). This concept of identification and exploitation of opportunities differs with that of Schumpeter`s entrepreneur who introduces innovations. Even though these opportunities have been available to others, they have not been in a capacity to identify and exploit them. Drucker (1985) has identified three different categories of opportunities: "(1) The creation of new information, as occurs with the invention of new technologies; (2) the exploitation of market inefficiencies that result from information asymmetry, as occurs across time and geography; and (3) the reaction to shifts in the relative cost and benefits of alternative for resources, as occurs with political, regulatory, or demographic changes (Shane & Venkataraman 2000, p.220). These opportunities are usually exploited by en entrepreneur through the creation of new enterprise (Powell and Bimmerle, 1980). Start ups have often been strongly advocated as one of the major functions of entrepreneur. In addition to this, entrepreneur invests in an established company in order to maximize profit through purchasing shares in the companies listed in the stock exchange or through venture capital. Although buying of shares in the stock exchange is considered to be one of the functions of entrepreneurs, researchers working in the field of entrepreneurship have not elaborated a lot on this subject. One particular reason for not giving attention to this sort of investment could be attributed to the diverse nature of the phenomenon with a number of different actors. But when it comes to venture capital, it is a kind of involvement where investors acquire a stake in an already established company. These investors include individuals, firms and institutions (Lanstrøm,

2007). Venture capital has enjoyed huge scholarly attention and support after the emergence of Silicon Valley especially in the ICT related companies. This act of entrepreneur is usually triggered to a large extend by capital gains and networking plays an important part in bringing together different entrepreneurs. Networking is anticipated as a concrete mechanism through which investors gain both intangible and tangible resources like access to capital (Light 1984).

## 2.2 Entrepreneurship as a process

Scholars have long remained focused on traits (what are the qualities) and functions (what does he or she do) of entrepreneur. This direction was changed by William Gardner (1988) who stated that "entrepreneurship concerns a process – emergence of new organizations" (Lanstrøm, 2005, p.18). Entrepreneurship has been viewed as a whole process of starting a firm alone or with the involvement of different actors and functions. The notion of entrepreneurship as launch of a firm has usually been perceived as the most dominant way of explaining the entprenerurship process. According to Timmons (1989) entrepereneurship is "the ability to create and built something from practically nothing. It is initiating, doing, achieving, and building an enterprise or organization, rather than just watching, analyzing and describing one. It is the knack for sensing for opportunity where other see chaos, contradiction and confusion…(P.1) It has been generally perceived that the entrepreneurship involves activities of diagnosing, analyzing and launching of a firm or organization. But, entrepreneurship is not confined to process of starting a company in order to produce goods and services. Corporate entrepreneurship takes place in already established companies. There are other modes of investments where entrepreneurs invest in companies run and managed by some other entrepreneurs.

Researchers have been elaborating on entrepreneurship by keeping focus on different actors and functions. But when it comes to the question of definition of entrepreneurship, scholars have been inspired by two of the above mentioned researchers like Kizner and Schumpeter. They have been looking to area through the lenses of one or a combination of both approaches identified by these two famous scholars. For example, Venkataraman 1997) has proposed that entrepreneurship is a scholarly field that "seeks to understand how opportunities to bring into existence `future` goods and services are discovered, created and exploited, by whom, and with what consequences" (p.120). Even though in the above mentioned definition the main focus has been concentrated on identification and exploitation of opportunities, the concept of innovation in the form of creation of new products and services related with the Schumpeter's line of reasoning has been adopted. Furthermore, it has been assumed that this definition has shifted focus from starts ups to opportunity identification and exploitation. However, the concept of opportunity identification is not new in the entrepreneurship literature and the concept had been highlighted by Timmons (1989). Literature on entrepreneurship has been growing due to

multi disciplinary nature of the field. It has been easy to find a definition that covers one or two components of the phenomenon. But, when it comes to the comprehensive definition, it has remained a main challenge for the researchers to propose a definition which could cover different more or less all components and areas of entrepreneurship. Robert C. Ronstadt (1984) has taken an initiative and came up with a definition that covers some of the pressing issues attached to the entrepreneurship. He stated that "entrepreneurship is the dynamic process of creating incremental wealth. This wealth is created by individuals who assume the major risks in terms of equity, time and/or career commitment of providing value for some product or service. The product or service itself may or may not be new or unique, but value must somehow be infused by the entrepreneur by securing and allocating the necessary skills and resources (in Kuratko & Hodgetts 1998, p. 31-32). This approach to entrepreneurship combines two most important approaches describes by Shumpeter and Kenzner.

## 2.3 Innovation as a process

In contrary to entrepreneurship literature, innovator as an individual has not attained a popular support and attention from innovation scholars. One possible reason might be the change of perception on part of Schumpeter who after moving to USA realized that innovation was not solely a function of individual innovators, but it involved a collective effort within large organizations which has been called "Schumpeter Mark 2" (Fagerberg, 2005). This change of perception might have taken place due to embracing new economic realities comparatively different in size and nature from previous ones. Researchers have been elaborating on innovation as a process which in its true nature is a complex and integrated process where involvement of actors and coordination of interrelated activates plays a very important part. Like entrepreneurship and many other phenomena, it has been challenging task to articulate a single definition that covers all aspects of innovation. However, there is a broad consensus among innovation scholars about the nature of innovation which can be labeled "newness". This newness can be traced to father of innovation Josef Schumpeter who described innovation as new combinations. While this statement looks quite simple, a more comprehensive definition covering all aspects of innovation is not easy. Freeman (1982) defines innovation as "the technical, design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) process and equipment" (Bessant, 2003). This definition depicts a picture of innovation that has been confined to product and process innovation. A relatively broad definition covering a number of aspects of innovation has been proposed by Gibbons et al (1994), namely "(Innovation) might be defined as the application of ideas that are new to the firm, whether the new ideas are embodied in products, processes, services or in work organization, management or marketing systems (DIST, 1996, p.2.).

Schumpeter's scholarly work set the direction of innovation according to characteristics like what make innovations different in relation to current technology (Freeman & Soete, 1997). According to this approach, improvements in current innovations are called incremental

innovations as compared to novel which is usually called radical or disruptive. There is another classification of innovation which has been labelled as "technology push" and "demand pull" (Riederer el al., 2005). Technology push approach of innovation appeared as a result of Schumpeter's scholarly work on economic development where he described economic growth as a direct result of what he called "creative destruction". In contrary to this, Schmookler (1966) perceived innovation as a result of demand forces within the market. Innovation has also been classified according to "type". Schumpeter divided innovation into five different types: new products, new methods of production, new sources of supply, the exploitation of new markets, and new ways of doing business (Fagerberg, 2005).

While innovation is not confined to the introduction of new products alone, a lot of emphasis has been placed on technical nature of innovation. High tech industries have remained the prime focus of innovation researchers. However, for the last couple of years, services have also been attracting the attention of the innovation researchers. But, the pace and level of interest is quite low compared to the product innovation which still dominates the landscape of innovation. The shifting of attention to services could be understood in the context of changing nature of the economical activities. Service sector has been emerging as the dominant actor when it comes to employment and value creation. In 1990, two third of the employees were employed by the public and private services in OECD countries (Sirilli & Evangelista, 1998). The share of services in the economy has been growing rapidly as manufacturing sector is moving to low cast locations in Asia. As a result of growth in service sector, United States was the first country which emerged as a "service economy" and since the 1950s majority of the employed population has been involved in intangible activities which have grown to 75% of the labor force in 2000 (Fuch 1965; in Drejer 2004). UK has also emerged as a service economy or service dominated economy (Windrum & Tomlinson, 1999).

## 3. Common areas of understanding and differences

Entrepreneurship and innovation have been widely used as an interrelated phenomenon. It has been remained a problem for the research community to define these two concepts in a separate and comprehensive way. However, by going through the literature, I have identified a number of areas which relate them with each other. But, these areas have a number of components that separate them. Still, due to complex nature of interconnectedness and relationship, it is not easy to place them in different domains.

### 3.1 Creation of Enterprise:

Creation of new business has been assigned a significant importance in entrepreneurship literature. Individual entrepreneur and his/her ability to diagnose, analyze, and launch a new

venture has been perceived as a central part of entrepreneurship. This can be realized by going through the different definitions of entpreneurship. When it comes to the creation of new business, the phenomenon can be understood in relation to situation people face and the social groups they belong to (Gibb & Ritchie, 1982). There are no universally accepted reasons that can be assumed as the framework for launching new business. Different countries and cultures have diverse rationales and reasons of initiation a business venture. Difference social groups and individuals have different reasons of starting a business. According to one study initiated by Scheinberg and MacMillan (1988), there are six reasons of starting a business in 11 different countries like: "need for approval, perceived instrumentality of wealth, degree of communitarians, need for personal development, need for independence, and need for escape (Shane et al., 1991). Entrepreneurs have been divided into three well known categories like: men entrepreneurs, women entrepreneurs, and criminal entrepreneurs. Gender differences in creation of business have also received scholarly attention. Entrepreneurs have been divided into two well known categories like: men entrepreneurs, women entrepreneurs. Women entrepreneurs generally face a number of barriers compare to men entrepreneurs. Scholars have identified these barriers as education experiences, family roles and lack of networks (Kalleberg & Leight 1991). When it comes to nature of ventures, innovation and imitation have been treated on the same lines and parameters. It is not necessary for an entrepreneur to initiate a business on the basis of new ideas to produce goods or services. He or she could start a firm to produce products or services which somebody is already doing.

In the field of innovation, individual innovator or entrepreneur has not attained significant attention. Innovation has been considered as a collective and interactive process in which many actors and factors play a part. Furthermore, innovation takes place in firms and organization. Therefore, the process of starting up an enterprise has not received attention from innovation scholars, even though starting of a firm has been stated as the part of the innovation process. According to Fagerberg (2005), "Invention is the first occurrence of the idea for a new product or process, while innovation is the first attempt to carry it out into practice (p.4). Hence, if entrepreneur or innovator starts a business on the basis of his/her idea or on the basis of idea created by somebody else, it is considered to be the part of the innovation process according to above mentioned definition. Innovator or entrepreneur launches enterprise based on new idea in order to produce goods or services previously unknown to market and customers. This differs with the general perception that radical innovations are the result of entrepreneurial function.

## 3.2 Growth of a firm

When it comes to the growth of small businesses and firms, venture capital has been emerging as the most common form of capital acquisition. Venture capital has been defined as "a specific form of institutional finance – part of a more broadly based private equity market, that is investments (with private equity) made by institutions, firms, and wealthy individuals in ventures that are not quoted on as stock market, and which have the potential to grow and become significant players on the international market" (Mason & Harrison, 1999; Isaksson, 2006, in Landstrøm, 2007). There are a number of reasons for this kind of investment, but the most common one is short - term financial gains. The concept of venture capital got significant attention at the peak of IT growth at the end of nineteenth century. Silicon Valley emerged as a prominent place for venture capital related investments. Many investment companies were launched to facilitate investment in small companies with a high growth potential. However, USA has a comparatively long history of venture capital and first investment company called American Research and Development Corp. (ARD) was started in 1946 (Caselli & Gatti, 2004). Market for venture capital has been growing generally in the world and particularly in Europe. Venture capital market can be divided to submarkets, and three of the well known submarkets are: institutional venture capital, corporate venture capital and informal venture capital (Landstrøm, 2007).

Another approach of entrepreneurship in business and firm development is corporate entrepreneurship or entrapreneurship. Corporate entrepreneurship has been used to describe entrepreneur activities within en established firm. Jennings and Lumpkin (1989) defines corporate entrepreneurship "as the extent to which new products and/or new markets are developed" (p.489). This view is generally highlighted in some of the literature of entrepreneurship, but there are other scholars who posses a different approach to this one. Zahra (1995, 1996) perceives corporate entrepreneurship as "the sum of a company's innovation, renewing and venturing efforts. Innovation involves creating and introducing products, production processes, and organizational systems. Renewal means revitalizing the company's operations by changing the scope of its business, its competitive approaches and both. It also means building or acquiring new capabilities and then creatively leveraging them to add value for shareholders. Venturing means that firm will enter new business by expanding operations in existing and or new markets" (p.227, p.1715). This definition classifies corporate entrepreneurship into three categories with different functions, but with common cause which is firm's further growth and development. One of the salient features of this definition is the rejection of general perception where it is usually indicated that corporate entrepreneurship is limited to new combinations of resources and business activities. Innovation does not dominate the whole arena of corporate entrepreneurship. Thus, it can be concluded that corporate entrepreneurship is not limited to new combinations, but it incorporates a number of measures like acquiring of capital and/or technology, and reshaping of business.

In contrast to entrepreneurship, innovation literature explicitly emphasizes new combinations as the sole driver of firm's growth and development. Firms expand through transformation of technology and market conditions (Lazonick, 2005). They introduce new products and services in a bid to tape a much bigger share of market than their competitors. Their competitive advantage lies in their human resources. Human resources play an important part because innovation is viewed as a business phenomenon where growth of the firm relies on customers and market. Fulfillment of customers` and market's requirements by introducing new products and services has been assigned significant value. The success and failure of the products and service have been determined on the basis customers and market adoptability. Thus, firm's human resources could enhance its capability to understand the future trends and changes in the external environment. According to Nelson (1991), "it is organizational differences, especially differences in abilities to generate and gain from innovation, rather than differences in command over particular technologies that are the source of durable, not easily imitable, differences among firms. Particular technologies are much easier to understand, and imitate, than broader firm dynamic capabilities"(p.72). Firm's dynamic capabilities could be created to transform individual capabilities to collective knowledge. Creation of knowledge takes place through "learning by doing" (Arrow, 1962), and through "learning by interaction" (Von Hippel, 1988).

Acquisitions have also been emphasized as a strategy to enhance the firm's product development capacity (Lazonick, 2005). But, there has not been written a lot on this topic, regardless of the fact that importance of acquisitions has been highlighted in innovation literature. Investment in start ups or corporate venture capital has also been appearing as part of innovation strategies. Open innovation literature encourages investment in start-ups with significant innovation activities. Investments in these new emerging companies provide the company with the opportunity of accelerating innovation and future growth. Ernst et al., (2005) have highlighted a number of intensions of corporate venture capital like: 1) monitoring of technological developments that could seriously affect the large corporations` future growth opportunities; 2) assessing qualified experts who don't want to work in big corporations because of the feeling that it inhibits their creativity; 3) creating new future growth opportunities for the mother firm's core business; 4) promoting entrepreneurial culture in the mother firm; 5) increasing internal R&D efficiency (Bower and Christensen 1995) by awarding contracts to start-ups. It can be concluded that corporate venture capital has been treated as part of both innovation and entrepreneurship.

## 3.3 Networking

In entrepreneurship domain, the role of networking in starting and growing of enterprise has been receiving significant attention and support from entrepreneurship researchers. Research in this area has been growing for the last two decades. Network in entrepreneurship literature has been explained as "interconnected dyadic relationships where the nodes will be roles, individuals or organizations (Johannisson, 2000). Network is an interconnected phenomenon where information flows both ways. Hoang and Antoncic (2003) have identified three components of

networks: “the content of the relationships; the governance of these relationships; and the structure or pattern that emerges from the cross cutting ties” (p.166). When it comes to the content, they have stated that personal and interorganizational relationships are a mechanism applied by the actors to gain multiple resources (financial, information, advice). With regards to governance, coordination in network exchange takes place through social mechanisms where trust plays a central part. The third component is structure that is referred as patterns of relationships usually divided into direct and indirect ties. In entrepreneurship literature, both personal and interorganizational relationships have been mentioned, but major emphasis has been placed on personal relationships between entrepreneurs. According to Johannisson (2000), personal networks are purposely made by the entrepreneurs just like a launching of a venture. Entrepreneurs are well aware of the benefits of networks which could provide them access to information about technology, capital, knowledge of market and customers and information about their competitors. This act of entrepreneur is usually triggered to a large extend by capital gains and networking plays an important part in bringing together different entrepreneurs. Networking is anticipated as a concrete mechanism through which investors gain both intangible and tangible resources like access to capital (Light 1984).

In the field of innovation, joint arrangements in order to achieve the goals of innovation have always remained critical. Innovation scholars have always pointed innovation as an interactive and distributive process (Lundvall, 1992). Oughton and Whittam (1997) have highlighted that innovation in a firm stems from collaborative and interdependent activities and it does not takes place in a vacuum. When it comes to the interrelated and interdependent nature of innovation, it has been the networking of the firms that received a lot of attention. Peres and Sanchez (2002) have defined network as “a firms set of relationships with other organizations. R&D collaboration and joint venturing have remained the most common mechanism for collaboration. Firms have long been attached with universities and research institutions, and R&D has been the main motive for their collaboration. Pharmaceutical and chemical sector have traditionally forged close networks with other firms, research institutes and universities. Studied have showed a number of reasons for networking. Firms forge networks due to unavailability of internal resources (financial, human, knowledge) (Tether, 2002), to know competency of their competitors (Hamel et al 1989), and to access new scientific knowledge (Lundvall, 2002).

## 4. Conclusion

Entrepreneurship and innovation are among the fast growing fields of research. Although the boundaries between these two fields are not clear and well defined, still there are some similarities and differences which can provide the basis for setting the direction of future actions. While this paper may have failed to elaborate on all aspects of innovation and entrepreneurship as both the fields are multidisciplinary, it contributes to the on going debate about entrepreneurship and innovation. Entrepreneurship and innovation have some common topics of discussion, but they differ on many key points. In innovation literature, Entrepreneur or innovator (Schumpeter mark 1) have been considered as a first attempt of Schumpeter to shed

light on innovation which he latter modified to a collective effort undertaken by many actors jointly. On the other hand in entrepreneurship literature, entrepreneur have been receiving huge significance and considered as the main actor. His/her prime motivation is to gain financial benefits. Financial gains could come by filling the gap between supply and demand or launching new products and services. Entrepreneurs could apply both innovation and imitation to enhance in launching and enhancing his/her business. When it comes to the launch of new enterprise, innovation and entrepreneurship can be clearly distinguished. Different mechanisms have been identified by entrepreneurship literature for the growth of the firm. On the contrary, innovation literature emphasizes different types of innovation described by Schumpeter as common modes of growth with the exception of venture capital. Both innovation and entrepreneurship put networking at the central stage of firm's survival and growth. Entrepreneurship highlights the role of individual entrepreneur in forging networks. But, in innovation, organizational collaboration and networking sets the direction of the business.

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# THE INNOVATION SCORE OF TURKEY AND EUROPEAN UNION COUNTRIES: A COMPERATIVE ANALYSIS

Serra Çelik[14], Çiğdem Arıcıgil Çilan[15], and M. Erdal Balaban[16]

**Abstract**

Today innovation is getting more important and it is a part of development of countries. The innovation performance of European Union (EU) countries has been evaluated since 2001 by using European Innovation Scoreboard (EIS). This scoreboard has been calculated by taking 29 indicators that are separated to 7 dimensions as human resources, finance and support, firm investments, linkages & entrepreneurship, throughputs, innovators and economic effects. Finally these dimensions are grouped into 3 main blocks that Enablers, Firm Activities and Outputs. The aim of this study is to make a comperative analysis among EU countries to find out the innovation situation and weak/strong innovation indicators of Turkey by using EIS. Turkey's performance is compared to average of European Union Member Countries, as an innovation leader to Switzerland.

**Keywords:** Innovation, Turkey Innovation Score, Multidimensional Scaling

## 1. Introduction

Today's companies are forced by global world to diversify their products and services in order to gain advantage of competitiveness. This can be realized only technological development and innovation. Nowadays governments has important role in the innovation process. In this context, governments must create the institutional and legal infrastructure for protection of firms' market power and should compose the innovation systems at national level. Innovation is the key to global competitiveness and more efficient utilization of resources.

Innovation is the implementation of a new or significantly improved product (goods or services) or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relation (OECD 2005). Innovation introduces variety into the economic sphere (Metcalfe 1998).

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Innovation is a powerful explanatory factor behind differences in performance between firms, regions and countries. Firms that succeed in innovation prosper, also become success in a competitive environment. Innovative countries and regions have higher productivity and income than the less-innovative ones. Countries and regions that wish to catch-up with the innovation leaders face the challenge of increasing their own innovation activities towards leader-levels (Fagerberg, 2003).

Innovation is recognised to play a central role in creating value and sustaining competitive advantage (Baregheh et al. 2009). The understanding of innovation as a key driver to competitiveness has its root in the works of Schumpeter, who desribed market dynamics as a process of creative destruction. Later he has developed further this concept, referring it as a process of "creative accumulation". In this final model, firms have different capacity to accumulate technological capabilities and to generate innovation. The accumulated technological competencies are the key determinants and drivers of firm innovation and competitiveness. The minimum of required technological capabilities is also a barrier to market entry by new firms (Dobrinsky, 2008).

This study has two goals. The first is to analyze the strengths and weaknesses of innovation structure. The second is to compare Turkey's current performance to other European countries.

## 2. Measuring Innovation Performance of Europe by Using EIS Report

The European Innovation Scoreboard (EIS) is an instrument of the European Commission, developed under the Lisbon Strategy to provide a comparative assessment of the innovation performance of European Union (EU) Member States. The EIS attempts to benchmark, on a yearly basis, the innovation performance of Member States, drawing on statistics from a variety of sources, primarily the Community Innovation Survey (PRO INNO /INNO Metrics). EIS is evaluated since 2000 by European Union and the first annualy EIS report is published in 2001.

The EIS includes 29 indicators. These indicators are divided into seven groups: Human resources (5 indicators), finance and support (4 indicators), firm investments (3 indicators), linkages & entrepreneurship (4 indicators), throughputs (4 indicators), innovators (3 indicators) and economic effects (6 indicators). Each group represents a dimension. It is considered that these dimensions form the core of national innovation performance. These dimensions are grouped into 3 main blocks; Enablers, Firm Activities and Outputs**.**

The overall innovation performance is summarized by Summary Innovation Index (SII) in the EIS report. The Summary Innovation Index (SII) is a weighted composite index calculated by using the composite innovation indexes for three main blocks (Enablers, Firm Activities and Outputs).

The EIS 2009 report also includes innovation data for Crotia, Serbia, Turkey, Iceland, Norway and Switzerland. which are not EU member States. States are divided into four groups according to their innovation performance. These groups are; Innovation Leaders, Innovation Followers, Moderate Innovators and Catching-up Countries.

According to EIS 2009, Denmark, Finland, Germany, Sweden, Switzerland and the UK are the **Innovation Leaders**, with innovation performance well above that the EU27 average and all countries.

Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, the Netherlandsand Slovenia are the **Innovation Followers,** with innovation performance below those of the innovation leaders but close to or above that of the EU27 average.

Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Poland, Portugal, Slovakia and Spain are the **Moderate Innovators,** with innovation performance below the EU 27 average.

Bulgaria, Latvia, Romania, Crotia and Turkey are the **Catching-up Countries** with innovation performance well below the EU27 average.

The aim of this study is to find out the weaknesses and strengths of innovation of Turkey and to compare Turkey to other European countries. In this study, the data of 2009 EIS report were used as secondary data.

### 3. The Innovation Performance of Turkey

Turkey's innovation performance is well below the EU27 average but Turkey's annual innovation growth rate is three times more than EU27 (Table 1).

**Table 1.** Growth Rate and SII of Turkey and EU27.

| **Countries** | **Growth Rate** | **SII** |
|---|---|---|
| Turkey | 5.5 | 0.227 |
| EU27 | 1.8 | 0.478 |

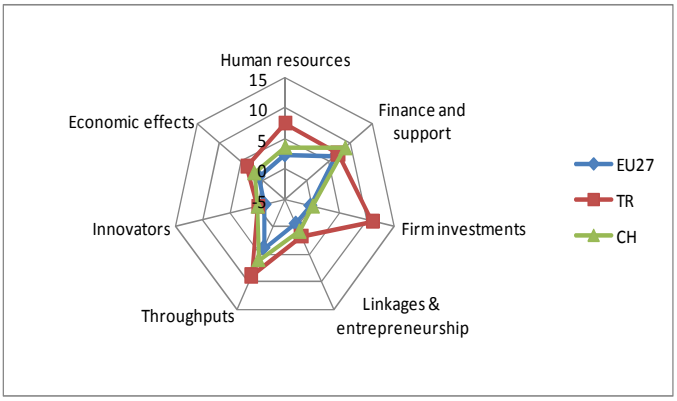
Over the past 5 years, Human Resources, Finance and Support, Firm Investments and Throughputs are the main drivers of the improvement in innovation performance of Turkey (EIS 2009). Turkey's growth in terms of these dimensions are performing better than EU27 (Table 2).

It is clear that Turkey is growing faster than EU27 average and faster than the leader Switzerland in terms of innovation performance but the growth rate is not good enough to catch up innovation leaders in a short term. Turkey needs to show better performance in Innovators and Linkages and in Entrepreneurship dimensions.

According to the innovation indicators Turkey has higher growth rates than EU 27 average except for two indicators ("S&E and SSH doctorate graduates" and "Broadband access by firms"). Turkey has high growth rates for "S&E and SSH graduates" (17.2%), "Lifelong learning" (13.1%), "Private credit" (17.3%), "Business R&D expenditures" (28.5%) and "EPO patents" (15.0%) (Figure 1).

**Table 2.** Comparable Growth Performance of EU27, Turkey and Switzerland for 7 Dimensions.

| Growth Performance Per Dimensions | EU27 | TR | CH |
|---|---|---|---|
| Human resources | 2.3 | 7.5 | 3.6 |
| Finance and support | 6.5 | 7.1 | 8.6 |
| Firm investments | -0.4 | 11 | 0 |
| Linkages & entrepreneurship | -0.6 | 1.7 | 0.8 |
| Throughputs | 3.8 | 8.8 | 6 |
| Innovators | -1.3 | 0 | 0 |
| Economic effects | 1 | 3.7 | 2 |



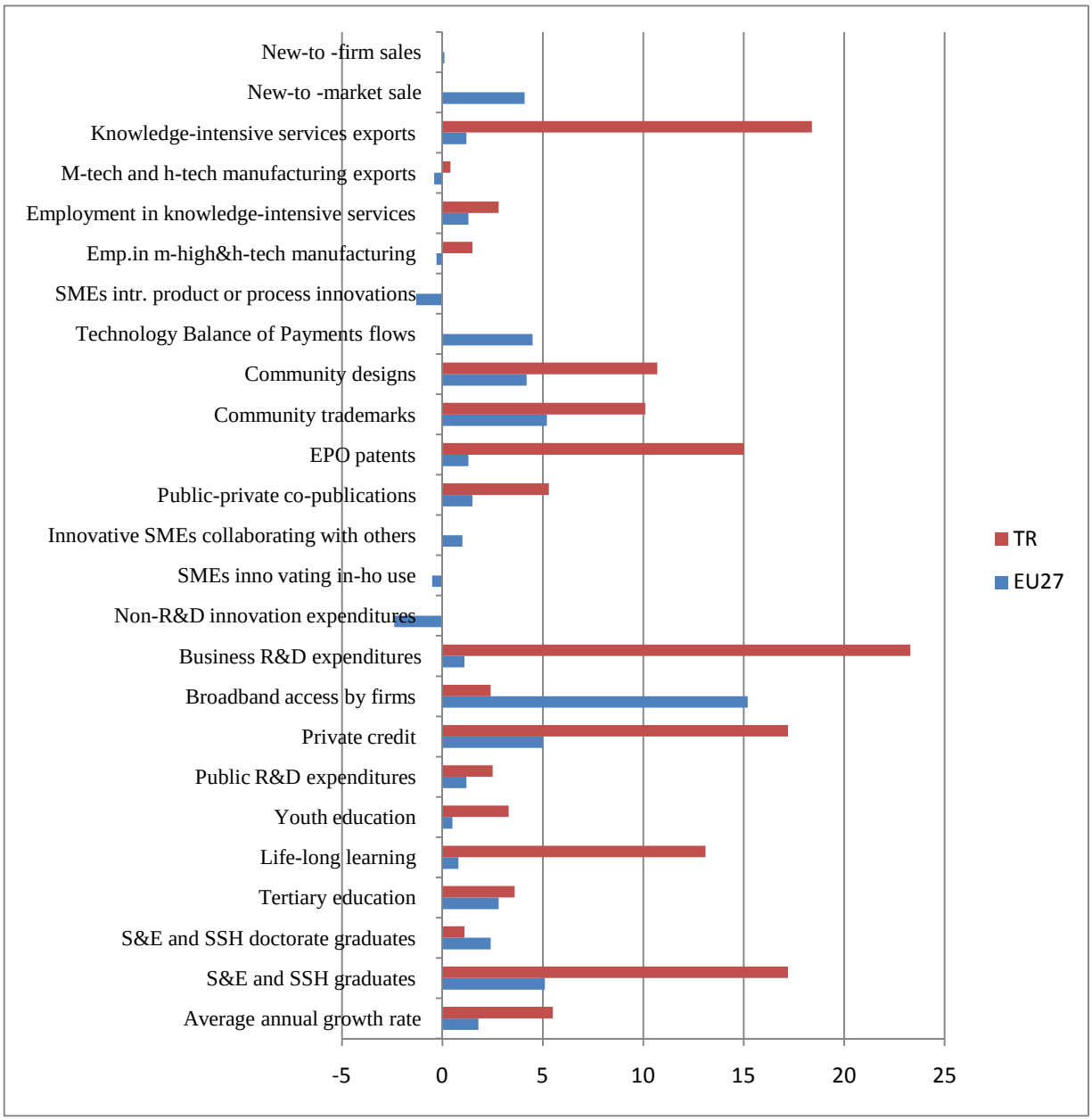



**Figure 1.** EU27-Turkey Comparison for Growth Rates Per Indicator.

Last 5 years innovation performance data shows that Turkey can not catch up EU27 and Switzerland, Innovative leader country. But Turkey is jumping up in terms of innovation performance in 2009 (Figure 2). If we assume that this slope of innovation performance will continue in the future. It is possible to catch up the EU27 countries and innovative leader Switzerland. The graph for last five years is also showing the gap of innovation performance between Turkey and EU27 countries and it also shows the gap between Turkey and Switzerland. As it seen clearly we can not approach to this countries in the near future, but growth rate of innovation performance in 2009 is much higher than the other countries. So Turkey needs to work hard and keep this growth rate in the future to reach the level of EU27 and Switzerland.

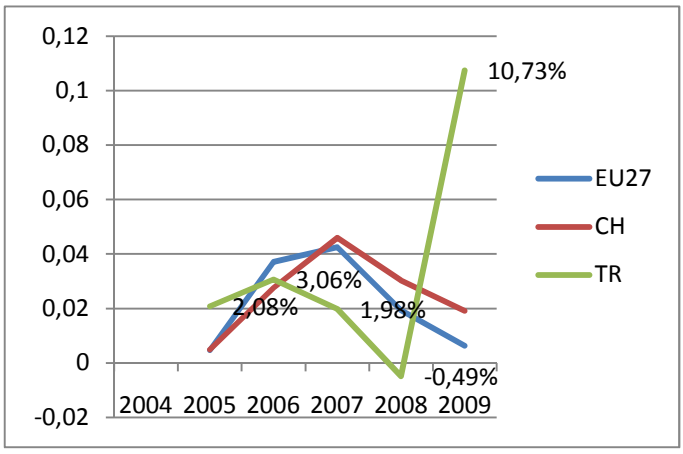



**Figure 2.** Comparable Graphs of Innovation Performance and Growth Rates for Turkey, EU27 and Switzerland.

According to last two years data, there is a huge gap towards EU27 and Switzerland innovation performance by using the slope of trend line of innovation performance. Turkey can catch up the average innovation of EU27 countries approximately in 16 years and Turkey can reach the level of Switzerland innovation level after 54 years (intersection points of the trend lines). It will take long time to reach a better level for Turkey in terms of innovation performance under the assumption of constant slope of innovation performance lines. As it is known there is a strong positive correlation between developed countries and innovative countries. It means that innovation performance shows the level of development. Turkey is a developing country and needs to improve the innovation performance in terms of weak level indicators to catch up developed countries innovation levels.

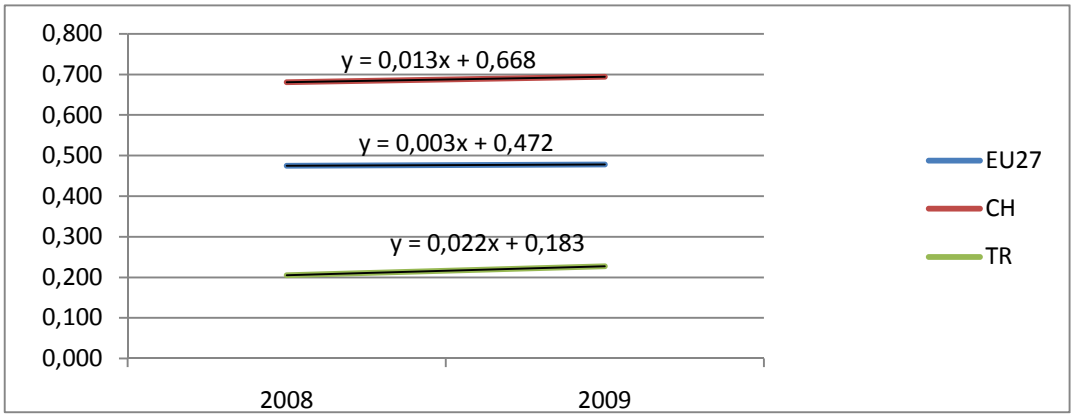



**Figure 3.** Turkey Innovation Trend Lines and Gaps Towards EU27 and Switzerland.

Although Turkey's innovation performance is lower than all country groups average Turkey's Innovation growth rate is higher than all country groups innovation growth rates (Table 3).

**Table 3.** Comperation of Turkey and Country Groups for Average of Innovation Performance and Growth Rate Percentage.

| | **Average Innovation Performance** | **Average Growth Rate Percentage** |
|---|---|---|
| **innovation leaders** | 0.605 | 1.571 |
| **innovation followers** | 0.495 | 2.789 |
| **moderate innovators** | 0.373 | 3.55 |
| **catching-up countries** | 0.282 | 4.438 |
| **Turkey** | 0.227 | 5.5 |

## 4. Comparison of EU Countries and Turkey by Using Multidimensional Scaling

Multidimensional scaling is a method based on proximities between objects or subjects used to produce a spatial representation of these items. Proximities express the similarity or dissimilartiy between data objects (Hardle&Simar, 2003). This method is based of comparison of cases. The purpose of Multidimensional Scaling is to transform similarities among cases into distances represented in multidimensional space.

In this paper Multidimensional Scaling is applied for each innovation dimension to see the similar countries in terms of indicators which forms these dimensions.

*Multidimensional Scaling for all Innovation Indicators:* Graph 1 shows locations of countries in two dimensions by taking into account all the Innovation indicators. According to Graph 1 Turkey is nearer to Malta, Croatia, Romania. It means these countries show similar characteristics in terms of all innovation indicators.

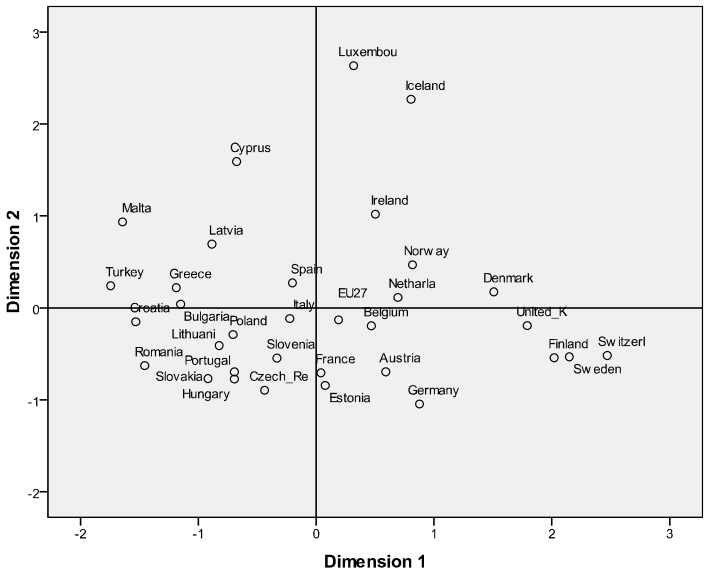



**Figure 4.** Mapping for all Innovation Indicators

*Multidimensional Scaling for the Human Resource Dimension:* While Switzerland, Sweden, Finland, Denmark are countries which show the best performance in Human Resource dimension Turkey is located quite different according to Figure 5. Nonetheless Turkey's location is also quite under the average of EU27.

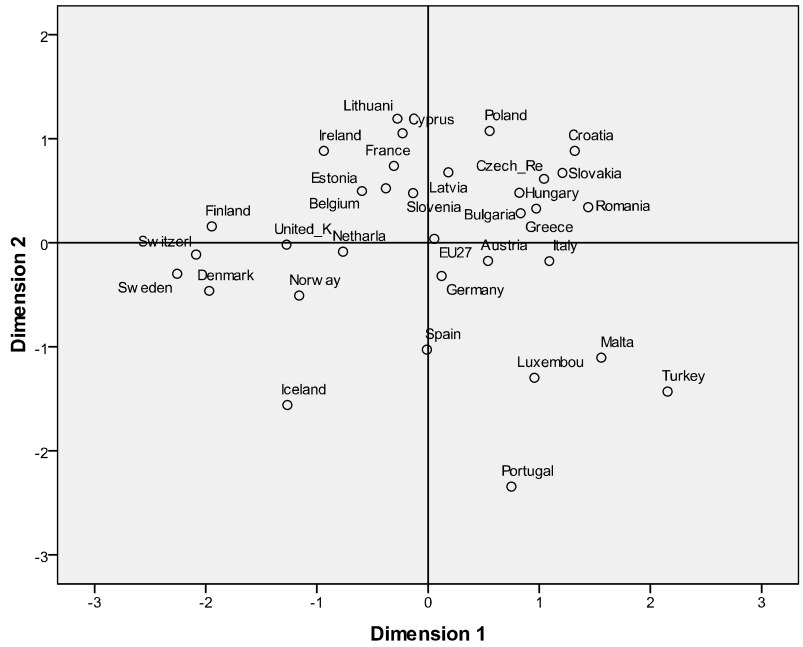



**Figure 5.** Mapping for The Dimension of Human Resources.

*Multidimensional Scaling for the Finance and Support Dimension:* Iceland is in a quite better location compared to other countries. Sweden and UK are close to each other in terms of financal and support dimension. It means that they have similar characteristics in financial dimension of innovation. Sweden and UK are also better located compared to other countries. Turkey shows

similar characteristics to Bulgaria, Slovakia, Romania in terms of financial and support situation. According to Crotia's location, Crotia has the lowest financial performance. The closest countries to EU27 average are Germany, Belgium, Italy, Estonia (Figure 6).

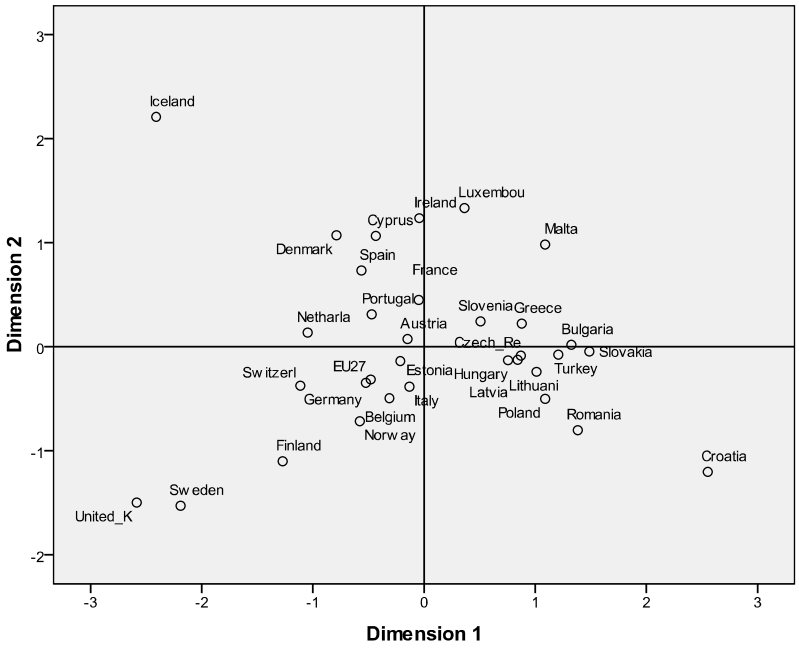



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**Figure 6.** Mapping for The Dimension of Finance and Support.

*Multidimensional Scaling for the Firm Investments Dimension:* Sweden, Finland, Switzerland which show the best performance in firm investment are collected together below right side of Figure 7. Turkey, Crotia, Malta which are collected below left side of Figure 7 are showing less performance in terms of firm investments than other countries. Netherland, Germany, France, Belgium and Norway are located near to EU27 average. Estonia is quite different located from other countries by reason of. the Non-R&D innovation expenditures. Estonia's Non-R&D innovation expenditures are higher than other countries (Figure 7).

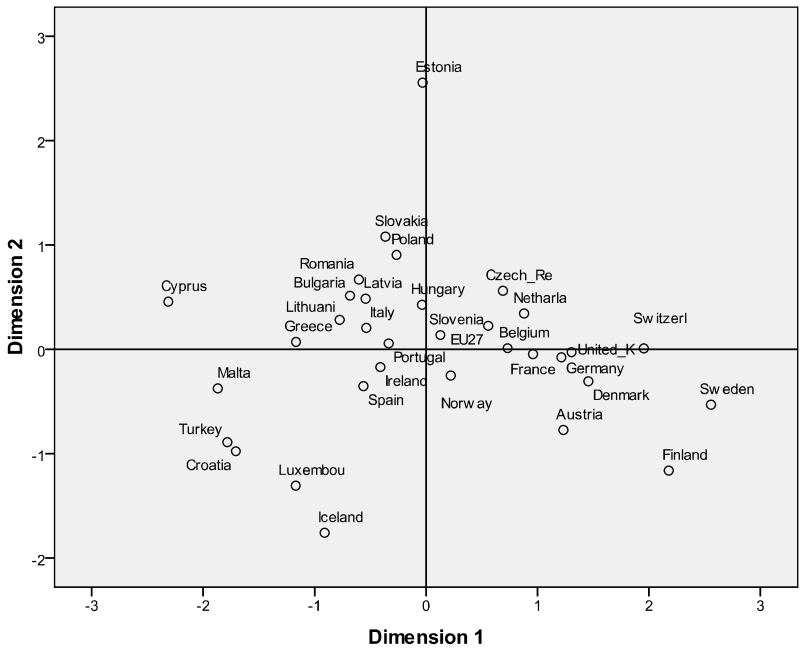


**Figure 7.** Mapping for The Dimension of Firm Investments

*Multidimensional Scaling for the Linkages & Entrepreneurship Dimension:* Finland, Sweden ve Switzerland are the best countries in terms of the Linkages&Entrepreneurship dimension. Turkey is close to Poland, Slovenia, Bulgaria and shows similar characteristics in this dimension.

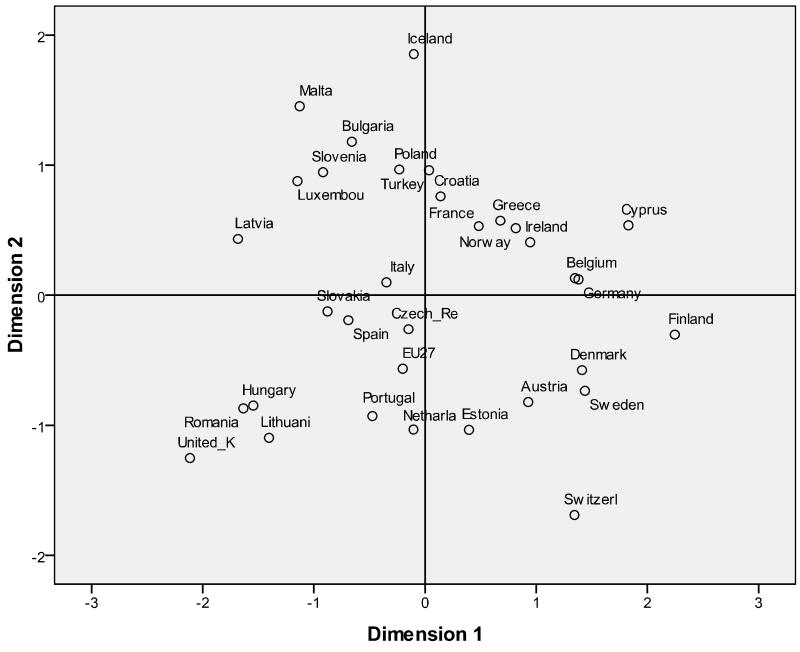


**Figure 8.** Mapping for The Dimension of Linkages & Entrepreneurship

*Multidimensional Scaling for the Throughputs Dimension:* Ireland, Switzerland and Luxembourg are quite different located from other countries. Ireland's situation is better is better in "Technology balance of payments flows", Switzerland is better in "EPO patents", "Community trademarks", "Community designs" and Luxembourg has a higher performance in "Community

trademarks" compared to other countries. According to Figure 9 Turkey's Throughputs structure is similar to Romania, Bulgaria, Lithuania, Slovakia and Greece.

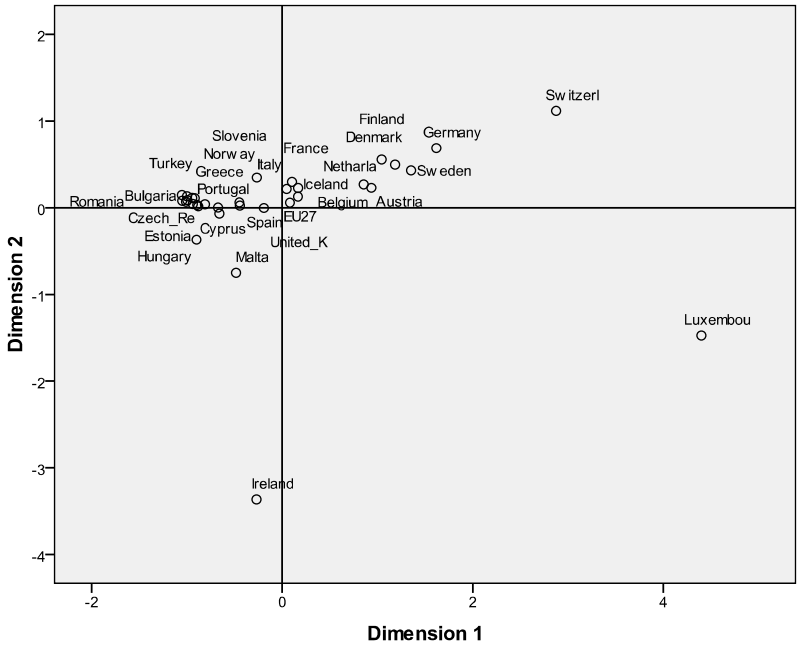


**Figure 9.** Mapping for The Dimension of Throughputs.

*Multidimensional Scaling for the Innovators Dimension:* Switzerland shows the best performance in terms of Innovators. Czech Republic, Belgium, Ireland, Turkey, Croatia and Luxembourg are the countries that are above EU27 average. Italy, Spain, Poland and Bulgaria are the countries which are below EU27 average. Latvia, Iceland and Sweden show lower performance than other countries.

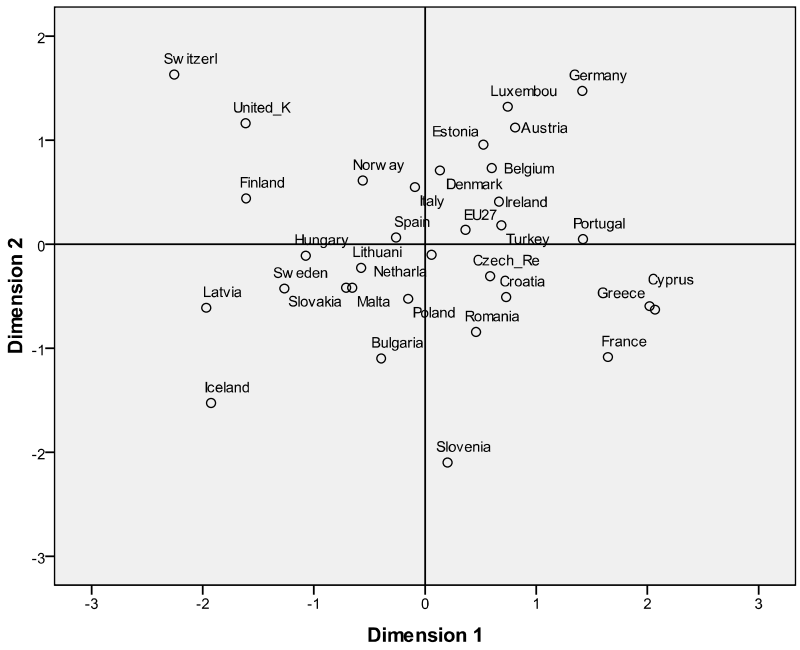


**Figure 10.** Mapping for The Dimension of Innovators

*Multidimensional Scaling for the Economic Effects Dimension*: Czech Republic, Hungary, Germany and Malta show the best performance in economic effects. Luxembourg has a higher level in "Knowledge-intensive services exports". Therefore it is far located from other countries. Ireland, Denmark and UK show better performance in "employment in knowledge-intensive services", "medium-tech and high-tech manufacturing exports" and in "knowledge-intensive services exports". Romania, Turkey, Spain and Crotia are similar in terms of economic effects (Figure 11).

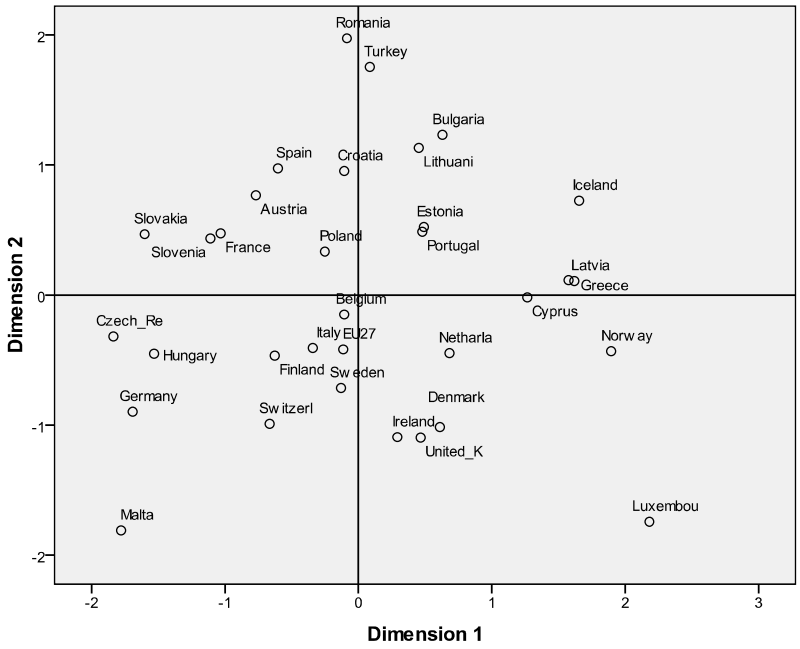


**Figure 11.** Mapping for The Dimension of Economic Effects.

## 5. Results

Turkey is a Catching-up Country with innovation performance according to EIS 2009 report. Although its innovation performance is under EU27 average Turkey's annual innovation growth rate for 2009 is three times more than EU27 growth rate. Turkey needs to improve especially in two innovations dimensions ("Innovators" and "Linkages and Entrepreneurship") and in two innovation indicators ("S&E and SSH doctorate graduates" and "Broadband access by firms").

Although the catching up countries have the lowest average innovation performance their average innovation growth rate (4.438%) is the highest comperad to the other country groups. Turkey's innovation growth rate is even higher than the average of catching up countries.

According to the results of Multidimensional Scaling; Switzerland, Sweden, Finland, Denmark are countries which show the best performance in Human Resource dimension but Turkey's performance of Human Resource dimension is under the average of EU27. Turkey shows similar characteristics with Bulgaria, Slovakia, Romania in terms of financial and support situation. Turkey, Crotia, Malta which are collected together in the perceptul map are showing less performance in terms of firm investments than other countries. Turkey is close to Poland,

Slovenia, Bulgaria and shows similar characteristics for the dimesion of Linkages & Entrepreneurship. Turkey's Throughputs structure is similar to Romania, Bulgaria, Lithuania, Slovakia and Greece. Czech Republic, Belgium, Ireland, Turkey, Croatia and Luxembourg are the countries that are above EU27 average for the Innovators dimension. Romania, Turkey, Spain and Crotia are similar in terms of economic effects.

In conclusion Turkey have to improve the innovation level by strengthing its weakness sides mentioned above. It has been seen in Multidimensional Scaling that Turkey, Bulgaria, Romania, Croatia have similar characteristics in terms of many innovation dimensions. These countries are very new member countries (Bulgaria, Romania) of EU that became members in 2007 or candidate countries (Turkey, Croatia). Turkey has also similar characteristics with Bulgaria, Romania and Croatia in terms of socio-economical structure. Furthermore all these countries can be accepted at the similar level of Innovation performance according to Multidimensional Scaling results. As a result we can say that socio-economical development is closely related with Innovation performance indicators/dimensions. Finally we can conclude that new members (which became member in 2005, Lithuania, Slovakia, Poland, Malta), very new members (which became members in 2007, Bulgaria, Romania) and candidate countries (Croatia, Turkey) must take action to improve their innovation performance.

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# OPEN INNOVATION

# CHANCES FOR SMALL AND MEDIUM-SIZED ENTERPRISES AND INCENTIVES OF EXTERNAL STAKEHOLDERS

Jessica Koch[17], Paul Flachskampf[18] and Ingrid Isenhardt[19]

## Abstract

A good standing of enterprises in the economic system depends on the ability to assert themselves and to achieve sustainable success. To achieve both, they have to generate innovation regularly. One strategy in the context of innovation management, which is getting more and more popular since several years, is the strategy of the so called “Open Innovation”. The term Open Innovation signifies the inclusion of external stakeholders into the process of innovation (cf. Chesbrough, 2003). Within this open innovation process, enterprises tend to receive more information about the external requirements and remedies, e. g. for the production process. Another effect of open innovation is the enlargement of the range of ideas (cf. Piller, 2003).

Integrating the external knowledge of their stakeholders into their process of innovation, small and medium-sized enterprises consider an important competitive factor. The economic success of Open Innovation is for example reflected in effects like the decrease of Time-to-Market and/or Cost-to-Market. On the other side, the increase of Fit-to-Market and/or New-to-Market (cf. Franke, & Piller, 2004; Brem, 2008) is an example for the entrepreneurial success with open innovation strategies.

Large enterprises, like Siemens, are already adopting Open Innovation. They do have the essential resources (particularly monetary resources), which are required for the process. Due to the frequently unforeseeable chances of success by including external stakeholders, the financial risk for small and medium-sized enterprises often is too high. Therefore these enterprises often deploy just their own staff inclusive its individual knowledge to generate innovation. Because of this, the question arises, how the open innovation management could be a good alternative to the traditional methods also for small and medium-sized enterprises. To answer this question, strategies for the involvement of external actors into the process of *innovation without busting*

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the budget of small and medium-sized enterprises have to be generated. Furthermore, it has to be clarified for what reason stakeholders allocate their knowledge for the process of innovation, so that small and medium-sized enterprises can also benefit from the Open Innovation.

Hence this article concentrates both the options for small and medium-sized enterprises to implement Open Innovation and the motivation of the external stakeholders to play a part in the process of innovation.

**Keywords:** Open Innovation, knowledge, SME, external stakeholders, requirements and remedies

## 1. Open Innovation in Small and Medium-sized Enterprises (SME)

Open Innovation is usually defined as an innovation strategy subjected to large concerns or as user generated contend and open source. But since several years the literature shows various types of methods in Open Innovation (cf. e.g. Tabscott, & Williams, 2006). One method is to call for ideas to solve a special problem. Another one is to offer externals a room like an internet platform where they can share and refine their ideas. Hence Open Innovation signifies the inclusion of external stakeholders into the process of innovation (cf. Chesbrough, 2003).

*IBM* for example is a member of the global developing association which refines the system software Linux. IBM does not have any rights in its programmed parts of the open source software; it is open to the public for free. The enterprise regularly calls for ideas to win the best software engineers for the further development of Linux (cf. Tabscott, & Williams, 2006). Hence IBM uses both sides of Open Innovation: on the one hand the enterprise takes an active part in the public generation of ideas. On the other hand it opens itself to use the knowledge of externals.

The Danish enterprise *Lego* is also adopting Open Innovation. The beginning of integrating the external knowledge of their stakeholders into their process of innovation was in the late 1990s when Lego launched the Mindstorms, programmable robotics. Some consumers were able to crack the source code and published it in the internet. Lego decided to seize this chance and use the consumers' knowledge to create the second generation of Mindstorm robotics (cf. Willhardt, 2007). Users, who exceed limits of existing products, develop them and create their own prototypes, are known as Lead-Users (cf. Tapscott, & Williams, 2006).

IBM and Lego are large enterprises with adequate resources, especially stuff and asset, to organize their innovation management flexible adapting it to its dynamic environment. The question is whether SME with less resources and smaller user groups (often due to the offering of niche products) are able to adopt Open Innovation successfully.

The following examples show that there are also SME yet which integrate their stakeholders into the value-added process successfully:

*Threadless*, which sells T-Shirts, has outsourced almost all its value-added and risk carried processes. The consumers can use an internet platform to design their own T-Shirts. It is also possible to rate and improve the ideas of other users. The consumers also promote their T-Shirts, act like models and photographers and acquire new users (cf. Reichwald, & Piller, 2008). The only task for Threadless is to provide the infrastructure and fabricate the products.

The automotive supplier *Webasto* fabricates roof, auxiliary heating and air conditioning systems. Hence the enterprise has less contact to its end customers, the car drivers. More important for component suppliers usually is the contact to the large concerns in the automotive industry. While the times of increasing market pressures, Webasto decided to make contact to its end customers. It searched systematically for Lead-Users by screening the customer requests and invited them for „innovation weekends". In every weekend workshop the customers generated more than 100 ideas, which brought out a considerable profit for Webasto (cf. Lohmann, & Depner, 2010).

Hence Open Innovation is also used in some SME successfully yet. Many enterprises use this form of innovating products unknowingly: they take part in public-aided research projects for example. The consequence is that they are integrating researchers into their innovation management. Beside the short resources the disclosure of a part of their knowledge means also a problem for SME.

To focus on the main issue it could be said that SME neither know how to use the Open Innovation strategy nor how much of their knowledge they have to externalize without risking too much of it. One method which proves the effectiveness and efficiency of Open Innovation techniques still does not exist. The exciting question is, if all companies, especially SME, really need new innovation strategies. Or would it be enough to use new internet technologies to create and support a modern way of making proposals (cf. Willhardt, 2007)? To answer these questions a methodical analysis has to reveal what is really new and how these reforms fit to the typical characteristics of SME. Hence the following chapter concentrates methodically on the three levels human, organization and technique as well as their changes.

## 2. Changes on the three levels human, organization and technique

By now innovation is examined as an integrated subject. That means that the three levels human, organization and technology are included in these examinations (H-O-T-approach). Currently Open Innovation is especially discussed on the level technology. The human, as an important actor, and the organization of innovation processes are often neglected. But the integrated examination of all the three levels is meaningful in SME, especially concerning opening their innovation process.

In the recent past a lot of technical innovations which pushed the discussions of Open Innovation were implemented (cf. Reichwald, & Piller, 2008; Howe, 2006; von Hippel, 2005). Examples are the continuous optimization of computers and the opening of the internet for private use (connected to this broadband connections and low-priced flat rates are also important). These innovations caused a networked digital world which is accepted and used by the new generation. A lot of users also generate and advance software and content in the internet. Examples for these Web 2.0 technologies are Wikis, Blogs, Tagging or Content-Management-Systems.

Already at the end of the 1980s Toffler formed the term „prosumer“, to describe this cross between costumers and producers (cf. Toffler, 1987). The users of the online encyclopedia Wikipedia for example consume and create knowledge. On the one hand they read the articles of other users; on the other hand they create their own articles and share their knowledge. There are more changes on the human-level. Today especially for young people it is as a matter of course to accept technical innovations and to operate in virtual worlds. This “new” generation is characterized by the digital networking und communication. Very important are also the aspects fantasy and hands-on learning. But the most important character concerning Open Innovation is the desire to take an active part in everything around and share the acquired knowledge. Veen (cf. 2006) names this grown up generation, which is now overflowing the employment market for the first time as “Homo Zappiens“. He identifies their fundamentally different paradigms of thinking, learning and acting. These characteristics are compared with the characteristics of the „old“ Homo Sapiens in figure 1.

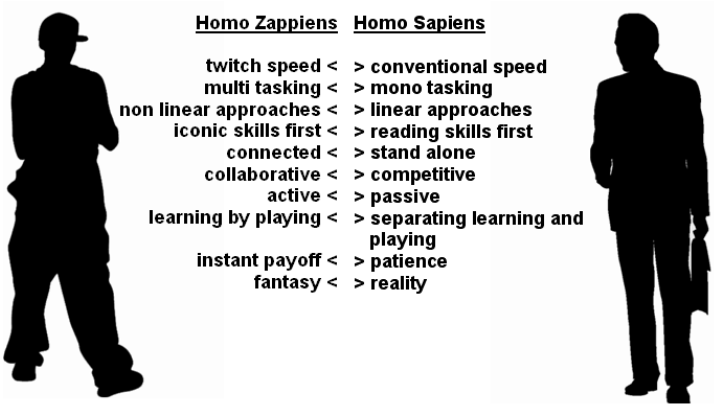


**Figure 1.** Homo Zappiens vs. Homo Sapiens (Veen, 2006)

The question is why the external stakeholders agree to cooperate with enterprises concerning the generation of innovations and share their knowledge. Some user for example could have problems with one product or have ideas how to develop or improve a product. The creation of a new product or the modification of an existing product is more difficult and cost-intensive than opening and sharing the knowledge to an enterprise (cf. Reichwald, & Piller, 2006). Humans also have the need to communicate. Thus they can share their knowledge and build new interpersonal relationships. Of particular importance is the fact that humans need contact to fellow men with the same or at least similarly interests and problems (cf. Hagel, & Armstrong, 2000). Another attractive aspect is also to be adept in something or to have a distinctive knowledge in a defined field. Of particular importance is to be given credit for the knowledge and to be asked for advice. By implementing Open Innovation, enterprises provide their external stakeholders the opportunity to share their knowledge with like-minded people. The geographic distance between the externals helps to minimize the thought of rivalry and increases the attendance to share the knowledge (cf. Reichwald, & Piller, 2006).

This short paragraph shows that Open Innovation fulfills some human basic needs. The attendance to share knowledge exists and will continue to increase. A monetary return service is not necessarily expected by the externals.

Thus it appears that the level human is impressed by a lot of changes, which enterprises should use concerning the successful opening of their innovation processes. The question is, if the “new” generation of employees still allows “Closed Innovation“. This kind of innovation management is contrary to the fundamental approach of the new generation.

Hence the levels human and technique offer the external resources which enterprises need to implement Open Innovation. The changes even exert pressure on the enterprises to fit the level organization to the other two levels (cf. figure. 2).

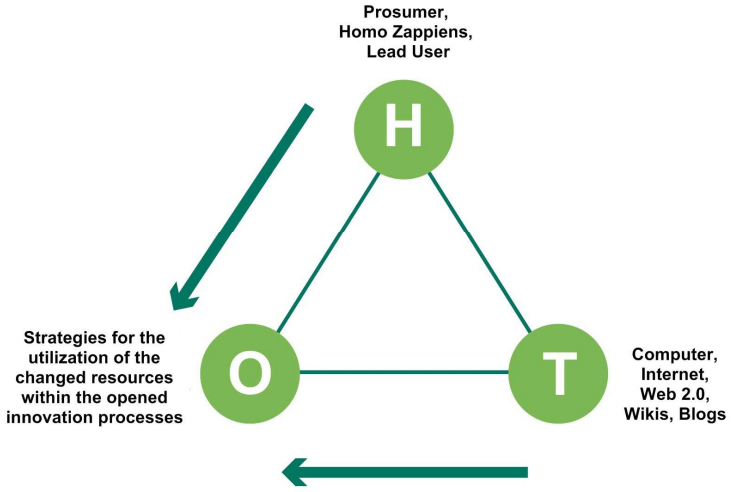


**Figure. 2.** Current trends in the levels human, organization and technique

It has to be re-emphasized the significance of all the three levels to open the innovation management successfully. For management cybernetics purposes the levels human, organization and technique depend on each other. A variation of one level or the existence of an actual-theoretical gap cause changes on the other levels. Analog to this the variation of one level usually does not cause any fundamental development of the SME's innovative ability. Hence the key to a successful innovation strategy is the interaction between the three levels as well as the recirculation among each other.

At this time, enterprises, especially SME, do not know any strategies to prepare their employees for the employment and implementation of Open Innovation. The lack of resources in SME is one of the reasons. To concentrate on Open Innovation, especially the development of adequate strategies as well as the fitting of their organization, SME need more capital and stuff (cf. Meyer, 2006; Mugler, 1998; Pichler, Pleitner, & Schmidt, 2000; Lindermann et al, 2010). Another reason could be the missing perception of the old generation of managers concerning the changes on the level human and the new generation, the Homo Zappiens[20].

SME have to consider that they will be forced to use Open Innovation in the future to retain their competitiveness. Hence the following paragraph identifies the specific characteristics of SME. It also derives first methods from these characteristics to classify them into strengths, weaknesses, opportunities and threats concerning the opening of innovation processes.

## 3. Characteristics of small and medium seized enterprises

[20] also known as "generation N" or net-generation

Because Open Innovation is becoming an important strategy, also for SME, it is necessary to contemplate the characteristics of SME. It will be possible to decide, if organizational structures go with the Open Innovation strategy and if there is a chance to use it efficiently. In a first step the characteristics which separate SME from large enterprises, will be identified.

Several definitions concerning quantitative classifications exist (cf. e.g. HGB; European Commission, IfM Bonn, etc.). The European Commission for example has committed that SME include companies which employ under 250 employees and either perform 50 million € annual sales maximum or annual total assets in the amount of 43 million € maximum (cf. European Commission, 2006).

These quantitative classifications allow a first differentiation between SME and large enterprises. It is possible to take exact measurements of such economic data but the characteristics of a SME do not become evident. It is necessary to identify qualitative factors. In a second step these factors could be clarified by using the H-O-T-approach. Especially the organizational and social factors are import to identify the SME's potentials concerning Open Innovation techniques. The following table shows generally accepted qualitative factors of SME[21], which were compiled from several references (cf. e.g. Pichler, Pleitner, & Schmidt, 2000; Pfohl, 2006; Mugler, 1998, & 2008; IfM Bonn, 2010; Gelshorn, Michallik, & Staehle, 1991; Siemers, 1997; Lindermann et al., 2009):

[21] only factors referring to innovation management

**Table 1.** Characters of SME.

| Characters of SME |
| --- |
| HUMAN<br>*Entrepreneurs*<br>the entrepreneur is both the owner and the top manager of his/her enterprise (unit of property, management, decision, risk and control); the entrepreneur also defines the corporate culture; the innovativeness of the entrepreneur causes the innovativeness of the hole enterprise; surrender to the enterprise; emotional engagement is very strong; patriarchic management; strategic planning is not very important; little knowledge concerning Business Administration<br>*Employees*<br>little stuff; little employees which are focused on Business Administration and its special functions; there is know-how in just one field; the employees are satisfied about their job; high motivation; flexible employees; large network of personal contacts to customers, suppliers and the relevant publicity |
| ORGANIZATION<br>high flexibility concerning company organization; preferential line organization; little delegation; the level of formalization is very small; little division of work; the contact between the management and the employees is close and informal; information paths are short and clear; the participation and the coordination between the employees are very important (social character of the enterprise) |
| TECHNIQUE<br>little resources; a long-lasting institution for research and development (R&D) does not exist; the R&D works intuitively; little working with Web 2.0; little working with information and communication technology (ICT) |
| OTHER<br>*Performance*<br>the production is individual and differentiated; no utilization of „economies of scale“ (no mass production)<br><br>*Situation*<br>lack of time; acquire capital is difficult; jobs are usually regional; subject to large companies which mostly act as account debtors; securing „intellectual property“ is difficult; little chance to influence the market; influenced by the uncertain environment<br><br>*Innovation*<br>the charge caused by fixed costs of innovations is disproportionately high; short periods between invention and economic use; little diversification of risk; internal financing of innovations |

All these listed characters are extremes. In the reality, they do not all exist parallel in one SME although every SME combines a lot of them. The next step is to choose some characters and go into detail concerning the (open) innovation management.

Both the individual and differentiated production and the networking, especially the personal contacts to the costumers, show that Open Innovation is used in several SME yet, mostly unknowingly. Furthermore the enterprises often have to cooperate with external experts because of the lack of resources, especially capital. The table also shows that the R&D department plans near-term and works intuitively. So there is another good point to integrate an open and cooperative innovation management in SME (cf. Gassmann, & Enkel, 2005). Using external knowledge gives SME a chance to counteract their handicap of short resources concerning stuff and capital (cf. Meyer, 2006; Mugler, 1998; Pichler, Pleitner, & Schmidt, 2000; Lindermann et al, 2010). SME could use the external knowledge to receive more information about requirements and remedies as well as to expand their R&D. It is also possible to identify insecurities concerning markets and technologies. This is accompanied by the fact that methods of acquire knowledge (e.g. information and communication technologies) often just support the day-to-day business (Lindermann et al., 2009).

The human is one of the most important elements in SME. Especially the central position of the entrepreneur has an effect, both positive and negative, on the potential of Open Innovation. The unit of property, management, decision, risk and control in conjunction with short information paths allows fast reactions concerning external changes and also a flexible organization (cf. Daschmann, 1994). Otherwise the whole success of the SME is affected by potentially wrong decisions of the entrepreneur, for example concerning declining the implication of external knowledge (NIH[22]-Syndrome), or by wrong innovation methods (cf. Meyer, 2006). Furthermore the self-organization due to using Web 2.0 is contrary to the patriarchic management of the entrepreneur and the lacking participation of his employees (cf. Lindermann et al., 2009).

Especially traditional managed SME undergo a revolution by implementing the strategies of Open Innovation. Hence the entrepreneur, who was successful by using closed innovation strategies for the last years, has to be prepared to implicate external knowledge. He/She has to accept and use the changes of the enterprise's environment and the new technologies, e.g. Web 2.0, because they definitely will have an impact on the SME's future (cf. Lindermann et al., 2009).

Another problem for the implementation of Open Innovation in SME is the risk-aversion of the entrepreneur. The aversion concerning the opening of their innovation process is especially caused and tightened by the difficult protection of the SME's "intellectual property" (cf. Rothwell, & Dodgson, 1991; Gassmann, & Widenmeyer, 2010). The entrepreneur has to decide, if it is more risky to share the internal knowledge or to miss adapting to the external changes and requirements. The definition of where to open the SME and the right measurement concerning the shared knowledge to keep the unique features is a first step to use Open Innovation.

[22] NIH = Not Invented Here (cf. Allen, & Katz, 1982)

Both the knowledge of the entrepreneur and the knowledge of his employees are fixed in a specific field. Hence in SME exists enough knowledge about inventing new technologies. Otherwise a lack of stuff concerning developing manufacturing methods and strategies concerning successful launches exists (cf. Lee, 2010; Noteboom, 1994). Some SME are working with their costumers yet. What is missing is the implementation of external knowledge in the phase of commercialization (cf. Lee, 2010).

Another important aspect concerning innovation activities in enterprises is the project organization (cf. Siemers, 1997). Because of the informal and personal communication between the management and the employees in SME the coordination of the various departments is very efficiently organized (cf. Mugler, 1998). The organization in SME is characterized by a high flexibility. Hence the structural changes inside the enterprise due to the implementation of Open Innovation could be managed without high costs. One of the most important facts concerning the integration of external knowledge is to manage well-organized innovation processes (cf. Van de Vrande et al., 2009). Using Web 2.0, enterprises have to create more self-organized and participated structures (cf. Lindermann et al., 2009). Because of lacking resources and factors like the time factor, the assignment of modern communication media has to be well-structured. Very important is the balance between creating innovations and handling daily tasks (cf. Van der Vrande et al., 2009). This is connected with a change on the human level. It is necessary to train the employees concerning the new ways of information search. The implementation of Open Innovation causes new roles with specific remits. Some of the new main tasks are to identify cooperation partners, use the offered external knowledge efficiently and separate important knowledge from irrelevant (Gassmann, & Widenmayer, 2010). Hence a gap between the lack of stuff and time as well as the requirement to manage new task over and above the operational tasks exists.

## 4. Conclusion

By now some SME use the Open Innovation strategy and generate important competitive advantages. Examples are Threadless and Webasto. These SME have to accept the changes on the three levels human, organization and technique and identify their potentials to use these changes and be responsive to pressure. The H-O-T-approach shows that especially the changes on the levels human and technique as well as the interaction between all the three factors have to be included in the new innovation strategies. The new technique which exists at present and which will be generated in near future will definitely enable the teamwork beyond the enterprise’s borders. Another fact is that a new generation will dominate the employment market. It is a generation which generates new ways of communication, cooperation and information processing.

By implementing Open Innovation enterprises provide their external stakeholders the opportunity to share their knowledge with like-minded people and create or improve a product on a way which is not really cost-intensive for them. Open Innovation fulfills this and some

other human basic needs. The attendance to share knowledge exists and will continue to increase.

The strengths and weaknesses concerning the implementation of Open Innovation in SME can be defined by characterizing it. One of the most important facts is to accept the separation of relevant knowledge from irrelevant as well as knowledge which should be shared from this which should be retained inside the enterprise as a new main task. SME are usually able to implement innovations faster and more cost-efficient than large enterprises. This is caused by their specific structure and culture. SME should also expand their networks (costumers and scientific partners) and use them more efficient especially in the phase of commercialization.

Therefore the Institute for Management Cybernetics e.V. (IfU) and the Technology and Innovation Management Group (TIM) at RWTH Aachen University will work on the research project „Invoice“, promoted by the Consortium of Industrial Research Associations (Arbeitsgemeinschaft industrieller Forschungsvereinigungen, AiF). The first step is to construct a SWOT-analysis for SME and their innovation management, based on the above-named characters. After this it would be possible to develop and systematize critical success factors of SME in the context of Open Innovation

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# THE ENTREPRENEURIAL PERFORMANCE MODEL OF EXPERIENCED ENTREPRENEURS: AN INDIGENOUS AND REGIONAL STUDY FROM TURKEY

Ramazan Uygun

Murat Kasımoğlu

## Abstract

In order to speak of entrepreneurship there should be an identified entrepreneurial opportunity first. Individuals get involved with entrepreneurial processes only when they identify entreprenerial opportunities and engage to capitalize on them. In this manner, both distinguishing entrepreneurs from non-entrepreneurs and among types of entrepreneurship identifying opportunities reflect the initial steps of entrepreneurial process. Human capital approach which is prominent recently among entrepreneurial researches in literature has been studied on lately as a wraparound concept which covers individual's education, work experience, family, job and entrepreneurial background. Human capital approach contributes to identify some opportunities and is a significant theoretical perspective when directed to examine entreprenerial process. When types of entrepreneurship based on past entrepreneurial experiences taken into notice, it is important to acknowledge that human capital tools they have and the amount and quality of opportunities they identify are different from one another. They also differentiate in terms of experience. In this study, qualitative research approach is chosen for the purposes of acquiring enhanced data and a chance to look from a historical perspective. Archival data and semi-structured interview methods are utilized for data gathering. Data derived from archives primarily used to determine the extinct entrepreneurial opportunities in the last 50 years retrospectively in Biga ecology in Çanakkale province. In addition, entrepreneurs who had operated in those areas in the past have been determined using these records. Semi-structured interviews were conducted with a total of 76 entrepreneurs who were engaged in extinct entrepreneurial opportunities. It has been observed that the entrepreneurs interviewed had founded, taken over and acquired 154 enterprises in total. When their entrepreneurial processes are examined it was found that serial and parallel entrepreneurs have different insights and behaviors about start-up a business. Business establishment behaviours of experienced entrepreneurs are modelled referring to the findings.

**Keywords:** Entrepreneurship, Human capital, Entrepreneurial experience, Indigenous entrepreneurs

## 1.Introduction

Researchers analysis entrepreneurial dynamics in studies appearing in the literature generally reflecting perspectives focused on one discipline. Exploring only evolution of organization forms results in isolation of the entrepreneur, leading actor of entrepreneurship, and via immoderate deterministic comments renders him as a prisioner of the environment he dwells in. On the other hand, dynamics of entrepreneur's operational environment are ignored in studies which view the entrepreneur as an individual who precludes his environment and makes atomic decisions. However entrepreneurship researchs require multidisciplinary perspectives. For this reason, entrepreneur and his behaviours are chosen as the basic unit of analysis, besides the context which he embedded is also taken into consideration in this study.

The universal definition for the term entrepreneurship is contentious (Hornaday, 1992, p. 12; Gartner, 1989, p. 31) and despite the long history of this concept researches couldn't yet come to a conclusion for the true identity of entrepreneur (Carland, Hoy, & Carland, 1988, p. 33). Despite a great deal of studies made in the field of entrepreneurship a generally accepted entrepreneurship theory (Gartner, 2001, p. 28; Bull & Willard, 1995, p. 1) and a consensus about the nature of this phenomenon among the researches don't exist (Hoy & Verser, 1994, p. 17; Hornaday, 1992, p. 12; Gartner, 1989, p.31). Every single discipline has its original sights to define entrepreneurship and there exists single-disciplined perspectives rather than interdisciplinary multiple views (Gartner, 2001, p. 28). The entrepreneurship phenomenon exhibits a complicated and variable structure (Gartner, 1985, p. 706). Sharma and Chrisman (1999) emphasis that entrepreneurship holds different meanings for different individuals. A valid entrepreneurship description must depend on entrepreneurial activities rendered by general consensus and the description to be done must exclude the non-entrepreneurial activities with respect to the consensus (Long, 1983, p. 47).

## 2. Literature Review

Despite the high number of publications in the field of entrepreneurship, a generally accepted entrepreneurship theory (Bull, & Willard 1995, p. 1) and common agreement on the nature of the phenomenon among researchers have not yet been established (Gartner, 1989, p. 31, Hornaday, 1992, p. 12, Hoy & Verser, 1994, p. 17). An attempt to determine the traits of entrepreneurs by distinguishing them from executives and society became a preferred research topic during the 1970's and 1980's (Morris, Lewis, & Sexton, 1994, p. 22). Due to the traits approach, the common traits of entrepreneurs which lead them to start a business and succeed could be determined and a relation between these traits and entrepreneurial behaviour could be established (Jenks, 1950, p. 92). The failure of past researches to explore entrepreneurial personality and to distinguish entrepreneurial personality clearly through the entrepreneurship process has constituted a significant blank among entrepreneurship research which needs to be filled (Mitchell et al., 2002, p. 93). Controversial findings and inferences revealed by researchers shifted attention from the examination of traits to the examination of process (Morris et al., 1994, p. 22). Indicators of a positive connection between previous experience and entrepreneurial behaviour were determined (Kolvereid, 1996, p. 47). A great number of

researchers have pointed out that entrepreneurs get their first experience in the industrial field in which they set up their enterprise. Scott and Twomey (1988) indicated that previous work experience should be regarded as an important factor in an entrepreneurial career.

Other hand, for many years, researchs are designed based on the assumption that entrepreneurs are homogeneous species. But entrepreneurs are not a homogeneous species. Researches suggests that there are different types of entrepreneurs. For example Westhead and Wright (1998) emphasized the differences between inexperienced and experienced entrepreneurs. Literature classified experienced entrepreneurs in the form of two separate sub-species as serial and parallel entrepreneurs (Rosa, 1997, p. 43). Some experienced entrepreneurs may own multiple business sequentially (serial) and some experienced entrepreneurs may own multiple business at the same time (paralel) (Wright, Westhead, & Soul, 1998, p. 7). Inexperienced entrepreneurs are individuals with no prior minority or majority business ownership experienced either as a business starter or an inheritor of an independent business. Experienced entrepreneurs are individuals with prior minority or majority business ownership experienced either as a business starter or an inheritor of an independent business (Westhead, Ucbasaran, & Wright, 2003, p. 189).

Human capital approach has been gaining attention as a paradigm in recent years. This approach has attracted attention in the literature which has been coding entrepreneurial experience as a part of entrepreneurship-specific human capital (Marvel & Lumpkin, 2007, p. 809). Knowledge and experience are in the core of the concept of human capital. Human capital theory emphasizes some individual determinants of entrepreneurship (Carrera, Carmona, & Gutierrez, 2008, p. 297). Lynskey (2004), has examined the age, education, previous work experience and business experience of entrepreneurs as human capital variables. Marvel and Lumpkin (2007) suggest that individuals who are different in human capital inputs will be differ in recognition of entrepreneurial opportunities (Marvel & Lumpkin 2007, p. 822).

## 3. Methodology and Data Collection Process

In the study, qualitative research approach is chosen for the purposes of acquiring enhanced data and a chance to look from a historical perspective. As in Ucbasaran, Wright, & Westhead (2003) discussed it is always the ideal preference to choose qualitative research methods if the aim for newly research fields is to develop theoretical perspectives for prospective researchs in the future by contributing to existing knowledge. Archival data and semi-structured interview methods are utilized for data gathering.

### 3.1. The Identification of the Extinct Entrepreneurial Opportunities in Biga Region and Sampling Structure

The study focused on 16 extinct industries detected in Biga ecology. Archival records and open-ended questions in-depth interviews are used as data collecting methods.

Qualitative research perspective is also adopted in respect of acquiring generous data and so as to get the research to provide historical characteristics. Data derived form archives primarily used to determine the extinct entrepreneurial opportunities in the last 50 years retrospectively in Biga ecology. In addition, entrepreneurs who had operated in those areas in the past have been determined using these records. Semi structured interviews have been conducted with those entrepreneurs. Through exploring those extinct business opportunities, a longitudinal research technique has been acquired and it has been used to discover what type and number of entrepreneurs were operated in which opportunity.

Interviews have been conducted with a total of 76 people who were engaged in extinct entrepreneurial areas comprising 15 at briquette or breeze block manufacturing, 30 horse carman and tipcarting, 10 at rush or wickerwork manufacturing and 21 at other jobs. Because geographical boundaries for this research aimed at detecting extinct entrepreneurial opportunities is limited to Biga province, our primary data source comes from the recordings of Biga Chamber of Craftsmen and Artisans (BCCA). The purpose of Craftsmen and Artisans Law (06.07.2005) in Turkey is to meet occupational and technical requirements of craftsmen and artisans and employees working with them, to facilitate their occupational activities, to ensure their vocational training and progress in accordance with common interests of the profession, to impose integrity and trust to the relationships of members mutually and with community, to preserve professional discipline and work ethics, to regulate the working procedures and basics of craftsmen and artisans associations organized as public bodies possessing corporational traits and to regulate those procedures and basics between them and their superiors. According to this law, “Craftsman and Artisan” is the person who partakes whether mobile or steady in the branch of vocations designated by The Coordination Council for Assignation of Craftsmen and Artisans and Tradesmen and Manufacturers, founds his/her economic activities on his/her capital along with physical labour and whose income is not equal enough to personalize him/her as a tradesman or manufacturer. They are also taxed by uniform accounting system and subject to statements of working accounts. Some of them maybe tax free also. BCCA is founded with an act in 7th April of 1955.

The sampling frame of the study is focused on entrepreneurial fields which has no market activities today. Entrepreneurial opportunities which are extinct reflect the working fields which has no officially active representatives anymore. In this respect, the sampling framework of this study is constructed by taking into account the entrepreneurs registered to BCCA. For further information about the sampling population, table 1 can be checked out.

**Table 1.** Sampling Structure

| Extinct Entrepreneurial Opportunities | Number of Realized Interviews | Invalid Interview | Interview Refusal | False Archival Record | Moved out of Region | Alive | Dead | Total |
|---|---|---|---|---|---|---|---|---|
| Briquette | 15 | 0 | 4 | 2 | 2 | 23 | 7 | 30 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Manufacturing | | | | | | | | |
| Horse carman and Tipcarting | 30 | 0 | 3 | 0 | 1 | 34 | 5 | 39 |
| Seller and Repairer of Horse Car | 2 | 0 | 7 | 0 | 1 | 10 | 10 | 20 |
| Manufacturing of Horse Carman and Tipcart | 3 | 0 | 2 | 0 | 0 | 5 | 6 | 11 |
| Limekiln Business | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 2 |
| Tinsmith/Whitesmithery | 1 | 1 | 1 | 0 | 0 | 3 | 7 | 10 |
| Turkish Bath Business | 3 | 0 | 1 | 0 | 1 | 5 | 3 | 8 |
| Maker or Seller of Wickerwork | 11 | 0 | 2 | 1 | 1 | 15 | 4 | 19 |
| Repairer of Rifle | 3 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| Manufacturing of Wood Barrels | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Manufacturing of Mozaic | 1 | 0 | 0 | 0 | 0 | 1 | 4 | 5 |
| Seller of Perfumes and Cosmetics | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 3 |
| Manufacturing of Packsaddle | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| The Art of Wood Carving or Engraving | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Repairer of Car Glass | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Blacksmithery | 2 | 0 | 0 | 0 | 0 | 2 | 1 | 3 |
| Total | 77 | 1 | 21 | 4 | 7 | 110 | 48 | 158 |

### 3.2. Data Gathering Procedures and Analysis Model

All the research methods offer only limited opportunities for acquiring information about phenomena. All methods have different opportunities from one another by the means of collecting evidence and analysis them, however each also has specific restrictions. Different restrictions of various methods can be overcome by incorporating those different methods. But when using multi-methods approach, the methods must be chosen in a way to cover the weakness of one another (McGrath, 1994, p. 154-155). Researchers occasionally choose to examine one problem by using multiple methods. Moreover, by using multiple methods entire research process can be strengthened, enhanced data can be acquired and findings may be comprehensively interpreted (Pearce, 2002, p.104). Archive records and interviews were used concurrently in order to collect research data. Semi-constructed interviews were conducted with entrepreneurs who were engaged in extinct entrepreneurial opportunities detected by archival data.

Hand analysis of qualitative data method is used for data analysis in the study like Creswell (2002). This method is better when researchers want to be close to the data, capture the meaning and purpose to recognize the links between themes. For understanding and interpretation of the data obtained from this analysis method is the most appropriate method in the analysis of the data which were collected through interviews.

To avoid validity and reliability problems some measures adopted which were discussed in Bakoglu (2004). Interviews and archive records were used to collect data to complement each other.

- To increase the validity of the study, a *semi-structured interview form* was used in interview process. And one interviewer has been responsible for writing the answers.
- The data obtained from interviews and archival records were compared. For the avoiding mismatching data additional interviews were conducted with entrepreneurs.
- Some chronological questions were asked to entrepreneur himself and his relatives for increasing the reliability and accuracy of the information gained through interviews.
- With the aim of improving validity and reliability, some interviews were conducted with the entrepreneurs who were operated in the same business sector.

## 4. Findings

In the study which was based on the theory of human capital, the effect of work and entrepreneurial experience to entrepreneurial performance are investigated. Entrepreneurial performance of experienced entrepreneurs are modeled based on the findings.

Demographic characteristics for interviewees are as follows: Average date of birth for the group is 1945 and average age at the time of the research held (2009) is 63,06, 75 of 76 entrepreneurs were male and only 1 of them were female, %21 of them can only read and write, %71 are primary school graduate, %5 are high school graduate and only %3 of them

have an associate degree, %89 of these entrepreneurs grew up in a village and %11 are grown up in a city. When stories family entrepreneurship background were viewed, it was evident that %33 of them had an entrepreneur parent (father or mother who had his/her own job other than agriculture and livestock/cattle dealing), %77 of entrepreneurs start-up their business in the extinct industry and %23 carried on the family tradition by inheriting the organization from their families which serviced in the extinct sector (when the parents were still alive), %39 of the entrepreneurs had experienced in the extinct industry before they start-up or inherited the business. And %61 of them start-up their business without having an experience in the extinct industry.

When the data which obtained from the lifelong work and entrepreneurial behaviors of entrepreneurs is taken into account, this data may be an indicator of the entrepreneurial performance of entrepreneurs.

Operational definitions for the analyzed concepts are as follows:

- **The time for the repetition of entrepreneurial behaviour:** Time frame between two sequential or simultaneous entrepreneurial behaviours.
- **Work experience:** The number of different jobs worked for as a worker, an apprentice, an owner, a founder or a partner to gain experience until the interview time.
- **Entrepreneurial experience:** The number of entrepreneurial behaviour that the interviewer demonstrated as an owner or a partner of a business by starting-up, inheriting or purchasing an operational one.
- **Homogen or heterogen entrepreneurial opportunity:** The difference or similarity between two entrepreneurial opportunity which is exploited sequentially or simultaneously either as a founder, an inheritor or a purchaser of an independent business by entrepreneurs who currently own a minority or majority equity stake in an independent business that is either new, purchased or inherited.

**Table 2.** Findings About Entrepreneurial Performance of Entrepreneurs

| | N | The Time for the Repetition of Entrepreneurial Behaviour (Year) | Average of Work Experience | Average of Entrepreneurial Experience | Number of Homogen Opportunities | Number of Heterogen Opportunities |
|---|---|---|---|---|---|---|
| Single Starters | 20 | - | 2.25 | 1 | - | - |
| Serial Entrepreneurs | 38 | 12.54 | 3.176 | 2.29 | 7<br>%30 | 17<br>%70 |
| Parallel Entrepreneurs | 96 | 9,67 | 3,02 | 2,48 | 13<br>%22 | 48<br>0,78 |

According to the findings:

- According to the findings about work experience, serial entrepreneurs are much more advantageous than parallel and single starters. Serial entrepreneurs have been gaining much more work experience and work in different jobs than the others.
- According to the findings about entrepreneurial experience, parallel entrepreneurs are much more advantageous than serial and single starters. Parallel entrepreneurs have much more entrepreneurial experience than the others.
- When compared with the previous entrepreneurial opportunity, parallel entrepreneurs founded, acquired or taked over businesses which were operated in different or heterogen business opportunities than serial ones.
- The repitation of the entrepreneurial behavior is measured as the time frame between the two founding or taking over behaviors. In this concept serial entrepreneurs sequential entrepreneurial behaviors time frame is longer than parallel ones. On the other hand entrepreneurial opportunity structure (homogenity or heterogenity), the story of founding (start-up, take over, acquire) are important in the process of time frame.

## 5.Conclusion

When the data which obtained from the research process and comprehend all lifelong entrepreneurial behaviors (start-up, take over or acquire a business) of the entrepreneurs untill the moment of interviews modelled as work and entrepreneurial experience, structure of entrepreneurial opportunity and the time frame between two entrepreneurial behaviors, the following results can be achieved:

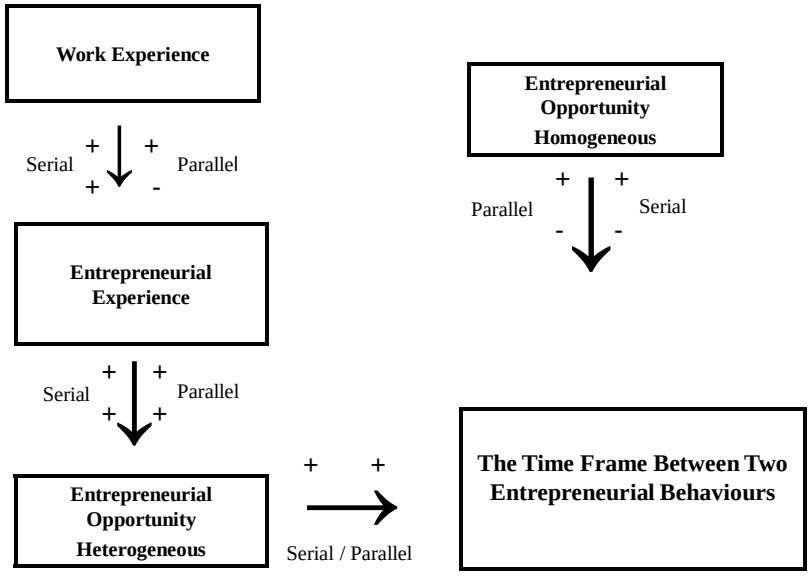


**Figure 1.** The Performance Model of Experienced Entrepreneurs

In according to the entrepreneurial experience, work experience contributes this experience in a positive direction for serial entrepreneurs where as increasing work experience lead up to decrease in entrepreneurial experience for parallel entrepreneurs. For both serial and parallel entrepreneurs, increasing entrepreneurial experience results in increasing heterogenity in the structure of exploiting entrepreneurial opportunities. And this heterogenity in the structure of business opportunity expands the time frame between two entrepreneurial behaviors for both serial and parallel entrepreneurs.

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# ECO-TECHNOLOGY PARKS AND IMPLEMENTATION PROPOSALS FOR TURKEY

Erol Sayin and M. Emre Yurttagül

**Abstract**

Eco-technology parks are emerging as the primary arena for testing and implementing industrial ecology. Ecotechnology parks are designed to allow firms to share infrastructure as a strategy for enhancing production and minimizing costs. The distinguishing feature of eco-technology parks is their use of ecological design to foster collaboration among firms in managing environmental and energy issues. In an eco-technology park setting, company production patterns, as well as overall park maintenance, work together to follow the principles of natural systems through cycling of resources, working within the constraints of local and global ecosystems, and optimizing energy use. Eco-technology parks offer firms the opportunity to cooperatively enhance both economic and environmental performance through increased efficiency, waste minimization, innovation and technology development, access to new markets, strategic planning, and attraction of financing and investment. As an effective way to achieve the cycle economics, ETP is a new topic in Turkey, and there is no mature experience yet. Simple structured interviews are conducted with high officers of related agencies and institutions. Depending on literature survey, policy search information obtained from interviews; an implementation proposal draft on ecoinnovation innovation policy for Turkey is being elaborated and a test-bed proposal in Ankara is composed.

**Keywords:** Eco-technology parks, Innovation, Sustainable entrepreneurship

## 1. Introduction

Increasing population and industrial development have several consequences such as depletion of natural resources, increase in demand for energy, and global climate change. Additionally; lack of awareness of environmental concerns, lack of environmental policy regulations and enforcements, lack of knowledge/information of available environmental solutions, lack of institutional linkages between research and industry, make those consequences much more dangerous.

In the year 1992, United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro. During this conference, the concept of Eco-Technology Park (ETP) has been developed as a strategy to implement the concept of industrial ecology by taking the advantages of collaboration between the firms. Close cooperation between business, technology and research communities was aimed. An Eco-Technology Park is defined as an industrial site with manufacturing and service businesses using technology and research and located together on a common property. Tenant businesses seek enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues. By the help of this collaboration, a collective

benefit that is greater than the sum of individual firms' benefits could be gained. An ETP can offer a great variety of economic, environmental and social benefits. ETP offers less production costs through increased materials and energy efficiency as well as greater economic efficiency through shared services, technology, know-how and information. By this way, it enhances competitiveness, property value and investment attractiveness. ETPs have enhanced economic performance; therefore it is a powerful local economic development tool . This, in turn, would generate new jobs, clients for services and buyers for products in the firms located in the park.

The main aim of an ETP is to improve the economic performance of the participating companies by minimizing their environmental impacts and maximizing their energy efficiency. Components of this approach include green design of park infrastructure and plants, cleaner production, pollution prevention, energy efficiency and intercompany collaboration and so on. Although the concept of ETP was first developed in 1992, Turkey is still not very familiar with it. In order to implement this concept especially in manufacturing and service businesses, a policy should be established. The objective of this study is to develop an ETP policy paper framework in Turkey.

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## 2. Background

Eco-innovation covers all forms of innovation reducing environmental impacts and/or optimizing the use of resources throughout the lifecycle of related activities. It is important to

develop relevant place-based policies as a complement to national and sector-based policies. Therefore ETP developers need to stay in close touch with the changing environment conditions especially in the field of policy and regulations with respect to opportunities and constraints, and test new policy approaches in areas like cleaner production, ETPs and eco-technology networks offer place-based opportunities. ETP's are expected to show better environmental performance than it is stated in regulations. Each country has different environmental policies and regulations.

As Stevenson (2001) stated, most programs promoting cleaner production have failed to address either the underlying policy framework that could provide critical incentives for change or the integrated national planning needed to use resources efficiently to achieve the rapid spread of cleaner production. Both donor and national programs consist of collections of intuitively useful actions to build capacity and awareness but they have been selected without reference to any holistic perspective of national goals, the conditions required to achieve widespread voluntary change, the public policies required to pursue and support those goals and conditions, and the set of actions strategically selected to best achieve those goals with the available resources.

## 3. Eco-innovation Policy and Turkey

Organization for Economic Co-Operation and Development (OECD) has prepared a report in 2008 (Leflaive, 2008), in order to assess eco-innovation policy in Turkey, the main objective of which was to complement the knowledge base on eco-innovation policies in OECD countries and to provide empirical material for additional research on policy issues related to eco-innovation.

As also mentioned in this report, national institutions playing a major role on eco-innovation concept are Turkish Supreme Council for Science and Technology (BTYK) and Scientific and Technological Research Council of Turkey (TUBITAK). These institutions are key institutions to set long-term strategies, co-ordinate and carry on research and development initiatives in science and technology. Ministry of Energy and Natural Resources, State

Planning Organization (DPT) and Electrical Power Resources Research Agency (EIEI) are other responsible bodies on eco-innovation concept. National Research and Technology Foresight Program, among major related documents, nicknamed as "Vision 2023" (TUBITAK, 2003) is prepared under the coordination of TUBITAK. Energy and natural resources are some of the areas included in the Program, but eco-innovation concept has not been stated clearly. "Ninth Five Year Development Plan" (DPT, 2007) is prepared under coordination of DPT, covering the period 2007 – 2013, analyses the future objectives for Turkey in competitiveness, employment, development and effectiveness issues. Key development objectives of the plan are improvement of energy and transportation and urban infrastructures, protection of the environment and development of research, development and

innovation, and increase of efficiency in agriculture. Eco-innovation concept has not found a place in this document too.

Since Turkey is in the process of becoming a candidate to the EU, several EU regulations and standards are transposed and implemented. The observed result has been the gradual change in perception of environmental challenges not as a barrier to economic growth but as a new opportunity for increasing competitiveness.

**4. Policy Integration and Implementation**

According to Lowe (2001), many developing countries have created a disintegrated regulatory structure, following the earlier model set by USA's environmental policy, which was concentrated on individual point sources such as facilities and factories. The U.S. system is trying to improve their performance and minimize emission of toxics to the environment. There were lots of regulations and legislations based on separate laws for soil, water and air; coordinated by different institutions and offices. Disintegration between environmental protection and economic development has also seen in the countries following the U.S. model. But in order to have an effective and successful environmental protection and industrial development, policy and its implementation should be integrated.

Hence technology park investors and developers expect organizational coherence and a more integrated set of policies and regulations prepared by policy makers. In other words, closer integration among policies and organizations will reduce the developer's costs and risks simultaneously.

As Gradel and Allenby (1995) stated, the new approach to environmental regulation recognizes that attempts to micromanage a complex system from a single, centralized node are doomed to failure; dispersed control mechanisms and feedback loops are required.

National and sector based policy is complemented by place-based policy and it provides a coordinated framework for implementation with effective channels of communication. Bateman (1999) says, "An approach that focuses on "places" is particularly intriguing because it can include the concept of island economies and industrial estates—"cordoned-off" areas where regulatory and policy practices are able to incubate, mature, and provide data to other places and their policymakers as well. In such cases, the significance of 'the fence' becomes more apparent; those physical boundaries make it easier for developers, manufacturers, and local government officials to ensure compliance with safety, environment, and security regulations. A fence line also makes it easier to direct and implement programs more efficiently and keeps out unplanned residential and commercial growth, sprawl, and squatter communities."

Supporting Bateman, for testing and disseminating policy initiatives, ETPs and eco-technology networks (ETN)offer high leverage opportunities on regional basis.The main objective of the environmental policy is to reduce and stop pollution to the environment. While doing this, policy-makers have gradually added concern with resource issues. But the result is a mixture of policies,regulations, and voluntary programs. Unfortunately, there is no

complete framework of policy yet that is trying tooptimize utilization of resources in the economies while preventing pollution., but industrial ecology concept has an increasing popularity in the world. According to the research conducted by M.Porter and Van der Linde (1995), economic value of regulation is linked to resource productivity, a basic industrial ecology measure of sustainability. In this study, the authors emphasize the dynamic character of industrial innovation in response to external pressures such as regulations. In addition, it is stated that companies in the U.S. and Europe are taking competitive advantage through the higher resource productivity created by their responses to regulatory pressures. These companies are looking not only at the costs of compliance but also the opportunity costs of pollution/inefficiency such as wasted resources, wasted effort, and diminished product value to the customer. The World Business Council for Sustainable Development (WBCSD) is a CEO-led, global association of approx. 200 companies dealing exclusively with business and sustainable development. Reflecting this direct experience in industry, the WBCSD supports the concept of “eco-efficiency” as one of the means of achieving sustainability (WBCSD, 2000).

A cross-agency task force at US-EPA is using the theoretical frameworks and tools of industrial ecology to form resource-based policies that support the search for eco-efficiency in the business world (Allen, 2001). This task force is responding to the leadership Japan and Europe is taking in resource-based policies as well as corporate achievements. As a result, resource efficiency will be a major factor not only for the competition of individual companies but also in national competitiveness.

According to Lowe (2001), many companies cite liability as a major concern when asked about their willingness to exchange by-product materials. Their core concern is that if the production or use of a product containing secondary materials had a serious health or environmental concern, the company that supplied the secondary materials also could be held liable for damages. Within an ETP, industries are connected with each other in also regulatory terms. All of the companies under this regulatory umbrella would be expected to take responsibility for meeting the compliance standards or the permit. On the other hand, it is difficult to monitor releases from individual industries exchanging materials.

Incentives are among not-to-neglected key instruments of a policy to be developed for eco-technology park developers, for park managers, and for companies located in ETPs. To have a sustainable economy and to gain competitive advantage in environmental and energy technologies, national R&D policy–makers should work closely with the business and academia to create an eco-industrial research agenda. Industrial ecology provides an organizing framework for researching the systems of technologies and business forms needed to achieve key environmental objectives in an economically feasible way, not just individual technologies. In order to establish an eco-technology network and operate an ETP in a specific region, analysis should be made in terms of energy, water, and materials. “Industrial metabolism” concept was first proposed by Ayres (1994) as "the whole integrated collection of physical processes that convert raw materials and energy, plus labor, into finished products and wastes”. In other words, industrial metabolism studies the inter-linked natural and human systems as a network of resource flows. Such studies enable regional stakeholders to identify

critical threats to human and ecosystem health and to pinpoint strategic points for intervention. There is an important concept for ETPs that is “umbrella permitting”. This concept helps companies in their liabilities in terms of environmental management and regulations. In other words, this would make site-wide environmental management of materials and energy flows feasible, support the sense of collaboration among stakeholders on an industrial park site, and provide them a performance challenge. Cluster is a good example of this concept.

Policy for encouraging renewable energy is a prominent example of a field where a whole systems view is of great value. By the help of this policy, a country can generate new industries, cut dependence upon non-renewable resources, lower long-term energy prices, and lower greenhouse gas emissions. Energy policy-makers need to track the timing of commercialization of new storage and transmission devices and a wide variety of renewable sources.

Extending distributed renewable energy infrastructure into new regions could be cost-competitive by combining smaller, highly efficient fossil fuel plants, co-generation and energy cascading, wind, photovoltaics, passive solar, geothermal, and biomass sources. By avoiding the costs of building more large centralized power plants and a new power grid, emerging technologies would be fully competitive.**5. Steps for the Establishment of the ETP Concept in Turkey** Policy related institutions in Turkey were mentioned in Section 3. Simple structured interviews are made with high officers of related agencies and institutions.

On practice level; technological developments are supported mainly by TUBITAK. TEYDEB is the national funding department within TUBITAK for industrial development projects, especially R&D projects. TEYDEB support various projects that have commercial value in several technology areas. Although not specifically oriented toward eco-innovation, TEYDEB grant programs can be used for this purpose and to promote ETP’s. Currently environment technologies is one of the seven national technology development priority areas and projects targeted to eco-innovation are eligible to benefit from 10% extra grant, available for all eligible R&D expenses.

TTGV (Turkish National Foundation for Technology Development) provides financial support in the form ofsoft loans to R&D as well as implementation/investment projects in the field of renewable energy, energy efficiency and eco-efficiency (cleaner production), which may also be used to promote ETPs. KOSGEB (Turkish Small and Medium Business Development Agency) has various funding and financial supporting tools towards SMEs, which may be an additional incentive for ETPs. In addition there are international and European R&D programs the resources of which can be used toward ETP policy implementations in Turkey. An initial project may serve as a model for the introduction of ETP concept and further implementations in the country. An ideal candidate seems to be OSTIM (Organized Industrial District in Ankara, being the largest industrial SME agglomeration in the country, having approx. 7.000 enterprises, acting in 17 different industrial sectors. Another advantage is that the industrialists there are well-organized under foundations, associations, sports clubs and even running their own infrastructure by

collectively owned companies. Similar companies serve in the fields of media, fair services, consultancy, and R&D. A branch of METU (Middle East Technical University) Technopark is acting on OSTIM site. OSTIM in general shows pre-cluster characteristics (DCP of Turkey, 2007).120 acres of land in the middle of their zone is designated by OSTIM for the development of an industrial ecopark, which indicates a clear willingness of the enterprises; an important factor for a probable success. Green buildings and associated land planning and infrastructure, local renewable energy production, waste recycling areplanned. A cluster-like functioning is being discussed with Cankaya University, with which OSTIM already collaborates for four cluster development projects (OSTIM, 2010).

The mission of OSTIM eco-technopark is defined as to be an excellence center for energy sector in the sustainable regional development context, to be ecologically sensitive with zero emission and to be a model for renewable local energy generation. The project aims further to minimize water demand, treatment and contamination by using integrated water treatment systems.

## 6. Conclusion

Eco-technology parks are emerging as the primary arena for testing and implementing industrial ecology. Similar in some respects to a standard industrial parks, eco-technology parks are designed to allow firms to share infrastructure as a strategy for enhancing production and minimizing costs. The distinguishing feature of ecotechnology parks is their use of ecological design to foster collaboration among firms in managing environmental and energy issues. In an eco-technology park setting, company production patterns, as well as overall park maintenance, work together to follow the principles of natural systems through cycling of resources, working within the constraints of local and global ecosystems, and optimizing energy use. Eco-technology parks offer firms the opportunity to cooperatively enhance both economic and environmental performance through increased efficiency, waste minimization, innovation and technology development, access to new markets, strategic planning, and attraction of financing and investment. Industrial processes can be linked systematically to reduce consumption of raw materials, water and energy. Industrial waste can become raw material for linked businesses. Businesses can be clustered in eco-industrial parks to reduce waste and transport costs while simplifying logistic and expertise can be applied on a case-by-case basis.

As an effective way to achieve the cycle economics, ETP is a new topic in Turkey, and there is no mature experience for drawing lessons to it. Successful experiences from the world should be studied with Turkey’s specific national conditions and characteristics. ETP concept should be included in policies and implementation measures of mainly of TUBITAK and DPT and other related agencies and institutions and OSTIM Organized Industrial District in Ankara seems to be an ideal candidate for serving as a test-bed for ETPs.

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# THE NEXUS BETWEEN ENTREPRENEURSHIP PROCESS AND VALUE OF INNOVATION: A CONCEPTUAL MODEL INCLUDING COGNITIVE AND INSTITUTIONAL FACTORS

Özge Gökbulut Özdemir[23]

## Abstract

As well as mentioned that some but not others recognized and exploited opportunities; researchers in the entrepreneurship field are also trying to understand why and how it happens. The paper introduces a theoretical framework to understand the nexus between entrepreneurship process and innovation. By a process based approach the paper deals with to expose the nexus between the value of innovation and entrepreneurship process besides how and why the entrepreneurship occurred. The paper focuses both the opportunity exploration phase, since it is essential and initial phase of the entrepreneurship process, and the opportunity exploitation phase, since it enhances the phase of entrepreneurship process by realizing the creativity and introducing the innovation. By defining the differences between the phases the paper also aims to separate the phases and put forward to different effects of cognitive and environmental factors on the phases. In this context, cognitive and institutional theory shed light on the paper. The paper is important since it focuses opportunity related phases of entrepreneurship and introduces a holistic and process based model for the future researches to investigate the link between entrepreneurship and innovation. The paper both emphasizes the role of entrepreneurship in innovation and explores the cognitive and institutional environmental factors, affecting the value of innovation. It is believed that increasing comprehension in the entrepreneurship process also increases the value of outcome which is called innovation.

**Keywords:** entrepreneurship process, value of innovation, cognitive theory, institutional theory

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## 1. Introduction

Central research question in entrepreneurship noted by Baron (2004): "*Why do some persons but not others recognize opportunities for new products or services that can be profitably exploited?*" (Tang, et. al., 2009)**.** Entrepreneurs are often described as creative thinkers or actors in the business environment, emphasizing Schumpeter's phrase "creative destruction" which describes the effect of entrepreneurial activity on the economy.

Shane (2003) defined entrepreneurship as the behavior of the entrepreneurial individual and enlarged the individual side of the entreprenurship by the "individual nexus opportunity" and Gartner (1989) emphasis the environment, that interact and effect both the entrepreneurial thinking and the behavior, by saying that; "entrepreneurs doesn' t operate in vacuum." So the cognitive theory and the institutional theory are fundamental to understand both the mindset and the behavior of the individual entrepreneur that live in the institutional environment.

This study bases on the view that, the innovation is the value emerged as the output of the entrepreneurship process that include creative thinking and entrepreneurial behaviour (Gökbulut, 2007) and searches the link beween entrepreneurship and innovation by the lights of the cognitive and the institutional theories. Because the most essencial subject of the entrepreneurship is the opportunity recognition (Schumpeter, 1934, Kirzner, 1973, Shane, 2003) the study focuses to the opportunity based phases of the entreprenurship that are identified as opportunity exploration (E1) and opportunity exploitation (E2). The effects of the cognitive (a) and institutional environmental (b) factors to the opportunity based phases of the entreprenurship process are discussed theoriticaly and also the effects of the factors to the value of innovation (Inv) by the process based link between entrepreneurship and innovation.

The aim of the study is;

- to contribute the literature both explaining the entrepreneurial process by focusing on opportunity related phases and linking the entrepreneurship and the innovation by demonstrating the role of entrepreneurship on innovation in a conceptual model based on individual and environmental factors.
- to provide knowledge to the existing and potential entrepreneurs, regarding the entrepreneurship process in order to support higher-value innovation.

The study is important because of its theoretical and practical aims to extend the entrepreneurship and innovation context.

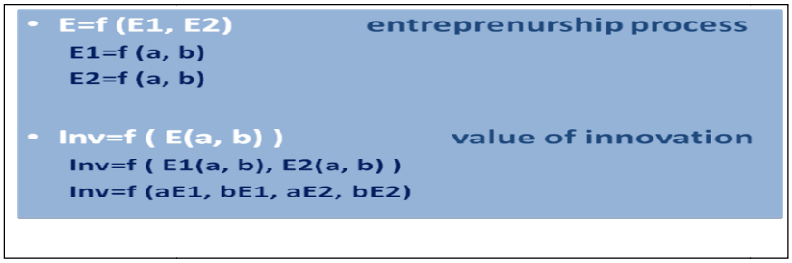


**Figure 1:** Formulation of theoretical relations

## 2. Litherature Review

Entrepreneurship is described as, “new combinations” (Schumpeter, 1934), “creating future goods” (Shane & Venkataraman, 2000), and “new firm formation” (Katz & Gartner, 1988). Koçak and Edwards (2005) emphasizes three dimensions of entrepreneurship as innovativeness, risk-taking and proactiveness.

Theories in the field of entrepreneurship focus on how entrepreneurs take on uncertainty (Knight, 1921), provide innovation (Schumpeter, 1942) and engage in the allocation of scarce resources (Hayek, 1968) (York&Venkataraman, 2010). But opportunity is the central topic of the entreprenurship which makes the field independent (Brush, et. Al, 2003). Shane and Venkataraman (2000) define the act of entrepreneurship as one of discovering and evaluating opportunity as well as creating new opportunities and possibilities. Entrepreneurship is concerned with the discovery and exploitation of profitable opportunities (York&Venkataraman, 2010).

First part of the study involves the litherature review of entreprenurship and the link between innovation in order to present a contextual model. Second part is present the theoritical assumptions and the propositions of the model.

### 2.1.Entrepreneurship and Innovation

The innovative role of the entrepreneur was first defined by Schumpeter (1942). York&Venkataraman (2010) define innovation more broadly than the Schumpeterian role of the entrepreneur, according to them, creating new firms, as well as markets, products, information sources and institutions, entrepreneurs can create new opportunity and also societal change.

Innovativeness requires entrepreneurial orientation. Covin and Slevin (1989) have considered three components of “entrepreneurial strategic posture” and these components are “innovation, proactiveness, and risk taking”. Lumpkin and Dess (1996) propose that “competitive aggresiveness” is an important component of entrepreneurial orientation and point out is the “tendency toward independent and autonomous action.

In the litherature the main drivers of innovativeness is defined differently by the scholars. Jaworski and Kohli (1993) argue that risk taking, Han et. al. (1998) argue that customer orientation is required. Slater and Narver (1995) state that the market orientation-involve customer orientation, competitor orientation, and interfunctional coordination- is valuable and

Hult et. al. (2004) mentioned the direct link between market orientation and innovative culture efficient degree of market orientation. Baker and Sinkula (1999) state that market orientation is reflected by knowledge producing behaviors and link the market orientation witth learning orientation (Arıkan, 2008).

## 2.2. Cognitive and Institutional Theory

The emergence of entrepreneurship is dependent upon the tendency of certain individuals to respond to the cues provided by an economic, industrial, and social environment (Shane and Venkataraman, 2000). Mathew (2008) stressed that entrepreneurship can be summed in an equation, $E= f (P,E)$, that is, entrepreneurship is a function of the person and the environment. Also this study involves the cognitive factors in person context and institutional environmental factors in environment context. Since cognitive and institutional theories are useful both to understand the entrepreneurial action by the lights of the factors and to integrate the factors in a holistic approach.

*Cognitive Theory*

To understand the opportunity recognition (Eckhardt & Shane 2002; Shane 2003) and heuristics in decisionmaking (Busenitz & Barnet, 1997; Das, Teng 1999; Schwenk 1984) cognition (Baron, 2004; Mitchell et al. 2002; Simon et al. 2000) is the fundamental dimensions of entrepreneurship (Gökbulut, 2009). Mitchell, et.al. (2002), demonstrate the relationship between the domains of cognitive psychology and entrepreneurial cognition. In social cognitive theory Bandura (1986) also points to the determination of the individual behavior by environmental forces (Baum et.al., 2001).

*Institutional Theory*

Zahra and Dess (2001) mentioned the integration of the personality processes, cognitive processes, and motivational dynamics with the attributes of the environment. Wood and Bandura (1989) explain that individuals develop their knowledge and skills on the basis of information they receive through interactions with others in the environment (Mathews, 2008). Since, the external environment is an important feature influencing entrepreneurial behaviour, as “we cannot assess the rationality of individual action without taking account of the institutional and cultural context in which everyday decisions are made.” (Welter, 2004).

Institutional theory (Aldrich&Argelia, 2001) focuses on the environment and explains the effects of environment on the organisms. The environment is introduced most actively in the population ecology theory which introduced the organism relatively passive (Hannan&Freeman, 1977). Dimaggio and Powell (1983) stressed the institutional isomorphism that emphasizes normative rationality behind decision-making processes (Uçbaşaran et.al. 2001).

In the end, cognitive psychology helps to explain the mental processes that occur within individuals in their innovative search of the environment for opportunity realization (Mitchell, 2002). Also environment is an important feature influencing entrepreneurial behavior, as "we cannot assess the rationality of individual action without taking account of the institutional and cultural context in which everyday decisions are made." (Knight, 1997). So both cognitive and institutional theories shed light to the entrepreneurship field and the study.

### 2.3. Entrepreneurship and Opportunity

Opportunity is the central topic of the entrepreneurship field (Shane and Venkataraman, 2000; Shane, 2003; Shane&Baron (2007). Opportunity recognition for a new venture is the important dimension of the entrepreneurial process (Shane and Venkataraman, 2000; Shane, 2003). A central distinction in entrepreneurial theory is that between Schumpeterian and Kirznerian opportunities (Schumpeter, 1934; Kirzner, 1973). According to Shane (2003), Schumpeterian opportunities are disequilibrating, depend upon new information, are highly innovative, rare, and involve processes of creation. Kirznerian opportunities, in contrast, are depicted as equilibrating, having limited, or no, reliance on new information, being less innovative, more common, and relying on discovery rather than creation (Goss, 2007).

Venkataraman (1997) argues that one of the most neglected questions in entrepreneurship research is where opportunities come from. 'Why', 'when' and 'how' certain individuals exploit opportunities appears to be a function of the joint characteristics of the opportunity and the nature of the individual (Shane and Venkataraman, 2000).

While most of the researchers have examined who becomes an entrepreneur (Gartner, 1989; Shane and Venkataraman, 2000; Baron, 2004), some have considered how entrepreneurs discover new opportunities while others do not (Kirzner, 1973; Knight, 1921). Entrepreneurial action requires a recognized opportunity and intentions, driven by critical attitudes and beliefs (Krueger 2003, Ardichvili et al.2003), toward pursuing that opportunity (Gökbulut, 2009). Venkataraman (1997) highlighted three main areas that may help us understand why certain individuals recognize opportunities while others do not: knowledge (and information) differences; cognitive differences; and behavioral differences. Low and MacMillan (1988) suggested that networks are an important aspect of the context and process of entrepreneurship (Ucbasaran et. Al, 2001).

The study focuses the central topic of the entrepreneurship and aims to extend the opportunity related researches. The exploration and exploitation context is used both in opportunity and innovation topic based on the link between opportunity and innovation highlighted by Schumpeter (exploratory opportunities-radical innovation) and Kirzner (exploitative opportunities-incremental innovation).

## 2.4. Exploration and Exploitation

Jansen et. al.(2006) mentioned that, the notion of exploration and exploitation (March 1991) has emerged as an underlying theme in research on organizational learning and strategy (Levinthal and March 1993, Vera and Crossan 2004), innovation (Danneels 2002, Lee et al. 2003, Rothaermel and Deeds 2004), and entrepreneurship (Shane and Venkataraman 2000) and they indicate that centralization negatively affects exploratory innovation, whereas formalization positively influences exploitative innovation.

Exploitation can be characterized as routinized learning, adding to the firm's existing knowledge base, and competence set without changing the basic nature of its activities. Exploration means breaking with an existing dominant design and shifting away from existing rules, norms, routines, and activities to allow novel Schumpeterian combinations. The creativity literature suggests that non-obvious analogies may entail highly novel solutions by combining knowledge pieces associated with a higher innovation potential (Enkel&Gassmann, 2010)

Ireland and Webb(2003) underlines the diffferences between exploitation and exploration similar to the other scholars but in contrast to them, introduces the support of the exploitation for the exploitation efforts by incrementally extending the firm's established knowledge base. Exploration occurs as the firm integrates diverse knowledge with existing knowledge stocks. Absorbing new knowledge to which the firm gains access while exploring becomes the foundation for future exploitation actions.

By these arguments, Ireland and Webb (2003) stress that, exploration and exploitation demand different behaviors and suggests separating the exploration and exploitation activities but supporting each with distinct operational, structural, and cultural mechanisms.

*Exploration*

Hills et. al. (1999) stressed the link between creativity and opportunity explorartion. Since exploration process consists of the same cognitive elements of the creative process that were first introduced by Wallas (1926); preparation, incubation, insight, evaluation and the later added elaboration.

Exploration depends on the new, diverse knowledge and integrating it with existing knowledge. In other words, exploration represents a learning process in which the firm attempts to significantly broaden and deepen its total stock of knowledge. Ireland and Webb(2003) defines the exploration as a longterm, uncertain process. In exploration, semi-standardization and semi-formalization refer to controlling decision rules, while placing less restriction on creative, entrepreneurial behaviors.

Through taking action in the face of uncertainty, entrepreneurial action transforms uncertainty into opportunity. Entrepreneurial action often cannot be based on known facts, as the opportunity for exploration relies on the existence of true uncertainty, unknown factors

which cannot be optimized (Knight, 1921). By embracing uncertainty, and privatizing it through accepting risk, entrepreneurs are able to simultaneously create value and profit from the creative process (York&Venkataraman, 2010).

*Exploitation*

Exploitation is characterized by structural and cultural mechanisms that allow the firm to focus on a core set of knowledge and capabilities. Continuously acquiring and integrating diverse knowledge stocks is not critical when exploiting. Indeed, the need for speed requires that the firm focus on established knowledge (Ireland&Webb, 2003)

The system of shared values supporting exploitation includes a need for greater certainty regarding tasks and outcomes, a preference for meeting short-term goals, and a commitment to focus on existing competencies and competitive advantages. In exploitation, to a much greater extent, decision rules and behaviors are standardized and formalized and outcomes are much more certain as compared to exploration. Exploitation context may benefit the firm's incremental innovativeness. The duration between incremental innovations is much less than for radical innovations (Ireland&Webb, 2003).

Ireland and Webb(2003) discosesed the factors that affect the balance between exploration and exploitation in a firm. These factors include the frequency and significance of changes taking place in the firm's external environment, whether the firm competes in a slow or fast-cycle market, and the firm's resources and capabilities. The study makes smilar asummptions for the entrepreneur in induvidual level and searchs for the affects that depends on cognitive factors of entrepreneur and the institutional factors. It is suggested that the link between entrepreneurship and innovation may be occur in this process based context.

## 2.5. Innovation and Value of Innovation

Innovation is defined as any activity that "adds value" and welfare is obtained by value creation. Successful innovation is a complex set of interactions that draws upon not only science, engineering and technology, but social, political and economic factors as well. Definitions may vary but above all innovation is something that adds value to a firm or society (Turman, 2005). Those innovations and inventions have been the main driving force behind the advancement of humanity.

Camison-Zornoza et al. (2004) claim that innovation has a multidimensional character due to its complex process of creation and diffusion. Different types of innovations have been technical versus administrative innovations, product versus process innovations, and radical

versus incremental innovations. According to Damanpour(1989), administrative innovations is to solve more difficult problems compared with technical. Wright et al.(2005) used the term “dramatic” to describe radical innovations involve big and major changes in the products, whereas incremental innovations are small, less risky and less costly improvements. Each innovation is actually unique in nature, otherwise it woul not be an innovation and due to its nature, can be easily defined and recognized, but it is very difficult to measure it, compare it across other industries, or rate it. (Arıkan, 2008).

Schumpeter argues that, innovation is more important than price competition because it is a more effective means of gaining advantage over competitors. In the Schumpeterian view, there is a positive relationship between innovation and market power, Schumpeter initiated modern research about the effects of market structure on innovation. Patents allow to gain market power by imposing costs on potential imitators (Schumpeter 1950) (Turman, 2005).

Value Creation is the most important concept in the innovation framework and it can be measured in many ways. One relates innovation to productivity (via value added or output) and the other to the market valuation of the company. The model of the innovation process is characterized by research efforts (inputs) and research outputs or innovations generated by those inputs. Kline and Rosenberg(1986)’ s linear innovation model start with research and continiue with development and production and ends by marketing (Turman, 2005). In order to evaluate innovation’s performance, Enkel and Gassmann (2010) distinguish between the exploration context and the exploitation context and expected a higher cognitive distance to have a positive effect on the novelty value, as in exploration and a low cognitive distance between analogical knowledge to result in exploitation.

Innovation can be categorized by how they affect the existing subsystems and whether they address the needs of existing customers or are designed for new or emergent markets. Benner and Tushman(2003), classified innovations along two dimensions: Incremental innovation, characterized by small changes and radical innovation, changes the trajectory and competencies.

*Exploitative-Incremental Innovation*

Incremental innovations represent minor extensions to established bases of knowledge, how the firm efficiently and effectively processes knowledge to exploit new market demands differs substantially from exploration-related behaviors (Ireland&Webb, 2003). Benner and Tushman (2003) introduced the exploitation and inertia that may be functional for organizations within a given technological trajectory or for existing customers and reduce the exploratory innovation and new customer segments.

*Exploratory-Radical Innovation*

Radical innovation, that are defined exploratory, are often organizationally disruptive as Schumpeter' s "creative destruction"defination. (Benner&Tushman, 2003). Incremental innovations, that are defined exploitative are build upon existing organizational knowledge.

Christensen (1998) and Leonard&Barton (1992) stress about the unattractiveness of exploratory innovation in short-term. Benner and Tushman (2003) stressed the importance of the balance between efficiency and exploration. While the exploratory units are small and decenralized, with loose cultures and process, the exploitation units are larger and more centralized,with tight cultures and processes. Cohen and Levinthal (1990) argued the role of past innovative activities role in future innovation by providing knowledge base that allows to absorb external sources (Benner&Tushman, 2003).

Benner and Tushman (2003) modeled the the incremental innovation for the current customer set in the exploitative context and modeled the architectual innovation, radical innovation and innovation in emergent customer setin the exploratary context. Benner and Tushman (2003) stressed that in short- term performance pressures are dominant exploitation overwhelms exploration but variation in the outcomes of those activities decrease, which is also stressed by Levintal and March (1993). Gavetti and Levinthal (2000) sugessted new, forward-looking cognitive models for exploration units and backward-looking experiential learning models for exploitation units (Benner&Tushman, 2003).

*Value of Innovation*

Although there is a growing literature that examines various aspects of the impact of innovation upon economic performance, there is little agreement about the value of a given innovation. According to Dew et. al., (2004), it is even less likely that an existing firm will act because "the opportunity resides totally in the individual's mind" (York&Venkataraman, 2010). Measuring innovation output is problematic because of the complexity of the construct (Arıkan, 2008). The relationship between innovation and business performance has been studied by many authors as Wright et al., (2005). Measures of innovative output include the number of patents, the number of significant innovations, and various indices of the market value of innovations. (Turman, 2005).

Rather than the quantitive measures, Levitt (1986) focuses to differences between innovation and imitation by a quality based approach and emphasis that the real value can only be occur by the innovation. He also refers the term innovation by recognizing first. This view integrates the entrepreneurship with the innovation. Since the entrepreneurship is related with the recognizing and exploiting the opportunities before than the others. Although it looks like opportunity exploration is more important for the innovation in first glance, it is clear that the exploitation is also necessary to transfer the creative thinking to the behavior in order to present innovation.

Levitt (1986) stressed that the imitation is more common in growth and profit oriented firms but the innovation is the rare value. The differences between innovation and imitation in quality and quantity are because of the fact that the imitation is the follower of the innovation. So innovation is directly related with the pioneer advantage in market. Sometimes these advantages are more, since the difficulties to follow and imitate and this can be define as the "blue ocean" represented by the Kim and Mouborgne (2005). Levitt (1986) suggests evaluating the innovation in the conditions occurred, because there are lots of kind and ways of the innovation. He mentioned that it is also innovation if it is new for the industry or the firm, but following the rivals is the imitation.

## 3. The Conceptual Model of the Entrepreneurship Process and the Value of Innovation

Shane and Baron (2007) stressed that the entrepreneurship is not related with establishing a certain kind of companies or to operate a particular sector or creating extraordinary thing. But it is related with to present the thing that has not been presented by the others yet. It is also the series events and the behaviors occurred over time that makes Shane and Baron (2007) to define the entrepreneurship as a process and a way of life.

Schumpeter (1934) discussed the emergences of the opportunities by the change in economic, technological and social conditions and these conditions also affect the entrepreneurship process of the individual (Shane, 2003) by the following categories of Schumpeter (1934):

- individual factors belonging to entrepreneurs
- relationship with other people and groups (partners, customers)
- the whole environment (government regulations and market conditions)

Ireland and Webb (2007), separates the exploration and exploitation phases because of their different structures in their nature. While exploration requires independent thinking, exploitation focuses to use existing and it is more close to strategy than entrepreneurship. When it is taken hand in the opportunity nexus, both exploration and exploitation are the phases of the entrepreneurship process but their nature are still different. Ireland and Webb integrate these different parts by the strategic entrepreneurship that both focus on reaching for the newness and searching for competitive advantage. According to Ireland and Webb (2007), exploitation is preferred more than the exploration because it is closer the organization's routine operations and the existing knowledge stock.

Similar to Ireland and Webb (2007)'s integration, the study suggests a conceptual model that focuses to two fundamental phases of entrepreneurship process. The study emphasis on the creative cognition in opportunity exploration and integrate and complete the

entrepreneurship process with the opportunity exploitation which depends much more on the institutional environment because of its strategic advantage searching nature.

Extending the understanding in this topic may provide the high value innovation, because the process based link between entrepreneurship and the indirect effects of the cognitive and institutional environment.

Benner and Tushman (2003) classify the innovation; as exploratory and exploitative, that is similar to Ireland and Webb (2003)' separation. Exploratory innovation is referred to the first time emerging innovation, exploitative innovation is referred to the development in existing. Benner and Tushman (2003)'s distinction is parallel with Levitt (1986)'s innovation and imitation separation with the common view about "pioneer".

The study searches the effects of the entrepreneurship process in the value of innovation. It is assumed that the independent thinking, and behaviors in the process, increases the value of the output referred as innovation. Individual differences also positively affect the value of the innovation by the direct effects on the cognition. Although it is seems as the institutional environment is common for all firms, because of the differences in the cognition it is also affect all differently.

In the end the study presents the assumptions and the propositions to the researchers in order to test and extend.

As long as described in theoretical framework theoretical assumptions of the study are as follow;

*a1: Entrepreneurship is the behavior of the entrepreneurial individuals*

*a2: Entrepreneurship is a process, creativity is the input of entrepreneurial behavior and innovation is the output of the entrepreneurial process*

*a3: Opportunity exploration and opportunity exploitation are the fundamental phases of the entrepreneurship process*

*a4: Opportunity exploration and opportunity exploitation are the different phases because of their nature*

*a5: To understand the entrepreneurship both individual and environmental factors needs to be examine*

*a6: Innovation is classified by exploratory and exploitative*

*a7: The value of the innovation degreases when it close up to imitation*

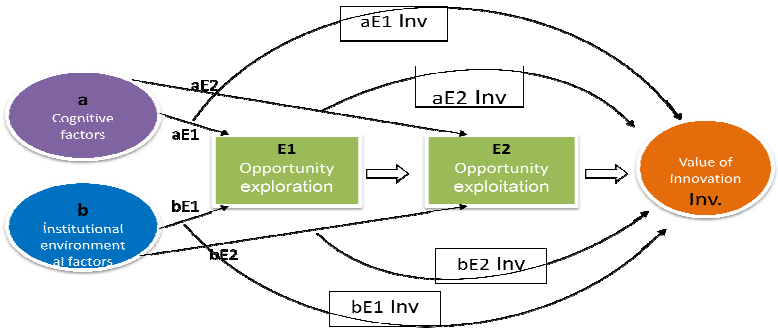


**Figure. 2:** The Conceptual model of the entrepreneurship process and the value of innovation

## 4. Conclusion

In the study, entrepreneurship is seen as the behavior of the entrepreneurial individual (Shane, 2003), and entrepreneurship is defined as a process by the creativity in put and innovation output. By the process approach to entrepreneurship, entrepreneurship process is separated as exploration and exploitation similar to Ireland and Webb (2007)'s approach. Also the effect of the entrepreneurship process to the value of innovation is associated with the Benner and Tushman (2003)'s exploratory innovation and exploitative innovation classification. In this context a contextual model demonstrated by focusing on both cognitive and institutional environmental factors that affect the phases and the value of innovation by affecting the opportunity related phases of entrepreneurship and the propositions presented as follow;

***Proposition 1:*** *Increase in the effects of the cognitive factors in the entrepreneurship process, increases the value of innovation.*

***Proposition 1a:*** *Increase in the effects of the cognitive factors in the opportunity exploration, increases the value of innovation more.*

***Proposition 1b:*** *Increase in the effects of the cognitive factors in the opportunity exploitation, increases the value of innovation less.*

***Proposition 2:*** *Increase in the effects of the institutional environmental factors in the entrepreneurship process, decreases the value of innovation.*

***Proposition 2a:*** *Increase in the effects of the institutional environmental factors in the opportunity exploration, decreases the value of innovation more.*

***Proposition 2b:*** *Increase in the effects of the institutional environmental factors in the opportunity exploitation, decreases the value of innovation less.*

It is hoped that the study will be extended by the other researcher both theoretical in order to extending the entrepreneurship and innovation concept and practical in order to creating high value innovation by understanding the why and how questions in entrepreneurship process.

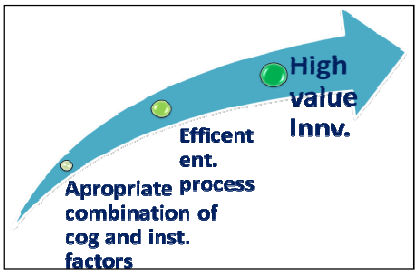


**Figure.3:** The creation of high value innovation focusing on entrepreneurship process

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# TEACHING INNOVATION, ENTREPRENEURSHIP SKILLS AND KNOWLEDGE TO INDIVIDUALS WITH NEUROLOGICAL DISORDERS: A PATHWAY TO FULFILLMENT, SELF-DETERMINATION, AND SELF-ESTEEM

Kevin J. O'Mara[1] Gary R. Palin[2] Emily E. O'Mara[3]

## ABSTRACT

The benefits of entrepreneurship are hailed from many quarters. Economically, it is considered the lifeblood of economic vitality for a society and greatly responsible for its standard of living. Socially, it is cited as the great equalizer between social classes enabling individuals to rise above their birth position. Creatively, it is the fountain of motivation, the source of great innovations and the wellspring of opportunity. It inevitably leads to change, potentially to progress and often to opportunity where none existed before. Is today the time for those challenged by cognitive disorders or other disabilities to benefit from entrepreneurship? Continued advances in communication technology, particularly the internet and its collaboration capabilities, provide unique opportunities for those with cognitive disorders to discover, embrace, and exploit the benefits of entrepreneurship for themselves. In many cases in ecommerce, the need for face-to-face contact is reduced substantially. Access to potential niche customers is limited only by baud rate, not the ability to physically move about or navigate travel. The challenges of verbal communication are often replaced by more comfortable forms of written communication via email or even numeric transactions. Communication needs to be quick but not instantaneous. Entrepreneurship offers a chance for their lives to be fashioned by what they can do instead of what they cannot do. Such a shift in perspective would be so liberating and exciting for those with disabilities, their loved ones, and for society at large. This paper explores basic questions regarding the intersection of entrepreneurial skills, targeted alliances, and the disabled. The theory of social entrepreneurship could be turned on its head - instead of helping others, the aim would be to help the entrepreneur through entrepreneurship.

**Keywords**: Entrepreneurship, Social Entrepreneurship, Innovation, Disabled, Teaching Skills

***"You make a living from what you get,***

***you make a life by what you give."***

Sir Winston Churchill

## 1. Introduction

According to the National Institutes of Health's *Eunice Kennedy Shriver National Institute of Children Health and Human Development*, a conservative estimate would be that one in every one thousand children has Autistic Spectrum Disorder (ASD). Globally, it has been estimated that ASD affects up to one percent of the population. And of this one percent, only six percent are employed in a meaningful manner (Wareham and Sonne, 2008). Experts are befuddled why there has been a rapid growth in this disorder over the past generation. Unfortunately, at the moment, there is no known cure.

From the medical perspective, there has been a tremendous growth in research and interest on ASD. Researchers, doctors, institutes, and foundations are teaming up in an attempt to unlock the mystery that has evaded everyone despite these efforts. The medical community has made great strides in early detection of possible ASD and other neurological disorders in children. Early intervention has been linked with later higher functioning levels, so promoting awareness of abnormal neurological signs to the medical profession and parents is very important.

The educational community has also been made aware of the prevalence of neurological disorders, especially the particular difficulties and needs they pose. Teachers routinely make enormous accommodations in an

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effort to provide their student the best possible learning environment. State and federal laws have significantly expanded student services to deal with the influx of so many more children in need of occupational, physical, and speech therapies. Schools specializing in children with neurological disorders are emerging throughout the country with targeted, innovative curriculum and school orientations.

Foundations and allied non-profit organizations now exist nationally for ASD and other neurological disorders. Parent support groups, along with these organizations, lobby state and national legislators to support additional funding and enact laws codifying rights deemed helpful to the lives of the neurologically impaired.

As indicated above, there is a multi-prong attack on neurological disorders by the medical, education, philanthropic, and non-profit communities. These groups are intensely and passionately concerned with the current and future well-being of individuals dealing with significant daily challenges. Their focus ranges from finding a cure, methods to reduce the debilitating factors that limit day-to-day engagement with the world around them, to unlocking their own world through individualized education programs to helping families cope with the impact of the disorder and the hard life transitions the entire family must face. All these professions, groups, organizations, volunteers, and supporters should be commended for dedicating all or parts of their lives to make a life of someone less challenging. These silent heroes must be dedicated enough to revel in small incremental progress of their patient/student/child in the hope that more progress will follow and follow steadily. However, they also know there is no guarantee of progress and plateaus are not necessarily temporary destinations.

This paper applauds the work and dedication of these communities and wants to add another community to this noble cause. The community is the entrepreneurial community of innovators, problem solvers, dreamers, and believers in the control of one's destiny. The paper argues that the entrepreneurial community can potentially make a substantial impact on the lives of the ASD and cognitive disorder population - not through generous financial donations from the largess of successful entrepreneurs but rather from the teaching and transfer of the skills and knowledge that make successful entrepreneurs successful. Like so many new opportunities for social and economic good, the adoption of the internet commerce is a potential component.

The entrepreneurial community potentially adds a self-determination dimension that the other communities cannot. Imagine the impact on a person who has experienced a life of dependency to be able to experience a level of social and economic independence. Entrepreneurship can potentially turn the discussion from what the person can't do to what they can do, from limitations to opportunities. It may be somewhat of a stretch, but the

biblical parable regarding the subtle but significant difference between giving a person a fish to eat versus teaching them to fish has a place in this discussion. Individuals afflicted with these disorders could benefit from both being given the fish (i.e., medical therapies and procedures, educational accommodations, legal advancements, and committed organizations providing critical support) and being taught to fish (i.e., entrepreneurship skills). The entrepreneurial community should not be thought of as replacing the role of another community but rather as supporting the overall shared goal from a different direction, playing a different role, and adding a different dimension. It is another hopeful piece being added to the pieces provided by other communities in the shared hope of solving a terribly challenging puzzle (Figure 1).

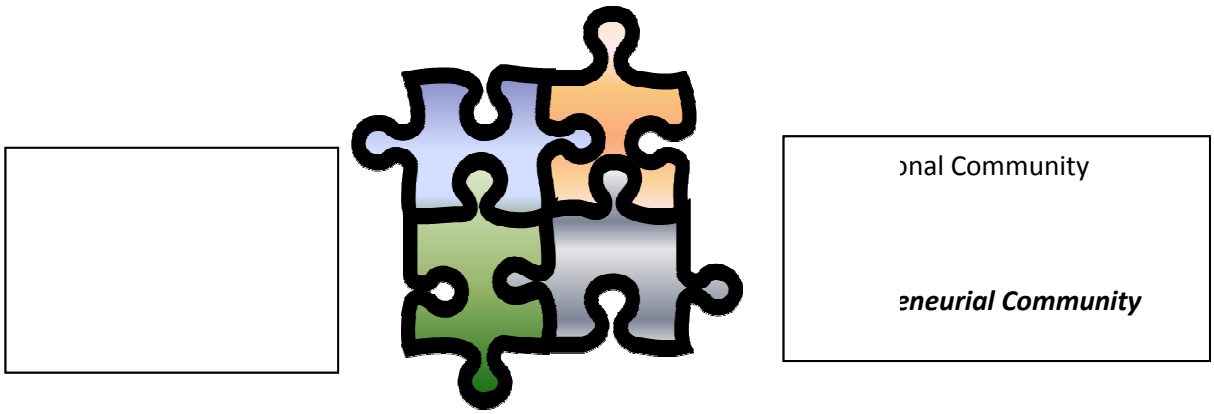
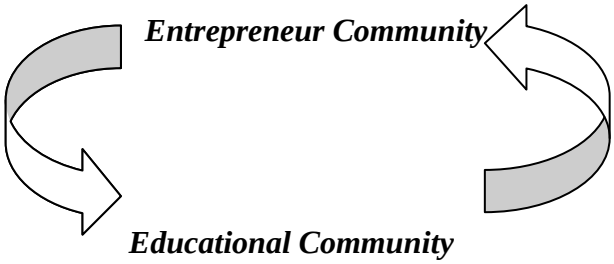



**Figure 1.** The Four Communities

2. Current Situation: Missing Linkages

Although the four communities share a common purpose and goal for those with mental challenges, the communities have not been linked very well as a unit or in a systematic fashion. There is great opportunity to be found if a systematic approach could be developed. At present, each community has been linked to one or two others but not to all. However, a coordinated, systematic linkage could produce powerful synergistic effects.

The Entrepreneur Community / Education Community Linkage



The Entrepreneurial Community and the Educational Community are linked through a variety of programs. The historical Junior Achievement program attempts to get young students involved in entrepreneurial activities at the local level. This international program, founded in 1918, estimates they reach almost 10 million students a year through nearly 400,000 classes (Junior Achievement website, www.ja.org, August 20, 2010). In addition to Junior Achievement, many communities can claim a variety of programs focusing on developing the entrepreneurial spirit for a variety of targeted groups. Legions of dedicated volunteers are the lifeblood of these programs as they teach critical entrepreneurial skills to the assembled young students.

In recent years, university business schools are beginning to bestow a level of respect to entrepreneurial programs that has been withheld in the past. Due to the increasing awareness of the crucial role of entrepreneurship in our economy as well as a surge in demand by incoming business students, entrepreneurial programs are flourishing. These programs often capture the interest and imagination of successful entrepreneurs who want others to experience the success and the life they have the good fortune to live. The discipline of entrepreneurship is now an accepted area within most business schools and is often the fastest growing department in the school. The typical curriculum focuses on developing underlying entrepreneurial skills and involves courses on various elements of the entrepreneurial process, often culminating with a venture plan activity.

The Educational and Entrepreneurial Communities are becoming better linked to deliver the skills sets and experiences that assist young potential entrepreneurs in launching their careers. A structured curriculum guided by practicing entrepreneurs, along with embedded experiential opportunities, has proven to be a successful combination. Cannot these programs be extended to reach individuals with disabilities?

The benefits of being an entrepreneur are many (Kuratko and Hornsby, 2009, Zimmerer
and Scarborough, 2008). A few of the most often cited benefits are:

1. Independence
2. Create Your Own Destiny
3. Financial Opportunity
4. Job Security
5. Providing a Social Good
6. Family Employment
7. Challenge
8. Do What You Enjoy

What on this list excludes the neurologically challenged population? The answer to that question is obviously "none". This population shares similar aspirations as the rest of humanity. They have dreams. They have hopes. But they also have larger hurdles to overcome to reach their hopes and dreams. By virtue of their disorders, they are not "mainstream" in society and possess smaller doses of the formula inherent in most successful entrepreneurs. In this paper, we choose to look at these impediments as hurdles to be overcome and not barriers that exclude participation.

Throughout the entrepreneurial literature are lists compiling the skills needed to become a successful entrepreneur. While what is on the list can be debated, most lists cite these areas as among the most crucial skills to acquire for any hopeful entrepreneur:

1. Research & Analysis
2. Communication
3. Financial Literacy
4. Leadership
5. Idea Generation & Creative Thinking
6. Networking
7. Marketing & Management
8. Negotiation

It is easy to discern that some of these skills directly touch on the shortcomings associated with neurological disorders. Communication is often very difficult, especially verbal. Networking requires a certain level of social skills often dormant or locked within the disorder. Negotiation is perhaps the most challenging as it combines communication, a reading of people, and the ability to quickly generate alternative proposals as new solutions. Given these necessary skills, it is clear why individuals with neurological disorders have not historically been entrepreneurs. While they shared the dream, the hurdles of verbal, face-to-face communication have been too high to scale.

In addition to the physical challenges faced by those with neurological disorders, they also must wrestle with the stigma associated with their condition. The origins of a stigma are often many but the result is the same - exclusion. Even though neurological disorders span a wide spectrum, the mere mention of a disorder often triggers a flood of assumptions and possible reactions. Researchers suggest there are multiple levels in the hierarchy of stigmas but all deal with exclusion (Jacoby, 2005). One definition of a stigma is "a social process or related personal experience characterized by exclusion, rejection, blame, or devaluation that results from experience or reasonable anticipation of an adverse social judgment about a person or group identified with a particular health problem (Weiss and Ramakrishna, 2006, p. 536). Stigmas have been characterized as the "silent disease", the "second illness", and the “chief nemesis to....quality of life” (Hopper, 2005). Oftentimes the stigmas associated with a disorder can be more harmful to the person than the physical effects of the disorder. One study revealed that forty percent ASD individuals have no friends (Fradd and Joy, 2007).

However, these historic shortcomings and embedded stigmas are not necessarily intractable, especially in the last decade. Advancements in communication technology offer new tools to augment and reconfigure interactions. If hurdled through some combination of electronic communication and operation systems, the individual with a neurological disorder might be able to obtain the benefits associated with entrepreneurship. This would be a noble and worthwhile goal for society to pursue.

The Medical Community / Support Community Linkage


The Medical Community and the Support Community have been linked since the first diagnosis of an impaired mental condition. The Medical Community traditionally seeks to treat the patient with the best known treatments while also exploring through research the next horizon in hopes of a cure. Physicians often devote an entire career to one particular area of neurological impairment. Therapists directly apply the latest knowledge to push the patient to a higher level of functionality. They also deal most closely with the patient and the parents as partners in this goal.

While the Medical Community focuses on the medical well-being, the Support Community is comprised of individuals, groups, and organizations. As indicated above, this community serves a variety of important purposes with respect to caregiving, education, fund raising, emotional support, and networking.

These two communities are tightly intertwined not only in their purpose but on organizational committees, board membership, volunteer participation, financial support, lobbying efforts, and external relationships with other communities. A great number of people have been helped and diseases either cured or better controlled as a result of this tight linkage between the Medical Community and the Support Community.

Unfortunately, the linkages tend to stop there. The Medical Community / Support Community linkage does not seem to overlap or link with the Entrepreneurial Community / Educational Community linkage. Why is that? Most likely because these communities are not often considered as natural allies in a common goal. Why and where would they overlap? While the Medical and Support communities focus on improving the health and functionality of an impaired class of people, the Entrepreneurial and Educational communities focus on the general population to encourage them to follow their passion. Even in the case of social entrepreneurship, those benefiting typically are the recipients of the service/product and not the individual providing the service/product.

But what if these communities were aligned and linked together? What would the possibilities be for those individuals afflicted with neurological disorders? Would an alignment of these communities offer the prospect of a significantly enhanced life? This paper envisions such an alignment and the enormous benefits it may entail for the individual with a disorder.

3. A New Vision: Four Communities Alignment

The paper proposes refocusing the traditional role of the disabled from being dependent on the talent and charity of others to being the person actively serving the need of someone else through entrepreneurial activity. All four communities could be aligned to help this shift in a meaningful, productive, and sustainable manner. The communities could support the development of entrepreneurial skills and also serve as a natural customer group. Each community could provide the crucial components enabling this shift to occur.

The Educational Community could begin actively training individuals with disorders in a structured environment tailored to their strengths. The Entrepreneurial Community could serve as program mentors providing invaluable expertise as well as a network to open doors of opportunity. The Medical Community would continue their research and treatments to improve individual functionality and social skills through dedicated therapies. And the Support Community would become a natural source of seed capital, engaged advocates, external salesmen and lobbyists, and lifelong fiercely loyal customers. These four communities working together in alignment could guide the launch companies in which individuals with neurological disorders actively participate, lead, and manage (see Figure 2).

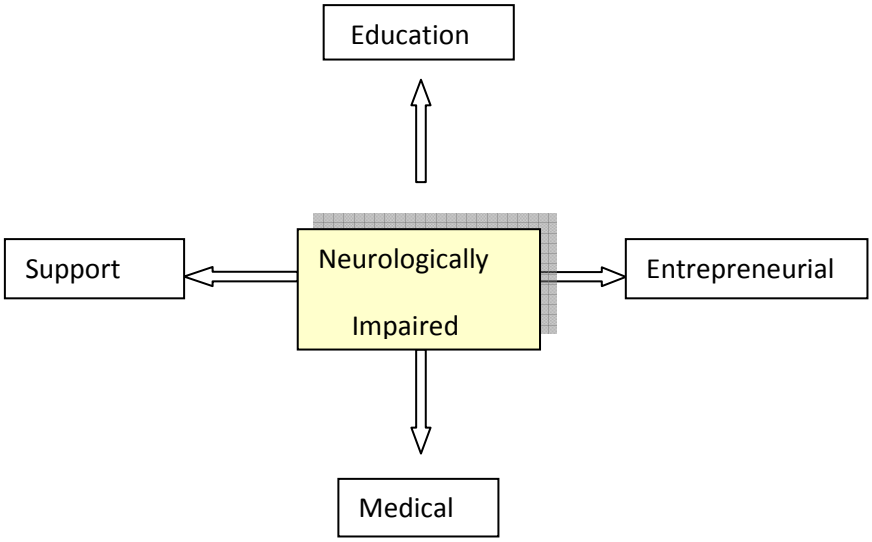



**FIGURE 2.** Four Communities Aligned

The desired outcome of this alignment would be the empowerment of those with neurological disorders to engage in the wider society as equal participants through their entrepreneurial activities. While still undergoing treatments and therapies, these individuals could secure the benefits attributed to entrepreneurship: a measure of independence, a hand in their own destiny, acceptance of the challenge to operate a commercial venture, securing their own employment, and blazing a path for future individuals with similar challenges. As with any entrepreneur, self-determination leads to self-esteem and more personal fulfillment in one's life.

The concept of educating and training those with challenging disabilities how to become entrepreneurs cannot be a novel concept nor could the idea that the Support

Community would be a highly motivated buyer group which would support the entrepreneurial initiatives of the neurologically impaired be novel. So why hasn't it been a staple of part of the developmental opportunities for those with these challenges? And, if not before, then why now? Two words - the Internet.

4. The Internet - Accessing, Accelerating, and Aligning Opportunities

With respect to individuals with neurological challenges, the internet is capable of masking their challenges while enabling them to access potentially a highly loyal niche customer base quickly, cheaply, and globally. Past efforts to encourage entrepreneurship among this group was limited geography to the local area. The odds of a significant customer group in a relatively tight geographic proximity severely dampened the chance for success. The ability to "scale up" the business was very limited. However, the internet has no geographic boundaries. A business can access up to six billion people that might like the opportunity to support "reverse" social entrepreneurship. The product or service offerings possibilities expand geometrically if you can access the world and not just a local area.

One of the difficulties of the pre-internet era for neurological challenged entrepreneurs was that customer contact and order taking likely involved a dialogue between the seller and buyer. Even high functioning individuals have difficulties with face-to-face conversations and the social skills inherent in personal communication. This shortcoming would place a barrier when attempting to persuade someone of future customer service. The internet, however, can change the dynamics of the interaction by moving it from a conversational to electronic transaction. As long as the company delivers what is promised via a website transaction, the purchaser would be unaware and uncaring of the seller's condition. While high functioning individuals may have difficulties with the give-and-take of conversations, they can be quite focused on performing and executing a task. The internet allows the significant shift from a focus on what the person can't do to what they can do.

The communication and collaboration technologies of the internet can allow another barrier to be hurdled. In the past, pre-Internet, accessing organizational support groups and potential professional advisors was limited to a physical presence, the mail, or a voice-only synchronistic phone call. Contact, communication, and collaboration likely were inconsistent and less than desired. However, with the Internet, the network of supporters and advisors is much easier, cheaper, and requires far less commitment. Opportunities to share documents, spreadsheets, and feedback encourage a closer consultant relationship to emerge. Training sessions can be stored on podcasts and redone over and over until the person understands it. Interested volunteers can monitor operations from afar and quickly be in contact when necessary. Best practices can be quickly and efficiently shared across similar operations scattered across the country and the globe.

The Internet enables the company to be a portal for all the interested and vested communities to communicate and develop synergies across their strategies. Mailing lists and website links can drive potential customers to the company. Outsourcing opportunities can be captured to allow the company to focus on what they can do well.

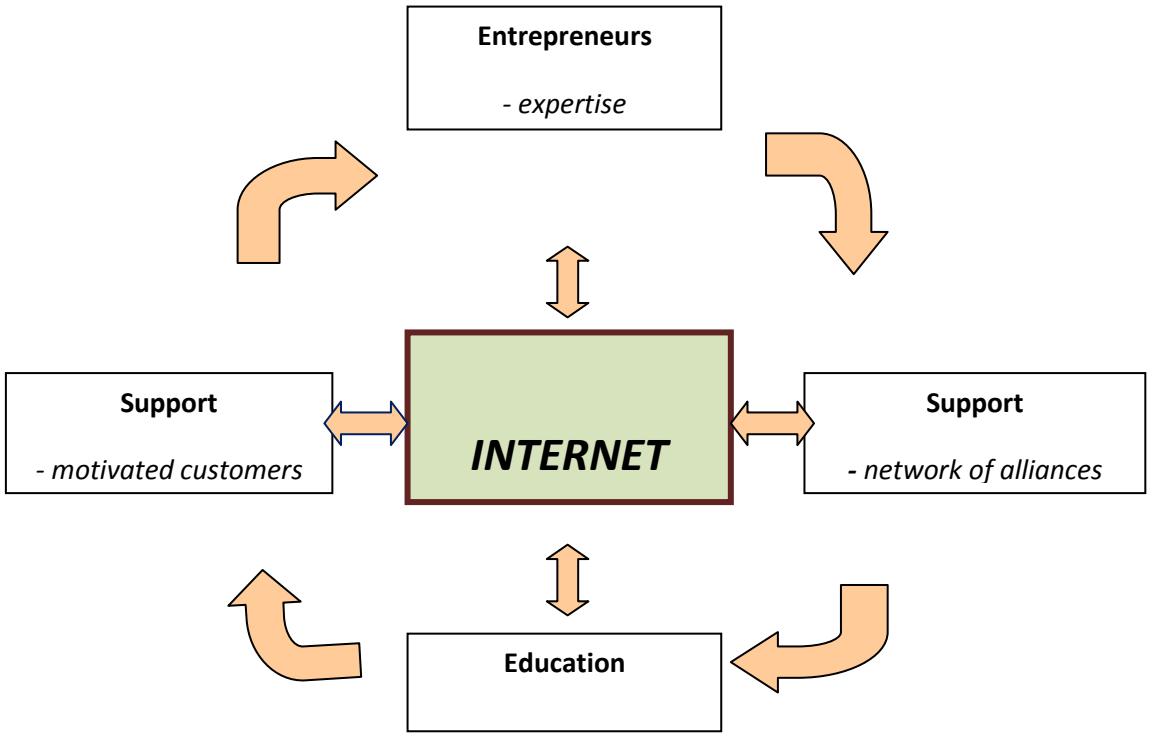



**Figure 3.** The Role of the Internet

What might a systematic approach look like? First, schools, both traditional and those targeted for special needs students, would develop courses and programs to teach entrepreneurship at lower levels than the university level. Entrepreneurial programs would be linked nationally to share best practices and collaborate to partner with each other when appropriate. University entrepreneurial programs would develop alliances with special needs organizations to assist in the formation of possible ventures. Entrepreneurs would be tapped to serve as mentors at the early stages of a start-up. Their role might be as advisors, volunteers, board members, and as a source of contacts for the newly formed company's offering. Internet communication will be the primary means of monitoring the start-up but will be complemented by periodic visits. A major key will be a well designed and well functioning website as it is the vehicle of primary contact for all the supporting constituencies. Parents, grandparents, friends, related organizations would all be first level customers to establish the start-up in a 'soft opening' phase. As with all entrepreneurial ventures, nothing is guaranteed but, at least, the opportunity is seized. If successful, these ventures should provide an outstanding platform for medical research on the inner workings of neurological disorders and may lead to breakthrough in treatment from psychological and sociological perspectives. **(Note**: it needs to be stated upfront and clearly that for this concept to meet the goal of self-determination the company offerings must be of comparable quality. Otherwise, the concept devolves into an illusion as it will be, essentially, charity purchasing).

In summary, the Internet is the potential vehicle to reshape the lives of those dealing with neurological disorders. By focusing on what the person can do instead of what they cannot do, the internet enables access to customers and contributors, accelerates the company's ability to "scale up" to a sustainable level, and fosters an alignment among its

crucial constituent communities to help guide the venture through its early phases. The benefits of aligning all four communities could have tremendous impact not only on treatment options but on the lives of each individual involved. Figure 3 depicts the envisioned role of the Internet for entrepreneurs with neurological challenges.

## 5. Conclusion

This paper offers an approach to social entrepreneurship that flips the conventional view of social entrepreneurship. Instead of developing a business that benefits the disadvantaged through a sharing of the proceeds or helping raise awareness, those benefiting in this model are the entrepreneurs themselves. However, these are not your usual entrepreneur types. They are afflicted with some form of a neurological disorder. This population has been essentially shut out of the tradition employment system for the variety of reasons addressed above. The paper proposes entrepreneurship as a vehicle to change the status quo. Advances in technology, particularly the Internet, opens the promise of gainful employment - even ownership - in a sustainable way for the first time. There are four communities in place (Educational Community, Entrepreneurial Community, Medical Community, Support Community) that have been aligned in terms of goals for a number of years. They just have not been aligned organizationally, collaboratively, and systematically. Fortunately, such an alignment can happen today.

To conclude the paper, it might be useful to point out that although the paper proposes a conceptual model, it is rooted in reality. Examples do exist that elements of the proposed model can be linked successfully and with very positive results. In Denmark, Mr. Thorkil Sonne founded "Specialisterne" (English translation - "The Specialists"), a company focusing on testing software programs. The company competes globally, offers a highly specialized service, and is financially successful. It also only employs individuals with ASD challenges. Mr. Sonne, the father of an ASD child, realized both the lack of employment opportunities for people with an ASD condition and the special skills often exhibited by ASD individuals. One of the common attributes of an ASD person is they can be very, very focused for a very, very long time. This trait is perfectly suited for software testing. Mr. Sonne has actually built a company that is "doing good and doing well."

Another example of an existing model is the Monarch School in Houston, Texas. The school is totally dedicated to serving students with neurological disorders. It has a full-time day school as well as an extensive summer program and a residential transition program for students beyond high school. One interesting aspect of the school is every student, regardless of functionality or age, spends one period of each day involved in the school's business program. Staffed by a full-time coordinator, the program has set up a number of small businesses in which students provide the labor, make the decisions, keep track of the finances, take and fulfill orders, and are involved in the planning process. The school undertook the initiative on their own and is not affiliated with another school or entrepreneurial organization. The possibilities of aligning the four communities with organizations like Specialisterne and the Monarch School would greatly enhance their prospects for finance sustainability and serve a great number of individuals in need of assistance. Of more interest,

imagine if there were hundreds of Specialisterne and hundreds of Monarch schools. That is a vision where everyone wins.

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# RELATIONSHIP BETWEEN ENTREPRENEURIAL ORIENTATION DYNAMIC CAPABILITIES AND FIRM PERFORMANCE: AN EXPLORATORY STUDY OF SMALL TURKISH FIRMS

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**Abstract**

Entrepreneurial orientation (EO) and dynamic capabilities (DCs) are widely recognized as an important source of competitive advantage and superior performance of firms. EO which is often described as mindset of firms which helps the firms to grow and perform better. EO creates a fertile internal environment which broadens firms' scope to reconfigure their existing asset base and processes. Hence, drives the building and development of DCs. DCs enable the firms to sustain competitive advantage by creating value and allow the firms to capture entrepreneurial rents. Nonetheless, very few studies have addressed the both concepts in a same study. This paper is an attempt to find a link between EO, DCs and small firm performance. To explore this relationship study used a qualitative case study approach. In this explorative study 10 case studies were conducted on high technology firms. Our findings reinforce the existing insights in literature that EO has a positive influence on small firm performance. An interesting finding of our study indicates that EO is fundamental for development of DCs. Further, study reveal that EO has a positive impact on building of DCs that, in turn, positively affects firm performance.

## 1. Introduction

This era of fierce competition and rapidly changing environment places intense demands on decision-making and managerial efforts of small firms for sensing and seizing opportunities and then exploit them by building and reconfiguring resources which may result in better performance of firms. Creating, adopting to, and exploiting change in environment requires entrepreneurial strategic orientation (EO) (Lumpkin & Dess, 1996; Wiklund & Shepherd, 2005). To capitalize on EO demands orchestration of resource base which resides in dynamic capabilities (Teece et al.,1997). However, the linkage between EO and DCs of small firms is a blind spot in previous research. Particularly in the context of a dynamic environment, where small firms are highly vulnerable, elements from both EO and DCs approach are likely to interact in sustaining competence and high performance. This paper addresses the issue of small firms' performance in dynamic environments by focusing on EO

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and DCs of firms. EO and DC perspectives offer the strategies for wealth creation but there are very few studies which addressed both concepts in a same study. The current paper addresses this research gap by studying the relationship between EO, DCs and firm performance in a same study.

In order to get ahead of their competitors entrepreneurial firms continuously create, discover, and exploit opportunities (Hamel & Prahalad, 1994). This continuous creation, discovery and exploitation of opportunities requires entrepreneurial strategic orientation (EO) which reflects the firm's willingness to engage in entrepreneurial behavior (Brown & Kirchhoff, 1997; Wiklund, 1998). In the entrepreneurship literature, EO has gain an instrumental importance because of its presumed connection to better firm performance. EO refers to "the processes, practices, and decision-making activities that lead to new entry" (Lumpkin & Dess, 1996, p. 136), and includes dimensions like the firm's innovativeness, willingness to take on risk and pro-activeness towards market opportunities (Covin & Slevin 1989, Lumpkin & Dess, 1996). EO helps firms to survive and generate value for firms and their owners. In the competitive and dynamic environment firms possessing high EO develop new strategic orientations and business platforms based on new opportunities in the market. By using EO firms meet the new and latent needs of market. Several studies demonstrate the positive influence of EO on firm performance (Madsen,2007; Wiklund & Shepherd, 2005; Zahra & Covin, 1995), although the empirical results are of contrasting nature. The current paper is an effort to bring more clarity to the relationship between EO and performance of small firms.

In dynamic environments after seizing opportunities entrepreneurial firms have to reconfigure their resources and routines to achieve competitive advantage and superior performance (Teece et al.,1997). The organizational capabilities perspective (Teece et al., 1997; Winter, 2003) gives an important theoretical lens for conceptualizing capabilities for change as dynamic capabilities. Firms need DCs that enables them to renew their existing asset base. DC is "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p.515). By reconfiguration and renewal of its resource base firms build new valuable strategies on their resources and capabilities and may thus gain competitive advantage. DCs helps the firm to keep up with changing environments and create value generating strategies (Eisenhardt & Martin, 2000). Teece et al. (1997) identified organizational learning processes as important organizational processes that underpin DCs. In this paper we conceptualize and define organizational learning capability (OLC) as a DC and explore it as a mediator of EO – performance relationship. An entrepreneurial firm is receptive to new information, committed to learning and is continuously engaged in information acquisition and dissemination (Huber, 1991; Sinkula, 1994). Hence, OLC of a firm maximizes the influence of EO on performance.

Summarily, in this study we pose the following questions. First, how EO affects the performance of small firms? Second, how EO leads to the development of DCs? Third, how DCs mediate the relationship between EO and performance? Our argumentation builds mainly on the theoretical perspectives of EO and DCs. Since this research aims to address the '*how'* questions, we use case study as a research method, as case study is a specific research

strategy (Eisenhardt, 1989) to investigate such questions (Yin, 2003). We conducted case studies of ten small high-tech Turkish firms.

In addressing the above questions, we make the following contributions. First, building on the DC and environmental dynamism perspectives we investigate the EO-performance relationship in an integrative way. Thereby, we advance the research on the contingency of EO-performance relationship, which can help in better understanding of this relationship. Second, a major contribution is to highlight the importance of DCs for small firms. Specifically, we suggest that DCs mediate the relationship between EO and firm performance. Finally, as there is a lack of research on entrepreneurial efforts and resource reconfiguration in small firms, our study addresses this research gap by exploring the relationship between EO, DCs and performance of small firms.

The paper proceeds as follows. The next section fleshes out the theoretical background on EO, DCs and OLC. The section afterwards explains the methodology used in the study. In the following section we report our findings. Finally, we provide discussion and conclusions.

## 2. Theoretical Background:

### 2.1 Entrepreneurial Orientation

The concept of EO refers to firm-level processes, practices, decision-making styles (Lumpkin & Dess,1996), and strategic orientation (Wiklund & Shepherd, 2005) that help a firm to gain competitive advantage and exhibit superior performance. EO is an expression of entrepreneurial firm's entrepreneurial mind and has a possible influence on strategic processes and performance (Rauch et al., 2004). Based on the Miller's (1983a) definition of an entrepreneurial firm researchers have agreed that EO is a multi-dimensional construct, which is an effective combination of dimensions of innovativeness, proactiveness and risk-taking (Covin & Slevin, 1989; Wiklund, 1999; Madsen, 2007). Innovativeness reflects a firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes, thereby departing from established practices and technologies (Lumpkin & Dess, 1996). Proactiveness is an opportunity-seeking, forward-looking perspective characterized by the introduction of new products and services ahead of the competitors and acting in anticipation of future demand (Lumpkin & Dess, 1996). Risk-taking propensity denotes willingness to commit more resources to projects where the cost of failure may be high or projects have uncertain outcomes or unusually high profits and losses (Lumpkin & Dess, 1996; Miller & Friesen, 1983b).

Since the pioneering work of Miller (1983a) and initial work of Covin and Slevin (1986) on EO, a significant number of studies have investigated the EO-performance relationship. In an environment of rapid change and shortened product and business model lifecycles, firms may benefit by adopting EO. Entrepreneurial firms by creating new products and technologies generate extraordinary economic performance and can be described as the engines of economic growth. Firms with strong EO innovate frequently and take risk in their product-market strategies (Miller & Friesen, 1983b). With a forward-looking perspective entrepreneurial firms create first-mover advantage and aggressively target premium market segments (Wiklund & Shepherd, 2005). Firms with a high EO are more likely to engage in

developing pioneering innovation, which can potentially create new markets and provide the firms the option of employing a skimming price strategy (Zahra & Covin, 1995) and realize handsome profits for their innovations. Several empirical results find support for EO's positive impact on performance (Wiklund & Shepherd,2005; Wiklund 1999; Zahra & Covin, 1995). Positive effects of EO on firm performance have been found for various different performance criteria, such as accountant-based figures, growth, survival, and perceptual performance (Rauch et al., 2004). However, positive relationship between EO and performance is disputed in some studies (Hart, 1992; Smart & Conant 1994). It is because that the risk-taking behavior might have a positive or a negative consequence. For instance risk level is likely to be influenced by environmental conditions and thus have an indirect impact on the relationship between EO and performance. Not only has the relationship between entrepreneurial orientation and firm performance been examined, but the literature has also studied non-financial consequences of adopting such an orientation. An entrepreneurial orientation has been found to enhance an organization's knowledge stores of customers, competitors, suppliers and regulatory agencies through its positive impact on information gathering (Griffith et al., 2006). While much of the research on the EO-firm performance link has been conducted using large organizations it is probable that this relationship holds in smaller and emerging firms as well. For instance, a study of technology start-up firms in South Korea found an entrepreneurial orientation to be positively related to firm sales growth (Lee et al., 2001). As firms enter new markets and begin to establish themselves, it is important they remain innovative, proactive, and exhibit a willingness to take risks in order to outperform their rivals.

The positive effects of EO are empirically well established. However, it is important to note that there is considerable variance in reported sizes of effects. In literature some studies suggest that firms which adopt a strong EO exhibit much better performance than firms that do not adopt an EO (e.g., Lee et., 2001; Wiklund & Shepherd, 2005), other empirical studies reported lower correlations between EO and performance (e.g., Dimitratos et. al., 2004; Lumpkin & Dess, 2001; Zahra, 1991) while some studies did not find a significant relationship between EO and performance (Covin et al., 1994; George et al., 2001). This heterogeneity of reported effect sizes and the theoretical arguments discussed above suggest that EO-performance relationship might be contingent on other environmental and/or organizational factors (Covin & Slevin 1989; Lumpkin & Dess 1996). Thus, we need to apply contingency theory to study EO of firms. This contingency approach suggests that in different environmental contexts all of the dimensions of EO may thus not be present or important in a firm. Which of them is most dominant in a firm often depends on the factors within the firm itself or within the environment in which the firm operates (Lumpkin & Dess, 1996). For instance, innovativeness depends on how the firm positions itself within its environment. Lumpkin and Dess (1996, p. 137) therefore consequently argue that '(a) the relationship between EO and performance is context specific and (b) the dimensions of EO may vary independently of each other in a given context'.

EO is directly concerned with strategic processes in a firm, it is interesting to look at relationship between EO and other variables in the strategic process such as internal resource

reconfiguration. The dimensions of EO are fundamental for building flexibility and alertness to environmental changes and market signals (that is DCs), enabling the firm to reconfigure its activities and actions quickly (Hughes & Morgan, 2007). Entrepreneurial orientation drives the accumulation of knowledge and the development of dynamic capabilities (Griffith et al., 2006). In their study on international performance of entrepreneurial firms, Jantunen et al., (2005) argued that EO influences DC. Authors suggested that EO is likely to be a significant factor for opportunity recognition in new markets and therefore also has a positive influence on international performance. This highlights the need to explore EO-performance relationship by using an integrative approach where EO helps to build DCs and thus enhance performance.

## 2.2 Dynamic Capabilities

The DCs view of the firm is the evolutionary extension of the resource-based perspective as it explains how capabilities evolve and how organizations deal with rapidly changing environmental conditions (Helfat et al., 2007). DC is 'the firm's ability to integrate, build, and reconfigure internal and external competence to address rapidly changing environments' (Teece et al., 1997, p. 515). DCs are built rather than bought in the market (Makadok, 2001). They are organizational processes in the most general sense (Helfat et al., 2007) or routines (Zollo & Winter, 2002) which may have become embedded in the firm over time, and are employed to reconfigure the firm's resource base by deleting decaying resources or recombining old resources in new ways (Simon & Hitt, 2003). DCs are used by managers to create new value-generating strategies by altering the resource base of the firm (Eisenhardt & Martin, 2000; Winter, 2003).

DCs view place substantial emphasis on differential firm performance. Teece (2007) argues that DCs are keystone of firm's competitive advantage and are essential for sustaining superior firm performance. Important DCs mentioned in the literature are networks, alliances, learning processes and decision-making processes. To understand DCs it is critical to identify core processes and mechanisms in which DCs reside. Therefore, for a more insightful understanding of DCs and their effect on firm performance current paper consider organizational learning capability as a DC because learning mechanism is an important dynamic feature of a firm (Eisenhardt & Martin, 2000).

### 2.2.1 Organizational Learning Capability

Organizational learning capability (OLC) is an important DC which refers to the processes through which firms integrate, build and reconfigure knowledge in order to create innovative thinking, address rapidly changing environments, and build a competitive

advantage (Teece et. al.,1997; Hurley & Hurt, 1998). This DC has spawned a literature all of its own (e.g. Huber, 1991; Nonaka, 1994). OLC is a DC which continuously creates economic value through innovative ideas and by reconfiguration and transformation of existing capabilities (Kogut & Zander, 1992). OLC affects the interactions among a firm's different resources which augmented productive capacity for individual resources (Zollo & Winter, 2002). From the aspect of changing knowledge resource, organizational learning is viewed as a dimension of DC (Zahra & George, 2002; Zollo & Winter, 2002). OLC plays an instrumental role in the evolution of firm capabilities which helps to meet dynamic market conditions.

Organizational learning is a process through which a firm conducts its activities more efficiently and effectively during repetition and experimentation (Teece et al., 1997). By learning, a company can explore and exploit new knowledge to improve efficiency and effectiveness. Organizational learning is referred to as information processes for organizational change (Huber, 1991; Templeton et al., 2002), a system for sharing experience (Casey, 2005; Kim, 1993; Nonaka, 1994), the capability to improve organizational performance (Dibella et al., 1996; Sinkula, 1994), and a strategic means for organizational renewal (Crossan & Berdrow, 2003; Crossan et al., 1999). *Organizational learning capability* is then defined as the ability to identify knowledge, recognize the value of information, assimilate it into business process and strategic design, and utilize it to generate better solutions (Cohen & Levinthal, 1990; Huber, 1991). *Information acquisition* refers to the ability of a firm to search and acquire new and relevant information or knowledge (Huber, 1991). A firm can *disseminate and distribute information* to those individuals who need it, share information among functional units through formal and informal channels. *Knowledge transformation* denotes a firm's ability to combine and refine existing knowledge and acquire new knowledge (Zahra & George, 2002). *Knowledge exploitation* indicates the ability of the firm to incorporate acquired and transformed knowledge into business operations (Cohen & Levinthal, 1990).

Organizational learning is essentially the process by which new knowledge or insights are developed by a firm (Slater & Narver, 1994). Furthermore, learning leads to new patterns of activities or understanding of business logic within a firm, through which resources and activities are reconfigured and transformed. From the performance-based perspective, organizational learning is regarded as an organization's capabilities and resources which are not an end in themselves (Prieto & Revilla, 2006). The concept of organizational learning is referred to as a critical means which can increase employees' capabilities and thereby improve a firm's performance by both acquiring existing knowledge which a firm already possessed and generating new knowledge. The processes of acquiring knowledge are oriented to market information, and the market-oriented knowledge obtained somehow impacts organizational performance (Sinkula, 1994). Learning capabilities of organization stored knowledge as organizational memory has a valuable role in combining a firm's resources to fit with its external environment so that the firm is able to exploit or explore opportunities in a competitive environment. Furthermore, its rareness and inimitability enable the firm to improve competitive advantages by providing a uniqueness that cannot be easily imitated by

competitors (Barney, 1991). OLCs not only stores the knowledge, they also plays a role in modifying existing knowledge or creating new knowledge to align with an organizational goal (Crossan et al., 1999). Thus, these knowledge accumulations and their transfer processes are essential to understanding how learning in an organization is translated into organizational competence and how this learning contributes to performance improvement (Prieto & Revilla, 2006).

Without OLC, the firm can neither fully utilize the productive capacities of its resources (Kor & Mahoney, 2000) nor promote a continuum of firm level capability accumulation, deployment, and renewal that fuels innovation and growth. There is an important link between entrepreneurship and learning as entrepreneurial activities may create disruptions that are part of the learning process (Antoncic & Hisrich, 2003). This disruption in learning process requires a constant creation, extension and reconfiguration of its resource base. In particular, small firms have to develop the routines and processes to build OLC. However, the literature does not tell us how entrepreneurial activities within firms leads to learning and resource integration. Therefore, it is important to see how entrepreneurial oriented behavior of firms influences OLC and firm performance.

## 3. Methodology

To investigate our research questions, we used case study approach. Case study is a specific research strategy (Eisenhardt, 1989;Yin, 2003), to explore the complexities of the entrepreneurial process (Gartner & Birley, 2002) and it is consistent with the problems of theory development in the field of dynamic capabilities (Verona & Ravasi, 2003). We conducted case studies of 10 small high technology firms operating in the techno-parks of Middle East Technical University, Ankara and Hacettepe University, Ankara (For details see Table 1). The high-tech sector was selected because this sector is most appropriate to benefit from dynamic capabilities (Teece et al., 1997). We developed a topic guide for data collection and analysis based on literature review and research questions. We conducted in-depth individual semi-structured interviews with owners/CEOs and other top managers of the firms. For interviews questionnaire was prepared which was derived from the extant literature. Two pilot studies were conducted to understand the content of the interview before full scale research. Interviews were started with open-ended questions and each interview lasted between two to four hours. Interviews were digitally recorded after getting permission and subsequently transcribed. Our data collection also relies on archival data which include financial statements, annual reports, internal documents, industry publications, web sites and other written material on the firm. Interviews were being recorded, with consent and were transcribed subsequently. For data analysis all data was coded, categorized and analyzed by using grounded theory method. Causal network maps of the events, activities and environmental conditions were drawn to elicit the relationship between the EO, DCs and firm performance.

Table 1. Firms' Information

| No. | Firm's Name | Area of Activity | Person Interviewed |
|---|---|---|---|
| 1 | YD Yazilim | Software Engineering | -Owner<br>-Project Director |
| 2 | Taleworlds Tech | Computer and Online Games | -Owner |
| 3 | Sistemim | Web Developing | -Managing Director |
| 4 | akakce.com | Web Developing | -Owner |
| 5 | btt teknoloji | Information Technologies | -Owner |
| 6 | MONAD Engineering. | Graphic and Web Designing | -Director<br>-Project Director |
| 7 | MITENG Engineering. | Information Technologies | -Managing Director |
| 8 | Labris Teknoloji | Software Engineering | -Owner |
| 9 | kade systems | Software Developing | -Owner |
| 10 | Ankara BT | Information Technologies | -Owner |

## 4. Findings

### 4.1 EO and Firm Performance

All firms in the case study seem to be well equipped with innovative business ideas. All firms possesses innovative capacity and considered idea generation to be the cornerstone for

their success and growth. As one interviewee told us, “Without innovativeness and new ideas we are bound to vanish from market in a very short span of time.” Not only idea generation but firms also exhibit great enthusiasm for exploration of these ideas. This idea generation and exploration help the firms to create new products and services. Firms’ innovativeness also has internal orientation towards business processes and self-renewal. As the owner of a firm remarked, “In our firm we always tried to bring newness in our working practices. I mean to do things in new and different ways.” With innovativeness firms seem to be able to make business adjustments cleverly for developing their businesses. Innovativeness emerges as an important tool to give response to market needs and also as a mean to make the production process more effective. For each of the firm in this study innovativeness is an important factor which underpins their growth and success. Innovativeness positively influenced the performance of firms and contributes to the competitive advantage by facilitating creative thinking within a firm. Risk-taking dimension of EO varied among the firms. Firms with more resources appear to be more leaned towards risk. Such firms invested heavily in the projects where outcome is highly uncertain. This is due to their better holding of financial and non-financial resources. As the director of one firm said, “We go for the high risk projects. We know that if project would not be successful we have the resources to overcome the failure.” The firms with less financial resources seem to be moderate risk-takers. Constraints to financial capital constrain their risk-taking behavior. A moderate risk-taker owner said, “Without risk-taking chances of business growth diminish. So we always take calculated risks.” The variance in the degree of risk-taking exhibit that risk-taking is a firm-specific dimension. Interviewees noted that risk-taking propensity is at the heart of their business activities. This suggests that risk-taking influenced the performance of firms positively but variance in risk-taking propensity does not have a strong impact on performance. Proactiveness seem instrumental in all the firms but not in the sense of first movers. Instead of being a first mover firms prefer to possess more forward-looking perspective by careful monitoring and scanning of external environment. Owner of a firm put it succinctly, “We are a small firm we can’t afford to enter market as a pioneer. But we seize opportunities with a forward looking perspective which brings us potential rewards.”Such an evolutionary proactive strategy impacted the performance positively.

To sum up, evidence from our study shows that EO positively impacts small firm performance. However, the relationship between EO and performance is specific to a firm’s context and the dimensions of EO vary independently of each other.

### 4.2 EO drives DC (OLC)

Another aim of our study was to explore how EO leads to building and development of OLC as a DC. Dimensions of EO appear to be strong drivers in development and building of OLC. As most of the firms appear to have high liking for innovativeness, therefore, they provide internal environment in which learning is most likely to take place. By adopting EO firms instilled flexibility and bring about organization-wide communication which facilitate

the commitment to learning. The innovativeness dimension of EO seems to highly influence the integration and reconfiguration of learning resources. Director of a software house stated, " Environment around us is changing very rapidly. We can't control environment but what we can do is that we can change ourselves in an innovative way in order to adapt to environment. For this we encourage new and novel ways of learning." Without any exception all the firms in our study gives high importance to innovativeness dimension which allow them to learn in a more efficient and effective way. All the firms by adopting innovativeness dimension of EO encourage and motivate the employees to learn and as a result employees demonstrate a higher level of commitment to learn which enhance the OLC of firm. Influence of risk-taking dimension on OLC appear to be varied from moderate to high among firms. Firms abundant with resources exhibit more propensity towards learning. As an owner said, "In our sector risk-taking is our business. But our firm takes moderate risks. High risk can result into high loss which we can't afford due to lack of financial resources." On the aspect of tolerance for new ideas interviewees echoed the uniform view that they are tolerant and flexible to new ideas and always provide an environment which is conducive to learning. As the CEO of a firm remarked, "We encourage new ideas and thinking by showing tolerance for mistakes as it is an important source of learning which helps to improve our business." By pursuing proactive strategy firms appear to constantly scan the external environment which stimulates the process of information acquisition and dissemination. By using the acquired information firms reconfigure their processes and routines to adapt to environment. Interviewees reported that they are open-minded for new information and then share it with other employees and get feedback from the employees that how they can use it in best possible manner. EO creates a fertile internal environment which enhances OLC of the firms and helps the organizational learning to take place. Thus, study reveals that EO provides fundamental building flexibility and environmental alertness which enable the firms to build and develop DCs, which in this study is OLC.

Table 2. Summary of Analyses

| Firm's Name | Innovativeness | Risk-taking | Proactiveness | OLC |
|---|---|---|---|---|
| YD Yazilim | High | High | High | High |
| Taleworlds Tech | High | Moderate | High | High |
| Sistemim | High | Moderate | Moderate | High |
| akakce.com | High | High | High | High |
| btt teknoloji | High | High | High | High |
| MONAD Engg. | High | Moderate | Moderate | High |
| MITENG Engg. | High | High | High | High |
| Labris Teknoloji | High | Moderate | High | High |
| kade systems | High | High | High | High |
| Ankara BT | High | Moderate | Moderate | High |

### 4.3 Relationship between EO, DC, and Firm Performance

The third aim of our study was to explore that beside its direct influence on performance how EO indirectly influences performance by developing DCs in a firm. For each of the firm in this study OLC driven by EO, have a positive impact on its performance. OLC plays a critical role in reconfiguring resources and capabilities in line with internal and external demand which is conducive to superior performance. As the owner of a firm noted, "A key factor of our success is fast learning which gives us an edge over rivals." In dynamic environments OLC as a DC enable the firms to learn from the entrepreneurial disruptions quickly and to seize the opportunities early than their competitors. Firms in the study used both internal and external resources for learning. Most of the firms used intra-firm internet forums to discuss and share the latest ideas and information. CEO of a firm told us, "Information is lifeblood of our organization. We give lot of importance to information

acquisition and sharing as it provide us new insights to develop new products." Every interviewee highlighted the importance of acquisition, dissemination, and use of relevant information as a vital capability for the development of new products/services. By focusing on the acquisition and dissemination of relevant knowledge firms were able to reconfigure their routines quickly and develop new efficient and effective routines which enhanced performance. For example one CEO said, "We always get latest information from our customers, academicians, and government agencies which we use for the renewal of our firm." This renewal allows the firms to meet emerging challenges in a timely fashion. It also enhances the firm's ability to respond to market and enter the market before its competitors. Therefore, OLC as a DC facilitate the firms to gain new knowledge that improves its performance.

OLC as a DC provided the firms strategic flexibility to adapt to changes in environment, and thus to secure sustained competitive advantage and superior firm performance. Firms by adopting EO eliminated the traditional hierarchical structures which encouraged collaborative learning and provided environment which inspires learning and new business practices. As an owner stated that, "We made teams according to the needs and requirements of tasks". Such flexibility served as a mechanism of skills reconfiguration which is critical for the OLC of the firms. The talent pooling according to the needs of environment smoothened the sharing process of tacit knowledge. This puts the firms in a position to exploit the acquired information to achieve better performance. EO driven OLC allows the firms to orchestrate change and organize the operational routines in an efficient way to take advantage of new opportunities. For example director of a firm said, "Through continuous learning about market and our competitors we are able to know new opportunities early than our rivals. We also try to know about successful practices in our sector so that we can use them." Transformation of knowledge into useful product/service plays a pertinent and useful role in enhancing the firm performance. Firms in this study reported to have excellent knowledge transformation capabilities. The project director of a firm stated that, "To transform information into a useful product at its earliest is very important. Because if we will act late then our competitors will take advantage or information will become obsolete." Degree of innovativeness and proactiveness dimensions of EO seem to be highly influential on the knowledge transformation dimension of OLC. Firms with high innovativeness allow new ideas to transform into new products/services and high market proctiveness orientation encouraged the firms to transform new ideas and information into new products/services. However, risk-taking proclivity affects the rate of transformation of knowledge into new products/services. Firms with large bundle of resources exhibit more tendency to transform new knowledge into products/services while firms with less resources shows low rate of knowledge transformation.

To summarize, EO driven OLC allows the firms to reconfigure its resources and processes in order to seize opportunities. DC in the form of OLC acts as a strong mediator between EO-performance relationship and optimized firm performance. Thus, study reveals that EO drives OLC which, in turn, has positive influence on the firm performance.

## 5. Discussion and Conclusion

In light of the increased competition and scare resources firms have to rely more on their distinct resources for better performance (Barney, 1991). However, it is not the resources themselves that are productive but only an entrepreneurial strategic orientation (EO) allow the firms to use them productively (Penrose, 1959; Wiklund, 2005). The firm needs to orchestrate its resource base according to changing environment in order to capture entrepreneurial rents (Teece et al., 1997). This shows that there is a possible link between EO and DCs perspective. The purpose of this study was to improve our understanding of relationship between EO, DCs and small firm performance. This study qualitatively investigated the relationship through 10 case studies of high-tech firms. The first result of the study reinforces the existing insights in literature that EO has a positive influence on small firm performance. Most prior studies which investigated EO-performance relationship were conducted in developed economies. Our study shows that in the context of an emerging economy (Turkey) EO-performance relationship is also positive. An interesting finding is that EO is not a unidimensional strategic orientation as proposed by different researchers (e.g., Covin & Slevin, 1989; Zahra & Covin 1995). Findings suggest that the EO is a multi-dimensional construct and firms use three dimensions in various combinations depend on factors within the firm itself or within firm's environment. Thus, study finds support for the argument that dimensions of EO vary independently of each other in a given context (Lumpkin & Dess, 1996).The second finding emphasizes that EO, by providing a fertile internal environment and through the scanning of external environment, broadens the firm's capacity to learn and thus enhance OLC of firm. EO by providing necessary conditions serves as an impetus for the building and development of firm's OLC as a DC. All the three dimensions of EO influence the building and development of OLC. However, innovativeness and proactiveness played an instrumental role in the development of OLC. Innovativeness due to its stronger internal orientation helped to facilitate the internal learning. While proactiveness has a strong external orientation which enhanced the firms' capability to learn from external environment. An important consequence of this finding is that EO not only directly impacts the performance but is also an antecedent of DCs. This suggests that by adopting EO firm not only show better performance but also laid foundations on which it can build DCs. Finally, study reveals that OLC as a DC has a positive impact the firm performance. OLC as a DC allowed the firms to seize and exploit opportunities much earlier than their competitors which resulted in generation of entrepreneurial rents. Therefore, study supported the argument that DCs are necessary to sustain superior performance in rapidly changing environments (Teece, 2007). Finally, study finds support for an integrative approach where EO helps firms in building and development of DCs in order to optimize firm performance.

To conclude, as most of prior studies investigated EO and DCs concepts in separate studies, our study by using an integrative approach brings clarity to the relationship between EO, DCs and small firm performance. This study is an attempt to understand the relationship between EO and DCs because both concepts helps to create value and wealth for the firms and their owners. OLC as a DC appears as an important mediator in the EO-performance

relationship. Small firms must foster EO and DCs to optimize the firm performance. Future research needs to use other DCs as a contingent factor in the examination of EO-performance. The case study approach allowed for data that improved the ability to build theory. Generalizability is a concern with idiographic research since the sample size is limited (Schofield, 2002). Future research needs quantitative investigation of relationship across a wider range of firms and industries.

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# THE ROLE OF THE INNOVATIONS FOR THE PROSPERITY OF SOCIETY IN 21 CENTURY AND THE CONDITION'S IN BULGARIA

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**Abstract**

The innovations create relationships between the science and business, with the leading role of the information technologies that have entered all the fields, from the extraction of raw materials, the obtaining of various products, to their presence in the households, in the offices, in the area of people's relaxation. The innovation can be examined both in a dynamic and a static aspect. In the latter case the innovation represents the final result of the scientific-productive cycle. The goal of the issue is to study the role of the innovations for development of society in 21 century and the condition's in Bulgaria. For accomplishing the goal there some problems to be methods of analysis, synthesis, the systematical methods of approach and statistical calculations.Having in mind the importance of ***European technology platforms*** for the future development of our country as well as the insufficient innovativity of Bulgarian economy a necessity for finding out mechanisms for motivating the business for an active cooperation with the scientific research institutes and universities in order to work out projects in the framework of the European technology platforms arises.

**Key words:** innovation, management, business, production and technologies

## Introduction

At the beginning of the 21st century the importance of the economics of knowledge and innovations as motive drivers of the sustainable development and the prosperity of society is indisputable. Nowadays the science and education as well as all forms of the innovations are principal prerequisites for creating more working places, especially in the conditions of world financial and economic crisis. The innovations create relationships between the science and business, with the leading role of the information technologies that have entered all the fields, from the extraction of raw materials, the obtaining of various products, to their presence in the households, in the offices, in the area of people's relaxation. The partnership between the public and private, including the industry and agrarian production, the scientific development and the state power play an essential role in facing these challenges in our contemporary life (3,6).

In the economics literature the notion of "innovation" is defined as a transformation of the potential scientific-technical progress into real one which is realized in the new products and technologies (5,6). According to international standards the innovation is defined as a final result of the innovation activity, as a created or improved patentable product, implemented in the market. It may also be an improved technological process, used in the practical activity or a new approach to the social services. The innovation can be examined both in a dynamic and a static aspect. In the latter case the innovation represents the final result of the scientific-productive cycle.

The goal of the issue is to study the role of the innovations for development of society in 21 century and the condition's in Bulgaria.

## Material and methods

For accomplishing the goal there some problems to be methods of analysis, synthesis, the systematical methods of approach and statistical calculations.

The working out and the implementation of new products in the enterprises create an opportunity for enhancing their competitiveness and eliminating their dependence on the life cycles of the products produced. It is necessary to make a difference between innovations, realized in the enterprises and the non-essential changes in their products and the technological processes that do not change the constructive performance and do not have a big influence on the product quality and price, as well as on the materials used. The criteria for classification of the innovations allow to reveal their essence more in depth.

## Results and discussion

The more important qualification signs, according to which the types of innovations can be differentiated, are represented in Table 1.

**Table 1: Criteria for the innovation classification**

| CRITERIA | TYPES OF INNOVATIONS |
|---|---|
| **DEGREE OF INNOVATIVITY** | • *Basic(true, radical)*<br>• *subsequent*<br>• *peripheral(modified, routine)* |
| **CHARACTERISTICS OF THE CREATIVE PROCESS** | • *primary*<br>• *imitation*<br>• *diffusion or transfer* |
| **GROUNDS FOR REALIZATION** | • *out of necessity*<br>• *initiated* |
| **THEIR ROLE FOR BUSINESS DEVELOPMENT** | • *strategic*<br>• *tactic* |
| **IMPORTANCE OF THE INNOVATION** | • *essential*<br>• *incremental(insignificant)*<br>• *improvements (secondary)* |
| **DEGREE OF MEETING THE NEEDS** | • *innovations raising new needs*<br>• *innovations meeting needs in a new way*<br>• *innovations improving the quality,design,functional possibilities,etc..* |
| **DURATION OF THE INNOVATION EFFECT ON BUSINESS** | • *long term*<br>• *mid term*<br>• *short term* |
| **EFFECT ON THE CUSTOMERS** | • *direct effect on the customers' needs*<br>• *indirect effect on the customers'needs* |
| **WAY OF REALIZATION** | • *evolutionary*<br>• *revolutionary* |
| **SUBJECT OF THE INNOVATION PROCESS** | • *products*<br>• *services*<br>• *technologies* |
| **SOURCES OF IDEAS FOR INNOVATIONS AND THE SUBJECT THAT REALIZES THEM** | • *internal*<br>• *external* |
| **FIELD OF APPLICATION** | • *production*<br>• *market*<br>• *social* |

**Source:** Elaborated by prof. Todor Nenov, additionally developed and expanded by the authors.

Under the contemporary conditions the renovation of the production and technologies occur at accelerated rates. In this aspect it is necessary to answer two questions: What engenders this? And what are the principal prerequisites?

***1. Formation of European technology platforms (ETP)***

This process begins as the formation of discussion groups with the participation of specialists from different fields of the science and technologies at the beginning of the 21 century. These results from the fact that European industry is considerably undeveloped, its technological contents are inadequate, and it lacks specialization in the high-tech sectors compared to the USA and Japan. A confirmation of this fact are the lower cost of technological product innovations amounting to 16% for EU -25, compared to the American industry which reports 23.3% from the gross revenues for 2002. It is necessary that a management approach from "downwards upwards" should be introduced, initiated and led by the industry, started by groups mainly from the member states. The goal is to expand the partnership between the private business and the public research institutes in order to change the research priorities into a direction supporting the industry.

Five years ago, at the formation of ETP, all participants led by the industry, worked out a Strategic Research Agenda in important areas of high social significance. The tendency is to accelerate the economic development of Europe, to enhance the business competitiveness. The main role in the management of the Strategic research agenda (SRA) is assigned to industry but the active participation of society is expected to achieve optimal results. The technological platforms include the participation of economic enterprises (especially of Small and medium enterprises) in scientific projects, related to their specific fields of competence in cooperation with the scientific technological institutes and universities. The financial institutions are set the task to ensure profitable financing of projects, including SRA priorities, by using various financial possibilities, one of which is risk sharing. At the third stage of the implementation of ETP, besides the $7^{th}$ framework program, financial sources can be European, national, regional and private funds and programs.

Another source can be The European Investment Bank (ETB) since in the $7^{th}$FP the European Commission together with the ETB stipulates a new opportunity for financing with Risk-Sharing Finance Facility in order to facilitate the access of the European scientific research to financing.

***2. Creation of innovation markets***

At a meeting in October 2005 the European leaders defined scientific research and the technological innovations as a number 1 priority under the conditions of globalization. They should contribute to the establishing of dynamic market conditions where more exigent customers, looking for novelties as well as the higher potential for investment return will act as a generator for research and innovations. The tools of ETP for creating innovation markets are reduced to:

- *Establishing and introduction of standards:*

The establishing of standards by participants in ETP is regarded as a basis for the development of a particular sector of the economy. Technological platforms can determine the fields of economy where the standardization can be decisive for the development of rapidly growing markets.

- *Market regulation*:

The fragmented regulation at the moment is a serious barrier to the innovations in Europe. It is necessary to create an anticipating approach for the market regulation to improve the present situation.

- *Defense of the intellectual property* :

By the guarantee of the safety and the effective defense of the intellectual property the conditions for its development will be improved and optimized, the implementation of the scientific technological progress in the business will be accelerated.

- *Public property:*

On a market where the public institutions are part of the consumers of a particular commodity the public property can play the role of a driver for the development of innovative technologies for creating of innovative products and services, and in this way it will also enhance the quality of public services.

***3. Joint technological initiatives (JTI)***

Most ETP are at the realization stage. Their Technological research agendas have to be transformed into concrete events and to achieve concrete results. It is stipulated for some of them to cross the national borders and to reach the scale of private-public cooperation at a European level. The European Commission has determined 6 main fields where such cooperation can be organized as the so-called "joint technological initiatives". For this purpose they have to be evaluated by the Competitiveness Council. Then these of them, in which the leading industries have shown the necessary long-term commitment and results that should lead to enhancing the business competitiveness in EU, will be implemented. A technological platform is regarded as successful only if it leads to the creating of "joint technological initiatives".

***4. Scientific priorities in the agrarian field***

A part of ETP is related to common scientific priorities in fields such as plant genomics and biotechnology, forest sciences, global veterinary sciences, farm animals, food and industrial biotechnologies. Other ETP will provide conditions necessary for the support of common agrarian policy; agriculture and commerce; regulation of food safety; animal health; disease control; development of fishing and aquacultures, healthy sea food and remediation of nature.

However the main priority in the field of agrarian sciences and biotechnologies is *the creation of European Knowledge-Based Bio-Economy-KBBE),* to respond to some basic social and economic challenges of the contemporary social development such as:

- Sustainable food production;
- Food related diseases;
- Infectious diseases in animals;
- Agrarian production, fish-farming and climate changes;

- High quality foods;
- Humane attitude to animals;
- Sustainable development of rural areas.

The newly adopted term “bioeconomy” includes all industries and sectors of the economy which produce, manage and use in different ways biological resources(as well as related to this services) such as farming, foods, fish-farming, forestry and others.

European technological platforms in the field of the agrarian sciences and biotechnologies, in force nowadays, are the following:

- ETP ”Food for Life“
- ETP „Global Animal Health” (ETPGAH)
- ETP “Plants for the Future”
- ETP „Sustainable Chemistry”
- ETP „Farm Animal Breeding and Reproduction” (FABRE)
- ETP „Water Supply and Sanitation” (WSSTP)
- ETP „Innovative and Sustainable Use of Forest Resources”
- ETP „Innovative Medicines for Europe”
- ETP „NanoMedicine - Nanotechnologies for Medical Applications”
- ETP „WATERBORNE”

The European technology platform “Food for Life” and the main results of it are directed towards faster and more efficient consumer orientation innovation of foods. It has to guarantee an effective multidisciplinarity and integration approach in the management of food chains. Thus it is expected to obtain a production of new and modified foods at the national, regional and world markets, corresponding to the consumers’ needs and expectations. These products together with the recommended changes of the diets and life style will have a positive effect on human health and the total quality of life. The platform stipulates to provide long term opportunities for career development in the European food sector as well as to train people from different fields; to establish sustainable business models; to contribute to the formation of consortiums including scientific research institutes, universities and industrial enterprises; to offer an opportunity for the identification and exchange of the best practices. Such activities will support a successful and competitive European food industry, based on economic growth, technology transfer, sustainable food production and consumers’ confidence.

The main goal of the Global Animal Health technological platform is to develop efficient tools for control of animal diseases of European and world importance. It will create conditions for the improvement of the animal health and the way of animal breeding, for the production of foods, safe for the human heath, etc.

The ETP “Plants for the Future” will cooperate with the other technology platforms: “Food for Life”, “Sustainable Chemistry”, “Forestry”, “Innovative Medicines”, “Farm Animal Breeding” and “Global Animal Health”. Its strategic scientific plan and the action plan will contribute to the solution to the following main challenges: Healthy, safe and sufficient foods

and forages; Sustainable agriculture, forestry and landscape; Biological products; Competitiveness, consumer choice and regulation.

The technology platform "Sustainable Chemistry", initiated by Cefic and EuropaBio in 2004 has the motto "Innovations for a better future". It stipulates a sustainable European chemistry and biotechnology industry with enhanced global competitiveness. The main goals of the platform are:

- Decreasing the effect of the energy production by finding out alternatives and efficiency;
- Improvement of the public health;
- Realization of access to cheap and high-quality communication systems;
- Improvement of the environment;
- Enhancing the competitiveness, etc.

**Conclusions**

Bulgaria is not represented in examining platforms, except the limited participation in ETP "Food for Life", "Plants for the Future" and the more active participation in ETP" Global Animal Health". As a whole the innovative activity of Bulgaria is not very high as it can be seen in Table 2.

**Table 2: Innovation indicators for Bulgaria according to EIS as of 01.01.2008 г.**

| INNOVATION INDICATORS ACCORDING TO THE EUROPEAN INNOVATION SYSTEM(EIS) | BQUANTITY OF THE INNOVATION INDICATOR | INDICATOR TYPE |
|---|---|---|
| 1.Part of university graduates in the scientific-technological fields aged 20-29 | **68 out of 1000 people** | INPUT – Innovation drivers |
| 2.Part of the population with a third educational degree aged 25 -64 | **99 out of 100 people** | INPUT – Innovation drivers |
| 3. Distribution of wide-band Internet | **No information** | INPUT – Innovation drivers |
| 4. Participation in lifelong education at the age of 25 -64 | **13 out of 100 people** | INPUT – Innovation drivers |
| 5. Educational level of young people with secondary education as % of the population aged 20-24 | **99%** | INPUT – Innovation drivers |
| 6. Budget expenses for scientific, innovation and development activities as % from GDP | **57%** | INPUT – Knowledge creation |

| | | |
|---|---|---|
| 7. Expenses for scientific, innovation and development activities by the business | **8%** | INPUT – Knowledge creation |
| 8. Part of the investments in scientific, innovation and development activities for mid-high and high technologies as % from the investments in the country | **96%** | INPUT – Knowledge creation |
| 9. Part of the enterprises having had state support for the realization of innovations as % out of all in the country | **12%** | INPUT – Knowledge creation |
| 10. University projects for Scientific, innovation and development activities, financed by the business-number. | **506** | INPUT – Knowledge creation |
| 11.Part of the innovative SME as % out of all | **36%** | INPUT – Innovation & entrepreneurship |
| 12.Part of SME participating in joint innovative projects as % out of all | **25%** | INPUT – Innovation & entrepreneurship |
| 13.Expenses for innovations as % of the expenses made in SME | **38%** | INPUT – Innovation & entrepreneurship |
| 14.Starting risk capital | **No information** | INPUT – Innovation & entrepreneurship |
| 15.Expenses for ICT as % of GDP | **37%** | INPUT – Innovation & entrepreneurship |
| 16.SME realizing non technological innovations as % out of all | **20%** | INPUT – Innovation & entrepreneurship |
| 17.Part people employed in high-tech services as % out of all employed in economy | **84%** | OUTPUT - Application |
| 18.Export of high-tech products as % of the total import | **16%** | OUTPUT - Application |
| 19.Sale of new for the market products as % of the total sale of products | **35%** | OUTPUT - Application |
| 20.Sale of new for the enterprises products as % of the total sale of products | **32%** | OUTPUT - Application |
| 21.Part of the people employed in the mid-high and high technological productions as % of the | **71%** | OUTPUT - Application |

| | | |
|---|---|---|
| total number of employed | | |
| 22.Number of new European patents per 1 million inhabitants in the country | **3** | OUTPUT – Intellectual property |
| 23.Number of new American patents per 1 million inhabitants in the country | **1** | OUTPUT – Intellectual property |
| 24.Number of new “triple” patents (EU,USA,JP) per 1 million inhabitants in the country | **None** | OUTPUT – Intellectual property |
| 25.New Union brands per 1 million inhabitants in the country | **None** | OUTPUT – Intellectual property |
| 26.New useful Union models per 1 million inhabitants in the country | **1** | OUTPUT – Intellectual property |

Source:EUROSTAT 2007

Having in mind the importance of ETP for the future development of our country as well as the insufficient innovativity of Bulgarian economy a necessity for finding out mechanisms for motivating the business for an active cooperation with the scientific research institutes and universities in order to work out projects in the framework of the European technology platforms arises.

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# INVESTIGATING THE INNOVATIVE BEHAVIORS AND EVALUATIONS OF TURKISH MANUFACTURING FIRMS FROM SELECTED SECTORS IN THE AEGEAN REGION[25]

Ipek Akalın[26] and Gül Bayraktaroğlu[27]

**Abstract**

In today's global and dynamic competitive environment, innovation is becoming more and more relevant, mainly as a result of three major trends: intense international competition, fragmented and demanding markets, and diverse and rapidly changing technologies. This study aims to determine the innovation activities, constraints and innovation sources the enterprises use. The paper is based on the findings of a survey of innovation activities of 76 firms in Turkish manufacturing industry in the Aegean Region. The manufacturing industries are divided into high, medium-high, medium-low and low technology industries by OECD. Electronics, chemical, plastics, pulp and paper industries are selected as sub industries representing each OECD industry category, respectively. The list of enterprises is acquired from the Aegean Region Chamber of Industry database. The findings show that more than half of the enterprises make product and process innovations. Improving the product quality and reducing the costs per unit produced rank at the top of the main objectives of innovation activities. The most frequently used innovation activity is acquisition of machinery, equipment and software. Market sources are found to be the most important sources of information assisting innovation activities and also these sources are used more frequently by the enterprises. Cost factors are found to be the most effective constraining factor on the ability to innovate.

**Keywords**: Innovation, CIS scale, manufacturing industry, Turkish Aegean Region

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## 1. Introduction

Global competition has increased performance standards in many dimensions including those of quality, cost, productivity, product introduction time, innovation, and smooth flowing operations (McAdam, McConvery, & Armstrong, 2004, p. 206).

Firms offering products that are adapted to the needs and wants of target customers and that market them faster and more efficiently than their competitors are in a better position to create a sustainable competitive advantage (Amit & Schoemaker, 1993, p.43; Calantone, Dröge, & Vickery, 1995, p.215; Prahalad & Hamel, 1990, p.277). In order to ensure their competitiveness, and even survival, companies must be able to meet these challenges by providing a continuous stream of new and improved products, processes and services. Competitive advantage is increasingly derived from knowledge and technological skills and experience in the creation of new products (Teece, Pisano, & Shuen, 1997, p.515).

Innovation is not only of importance for a limited group of high-tech, manufacturing or large-scale companies. The need to innovate is universal, irrespective of size, sector or technological sophistication. In an environment where technologies, competitive positions and customer demands can change almost overnight and the life-cycles of products and services are getting shorter, the capacity to manage innovation successfully is crucial for the competitive power of a company. It is therefore no surprise that managing the innovative function of firms has gained increasing attention in both business and academic communities.

## 2. Conceptual Background

Innovation is “the process of taking new ideas effectively and profitably through to satisfied customers” (Armstrong, McAdam & Kelly, 1998, p.140). Innovation is “the application of new ideas to the products, processes or any other aspect of a firm’s activities” (Rogers, 1998, p.6). It offers new solutions to problems and thus makes it possible to meet the needs of both the individual and the society (Armstrong et al., 1998, p.140).

Innovation is also defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1995, p.6). Two aspects of this definition deserve elaboration: the form of the innovation and the newness of it. First, the definition shows that an innovation can take various forms or appearances. It may be a tangible product, like an energy-saving compact fluorescent light bulb, but may also be intangible like a service or a behavioral pattern. Second, a product is only an innovation if it is perceived as new. However, innovations are not limited to technical innovations but include non-technical process innovations such as team work and continuous improvement processes, too (Armbruster, Kinkel, Lay, & Maloca, 2005, p.1).

Tushman and Nadler (1986, p.75) define innovation as “the creative process through which new products, services or production processes are developed for a business unit”. Innovation

is usually associated to radical advances in products or productive configurations. However, most successful innovations are based either on the cumulative effect of incremental changes of products and production processes or on creative combinations of already existing techniques, ideas or methods. Hence, innovation activities are not exclusive of R&D areas. Innovation activities also require other functional areas such as marketing and operations to interact (Song, Montoya-Weiss, & Schmidt, 1997, p.39) in order to gather market needs to technological and operational capabilities (Tushman & Nadler, 1986, p.78). This innovation process is shaped by information-processing activities, which translate consumer needs and technological opportunities into valuable information for operations management.

### 2.1. Classification of Innovation

In the literature different classifications of innovation are used. Some authors like (Avermaete, Crawford, Morgan, & Viaene, 2003, p.9; European Commission, 1995; Grunert et al., 1997, p.5; Johne, 1999, p.6) divided innovation into four groups as:

- ***Product innovation***- Product innovation can be seen as "any good, service or idea that is perceived by someone as new" (Grunert et al., 1997, p.5). Therefore, a product may be considered as an innovation to one person or organization but not to another (Johannessen, Olsen, & Lumpkin, 2001, p.22). Product innovation may result from changes in the organizational structure of the company. Further, new products may arise through the exploitation of new market segments. However, product innovation is mostly associated with changes in processing (Avermaete et al., 2003, p.9). Product innovation provides the most obvious means for generating revenues. The power of product innovation in helping companies retain and grow competitive position is indisputable. Products have to be updated and completely renewed for retaining strong market presence (Johne, 1999, p.6).
- ***Process innovation***- Process innovation includes the adaptation of existing production lines as well as the installation of an entirely new infrastructure and the implementation of new technologies. In general, process innovation allows the creation of new products. But process innovation may also be required as part of reorganization of the company or to enable the exploitation of new markets (Avermaete et al., 2003, p.9). Several authors have examined advantages associated with the various dimensions of process innovation (Buffa, 1985, p.138), product improvement, increased turnover of inventories, and shortened delivery cycles (Meredith, 1987, p.54). Process innovation, on the other hand, provides the means for safeguarding and improving quality and also for saving costs (Johne, 1999, p.6).
- ***Organizational innovation***- Organizational innovations are concerned as "changes in management, work organization, and the working conditions and skills of the workforce" (European Commission, 1995). This type of innovation that is labeled as organizational innovation is also described as managerial or administrative in the literature. Although studies on organizational innovation are limited, organizational innovation has gained importance in all industrial sectors. One can, for example, think of the success of the ISO (International Organization for Standardization) Standard, which prescribes rules in order to make processes

transparent, documented, reproducible and controlled. Other examples of organizational innovations are Total Quality Management (TQM), just in time (JIT), re-engineering and knowledge management.

- ***Market innovation***- Market innovation is defined as "the exploitation of new territorial markets and the penetration of new market segments". Market innovation is concerned with judicious choice and entry into market segments which are new to the company (Avermaete et al., 2003, p.10). Its purpose is to identify better (new) potential markets; and better (new) ways to serve target markets.

Some authors analyze innovation concept in two categories: (1) the incremental innovations and (2) the radical innovations (Ettlie and Subramaniam, 2004, p.97; Johannessen et al., 2001, p.23; O'Dwyer, Gilmore, & Carson, 2009, p.50). Radical innovations produce fundamental changes in the activities of an organization and large departures from existing practices. Incremental innovations are an improvement of an existing process, product, service or market approach, and involve a lesser degree of departure from existing practices (Ettlie & Subramaniam, 2004, p.97; Johannessen et al., 2001, p.23).

In the literature, the types of innovation are also classified using the criterion of their purpose as technical or administrative innovation by some of the authors (Damanpour, 1991, p.560; Hage, 1999; Normann, 1971, p.203; Tushman & Nadler, 1986, p.75). Technical innovations include new technologies, products and/or services, (Normann, 1971, p.203; Tushman & Nadler, 1986, p.75). Technical innovations can be considered as the combination of both product innovation and process innovation. Administrative innovations refer to new procedures, policies and organizational forms (Normann, 1971, p.203; Tushman & Nadler, 1986, p.75).

### 2.2. Empirical Studies on Innovation Using a Special Scale: Community Innovation Survey (CIS) Scale

The background for the CIS project is a set of mostly independent surveys on innovation carried out in the 1980s. The experience from these surveys resulted in an OECD manual in 1992 which is intended to be a basis for more coherent future surveys. Eurostat developed CIS in collaboration with independent experts and the OECD resulting in the final, harmonized questionnaire in June 1992. The questionnaire is aimed at enterprises within manufacturing and is generally send to a stratified sample of enterprises with relatively low cut-off points. CIS is implemented for the first time in the autumn 1993.

One of the studies done in UK and Europe analyzed the responses to various Community Innovation Surveys to explore whether financial factors constrain the innovative behavior of European firms and whether the pattern of such constraints varies according to firm size, industrial sector and national financial systems. In this research, data from the second and third Community Innovation Surveys were used. Analysis of the CIS2 data in UK indicates that (correcting for firm size), there is more risk that a firm in a high tech sector will experience financial constraints than a firm in a low tech sector. Analysis of the CIS2 data in

EU data confirms that this pattern is repeated across the whole sample of European countries. In this research it was found that financial factors do impact upon innovative activity in Europe. That impact was found to be more severe in higher tech sectors, for smaller firms and in market based systems (Canepa & Stoneman, 2007).

Another investigation examined the relationship between universities and innovation using a sample of 2655 manufacturing firms drawn from the UK Innovation Survey. The analysis showed that firms which use many other external sources of knowledge (sources such as competitors, suppliers and customers, private research institutes, fairs and trade associations, etc.) also tend to use university research more intensively. It is also found that R&D expenditures and firm size are associated with the use of universities (Laursen & Salter, 2004).

Another research which was done in Turkey was based on the initial findings of a nation wide survey of technological innovation activities of 2100 firms in Turkish manufacturing industry in 1995-1997. The findings showed that the innovation activities were more widespread in the firms having large sizes of employment. In some sectors of manufacturing industry, 60–80% of the firms undertook innovation activities. Improving the product quality and opening up new markets ranked at the top of the main objectives of innovation activities for the sample of the research. In-house R&D turned out to be the main sources of information assisting innovation activities. 51.2% of the firms that were engaged in innovation carried out joint R&D with consultancy firms, and 52.3% of the firms with which Turkish firms co-operate were in the EU countries. In the majority of the manufacturing sectors, more than 50% of the total sales were derived from technologically new and improved products. Only 19% of the firms had had patent applications with a return of very few patented inventions (Uzun, 2000).

### 2.3. Innovation in Turkey

Gross Domestic Expenditure on Research and Development (GERD) in Turkey was 6 893 Million TL in 2008. In Turkey, share of GERD in GDP was 7.3 per thousand. In 2008, 43.8% of Research and Development (R&D) expenditure was performed by higher education sector; 44.2% by business enterprises comprising state economic enterprises and private sector; and 12.0% by the government. Analyzing the sectors financing R&D expenditure in 2008, 47.3% was financed by business enterprises; 31.6% by government sector; 16.2% by higher education sector; 3.6% by other sectors; and 1.3 % by foreign funds. According to the survey results, total number of R&D personnel (full time) was 67 244 in 2008. Regarding R&D personnel distribution within sectors, 44.5% was employed in higher education sector; 40.8% in business enterprise sector; and 14.7% in government sector in 2008 (Turkish Statistical Institute, 2010).

One of the first studies on innovation was done by Turkish Statistical Institute and The Scientific and Technological Research Council of Turkey, including the years 1995 to 1997.

The CIS questionnaire was applied to a selected sample composed of firms from the manufacturing industry, some service industries and firms which got R&D support. Similar studies were conducted including the tree year period from 1998 to 2000, and from 2002 to 2004. The results of these studies showed that 25% of the firms in manufacturing industry and 26% of the firms in service industry introduced at least one technological innovation between 2002 and 2004. The innovativeness ratios are very low compared to the countries in European Union. 57% of the enterprises in UK were active in developing or implementing innovations. 44% of the enterprises in European Member States excluding Ireland, Luxemburg and United Kingdom were active in innovation in 2004. Estonia has the highest share of innovating enterprises among the new Member States (with 36% of enterprises with innovation activity), followed by the Czech Republic at 30% and Lithuania at 28%. However this was considerably lower than the EU average of 44%. At the other end are Poland and Romania with the lowest rates of innovation activity, both with 17% of enterprises with innovation activity (Crowley, 2004)

As it can be observed from the statistics, most of the R&D personnel belongs to the business sector and businesses are the leaders in financing R&D activities. Although the business sector is the locomotive sector in R&D activities, their innovativeness level is low. To understand the constraints that hinder the innovativeness of firms, factors motivating them to innovate, what type of innovation takes place more should be analyzed to be able to propose possible solutions to the business, government and the other elated sectors. Thus, this study aims to determine some innovation related activities, constraints, information sources used and their importance, etc. of firms registered in the Aegean Region Chamber of Industry. The firms from four sectors (electronics; chemical; plastics; pulp and paper) belonging to a different level of R&D intensities were selected.

## 3. Methodology

### 3.1. Objective of the Study

The aim of the study is to determine:

- the innovation activities conducted by the enterprises
- how much product related, process related and other factors lead to innovation activities
- the frequency of engagement in the innovation related activities
- importance and usage of information sources in innovation related activities
- importance of certain constraints on innovation activities which leads to a decision not to innovate

### 3.2. Sampling Method

In this study, the classification of industries by OECD is used. The current classification is based on analysis of R&D expenditure and output of 12 OECD countries[*] in the period 1991-99. The division of manufacturing industries into high technology, medium-high technology, medium-low technology and low technology groups was made after ranking the industries according to their average R&D intensities over 1991-99.

One industry is selected from each category. Electronics, chemical, plastics, pulp and paper industries are selected. The list of enterprises is acquired from the Aegean Region Chamber of Industry database. Electronics industry is in high technology industry; chemical industry in medium-high technology; plastics in medium-low; and pulp and paper industry is in low technology industry. Some of the enterprises in these industries were closed or could not be reached by telephone. Moreover, some of the enterprises are registered in the Aegean Region Chamber of Industry database more than once with different names. Because of these reasons 240 questionnaires were e-mailed to the ones which were still operating and which could be reached by phone (to take permission). The questionnaire is uploaded to a link. And for every enterprise, different links were generated by the system and these different links for each enterprise were e-mailed one by one. The enterprises were phoned and the questionnaires were e-mailed in April 2009. Top managers, department managers or the owner of the enterprise were asked to answer the questionnaire. In June 2009 the enterprises which did not complete the questionnaire were called again and lastly a total of 76 usable questionnaires were received, giving a response rate of 32 %, 17 were non-usable since the respondents did not complete the questionnaire.

### 3.3. Questionnaire Design

CIS is a survey conducted by European Union member states that allows the monitoring of Europe's progress in the area of innovation. The questionnaire is similar to CIS-3 and CIS-4 (The National Archives, 2010). CIS 4 took place in 2005 and CIS 3 in 2001 in Europe.

In this research, the questionnaire contained six sections. These were general information about the enterprise, product innovation, process innovation, factors for innovation, innovation related activities and strategic innovation. In the first section of the questionnaire, the respondents were asked 5 questions about the enterprises' general information. The questions were related to the geographic market that the enterprise sells their goods and services in; whether they export or not; the industries in which the enterprise operates; existence of a research and development department; the number of employees. Three options were given to the question related to the number of employees: 1-50, 51-100 and more than 150. These categories were used based on KOSGEB's firm size definition (Small & Medium Enterprises Development Organization, 2008)

[*] 12 OECD countries: United States, Canada, Japan, Denmark, Finland, France, Germany, Ireland, Italy, Spain, Sweden, United Kingdom

In the rest of the questionnaire, CIS questions were included. These questions were selected from both CIS 3 and CIS 4. Questions related to the general economic information of the enterprises were thought to disturb the respondent and might be perceived as attacking the enterprise's privacy. Hence, these questions were excluded from the questionnaire.

In addition, some of the scales were modified to enable a more complex statistical analysis of the data. Most of the questions in the original CIS used yes-no options. In addition, 4- point Likert scale was used. All of these questions were modified to have 5-point Likert scale.

In previous studies using CIS, three year intervals were given to the respondents to be used as a reference point in their answers. In other words, firms were asked to evaluate themselves and their activities considering their performance in three year time intervals. Similarly, in this study the respondents were asked to answer considering their internal activities between "1 January 2006-31 December 2008".

### 3.4. Data Analysis

The responses were entered into a SPSS 16.0 database and analyzed using both descriptive statistics and inferential statistics to validate the results observed.

## 4. Results

### 4.1. Frequency Tables

#### 4.1.1. General Information About the Enterprises

The first part of the questionnaire aimed to collect general information about the enterprises like industry, firm size, number of employees, etc. The enterprises surveyed were asked which markets they operated in. Different geographic markets are listed like Turkey, Europe, Asia, America, and others. The respondents selected the most important market in which they sell their products and/or services in. The enterprises sell their products mostly in "Turkey" with a percentage of 81.6, followed by "Europe" and "Asia", respectively. 69.7 % of the enterprises export their products (**Table 1**).

Firms in "electronics industry" (high technology) are 15.8 % of the sample. Chemical industry is in medium-high technology. 32.9 % of the firms are in "chemical industry". "Plastics industry" is an example of medium-low technology and has 38.2 %. "Pulp and paper products industry" is in low technology category and has the percentage of 13.2 (**Table 1**). Chemical and plastics industries have higher percentages while electronics and pulp and paper industries have lower percentages. This may be due to a higher number of firms registered in

chemical and plastics industries in the Aegean Region Chamber of Industry.

Most of the sample is composed of “small firms” with a percentage of 63.2 and 15.8 % are “large firms” (**Table 1**). Research and development departments in enterprises aim at creating innovations. 69.7 % of enterprises have “Research and Development Department” (**Table 1**).

**Table 1.** General information about the enterprises (n=76)

| General Information | n | Frequency (%) |
|---|---|---|
| **The geographic markets that enterprise sell goods and/or services** | | |
| Turkey | **62** | **81.6** |
| Europe | 8 | 10.5 |
| Asia | 6 | 7.9 |
| America | - | - |
| Others | - | - |
| **Export** | | |
| Exporting firm | **53** | **69.7** |
| Not exporting firm | 23 | 30.3 |
| **Business Sector** | | |
| High Technology Industry (Electronics Industry) | 12 | 15.8 |
| Medium-High Technology Industry (Chemical Industry) | 25 | 32.9 |
| Medium-Low Technology Industry (Plastics Industry) | **29** | **38.2** |
| Low Technology Industry (Pulp&Paper Products Industry) | 10 | 13.2 |
| **Number of employees in the enterprise** | | |
| Small firms (1-50 employees) | **48** | **63.2** |
| Medium sized firms (51-150 employees) | 16 | 21.1 |
| Large firms (More than 150 employees) | 12 | 15.8 |

| | | |
|---|---|---|
| **The existence of R&D Department** | | |
| There is R&D Department. | **53** | **69.7** |
| There is not R&D Department | 23 | 30.3 |
| **TOTAL** | **76** | **100** |

### 4.1.2. Innovation Activities of the Enterprises

Innovation takes place through a wide range of business practices and a range of indicators can be used to measure its level within the enterprise or in the economy as a whole. In this section, innovation is analysed under 3 sub-headings: Product, process, and organizational. The enterprises can apply only one of the innovation types or can apply all innovation types together.

To categorize enterprises as innovative and non-innovative on product basis, respondents were asked whether they introduced new products during the three year period 2006-2008. 63.2 % of the enterprises are innovative and 36.8 % are non-innovative enterprises on the basis of product innovation (**Table 2**). 63.2 % of enterprises improved new processes and 36.8 % did not improve new processes

Enterprises can also change their behavior or business strategies to make themselves more competitive, often in conjunction with product or process innovation, but also as independent means of improving competitiveness. Enterprises were asked whether they had made major changes to their business structure and practices in the three-year period 2006 to 2008. Changes in corporate strategy, new management techniques, organization structure, and marketing strategies are all examples of organizational innovations. 65.8 % of the sample implemented a new or significantly changed corporate strategy. 72.4 % of the sample applied organizational innovation by implementing new management techniques within the enterprise. 78.9 % introduced also organizational innovation like implementing major changes to organization structure. 72.4 % of the enterprises introduced marketing innovations during 2006-2008.

**Table 2.** The frequency distributions of the innovation applications during 2006-2008.

| Innovation Applications | n | Frequency (%) |
|---|---|---|
| **New Product (n=76)** | | |
| The enterprise introduced new product. | **48** | **63.2** |
| The enterprise did not introduce new product. | 28 | 36.8 |
| **Process Innovation (n=76)** | | |
| The enterprise improved new process. | 48 | 63.2 |
| The enterprise did not improve new process. | 28 | 36.8 |
| **Organizational Innovations** | | |
| Implementation of a new or significantly changed corporate strategy | 50 | 65.8 |
| Implementation of new management techniques within the business eq. Investors in People, Just in Time, 6 Sigma | 55 | 72.4 |
| Implementation of major changes to your organization structure e.g. introduction of cross-site/teamworking | 60 | 78.9 |
| Implementation of changes to marketing concepts or strategies | 55 | 72.4 |

### 4.1.3. Importance of Factors Leading Innovation

The effect of innovation is analyzed in three categories: product oriented factors, process oriented factors and other factors. Product oriented factors are to increase range of goods and services; to enter new markets; to increase market share; to improve quality of goods or services. Process oriented factors are to improve flexibility of production or service provision; to increase capacity for production or service provision; to reduce costs per unit produced or provided. Other factors are to reduce environmental impacts or improved health and safety; to

meet regulatory requirements; and to increase value added.

Respondents were asked to evaluate a number of potential effects on a 5 point Likert scale ranging from '1=exactly unimportant' to '5=exactly important'. Product oriented factors are more important for enterprises (**Table 3**). The least important factors are other factors like meeting the regulatory requirements, environmental impacts, etc. The most important factor leading to innovation is to improve quality of the goods and services. Since competition is high, it is expected that the enterprises try to improve the product features to meet the customers' needs. The next important factor is to reduce costs per unit produced or provided. This is also an expected result since in competition, costs per unit is very important. The least important factor is to meet regulatory requirements. [28]

**Table 3.** The importance levels of the factors leading to innovation (n =76)

| Factors Affecting Innovation | Mean* | Standard deviation |
|---|---|---|
| Product Oriented Factors | 4.487 | 0.526 |
| Process Oriented Factors | 4.276 | 0.572 |
| Other Factors | 4.040 | 0.724 |

- 1 =Exactly Unimportant, 2 = Unimportant, 3 = Neither important nor unimportant, 4 = Important, 5 = Very important

### 4.1.4. The Frequency of Business Engagement in the Innovation Related Activities

Enterprises use different innovation activities like acquisition of machinery, equipment, and software, acquisition of external knowledge, training and market innovation activities. Market innovation activities are changes in product or service design, market research, changes to marketing methods and launching advertising. Respondents were asked to evaluate a number of potential effects on a scale of 'never' to 'always'. The most frequently used innovation activity is acquisition of machinery, equipment and software. The least frequently used activity is acquisition of external knowledge like licensing for product and process innovations (**Table 4**).

**Table 4.** The frequency of business engagement in the innovation related activities (n =76)

[28] These influencing factors are not shown in Table 3 but in the questionnaire, each specific influencing factor is asked. For details if interested, contact the co-author.

| Innovation Activities | Mean* | Standard deviation |
|---|---|---|
| Acquisition of machinery, equipment, and software | 2.969 | 1.057 |
| Acquisition of external knowledge | 1.934 | 1.100 |
| Training | 2.737 | 1.248 |
| Market introduction of innovations | 2.786 | 0.905 |

- 1 = Never, 2 = Sometimes, 3 = Often, 4 = Usually, 5 = Always

### 4.1.5. Importance and Usage of Information Sources

Respondents were asked to evaluate the importance of a number of potential information sources on a scale from 'exactly unimportant' to 'very important'. These information sources are:

- ***internal***- from within the enterprise itself or other enterprises within the enterprise group
- ***market***- from suppliers, customers, clients, consultants, competitors, commercial laboratories or research and development enterprises
- ***institutional***- from the public sector such as government research organizations and universities or private research institutes, and

The most important information source is found to be market. Since the customers' decision is very important for the enterprises to improve their products in a better way. In addition, the competitors are also very important since the enterprises must follow their competitors for product innovations and applications not to lose their customers. For these reasons, market source was found to be the most important information source as itwas expected. The least important information source is institutional information sources like universities or other higher education institutions. Universities should develop innovation projects to become an important information source (**Table 5**).

In addition to asking the importance of information sources, the respondents were also asked the usage frequency of these sources. The enterprises use market sources more frequently than the others. Internal sources are used least frequently. (**Table 5**).

The respondents evaluated market information sources as the most important and they indicated that they use these sources more frequently than they use other sources. Although the respondents evaluated all kinds of information sources as important (since the mean scores are higher than 3), the usage frequencies of these information sources are lower than 3. This finding indicates that the enterprises in the sample find information sources as very important

for innovation however, they do not use them as frequently as it should be. Especially, the usage frequency of internal sources is very low. Some of the reasons might be lack of communication and/or insufficient integration between departments, necessary infrastructure to save and process data, not being part of a large corporation (e.q. holding) to share information. In addition, enterprises may find information sources as important but workers are not motivated or trained to use information sources. Companies should include usage of information sources in their organizational culture. Besides, firms might not have or devote necessary financial resources for the usage of information for innovation activities.

**Table 5.** The importance and the usage of information sources in innovation related activities (n =76)

| **Information Sources** | **Importance** | | **Usage** | |
|---|---|---|---|---|
| | **Mean*** | **Standard deviation** | **Mean**** | **Standard deviation** |
| Internal Sources | 3.816 | 1.197 | 1.868 | 1.289 |
| Market Sources | 4.135 | 0.533 | 2.969 | 0.983 |
| Institutional Sources | 3.263 | 1.002 | 2.072 | 1.012 |

***** 1 =Exactly Unimportant, 2 = Unimportant, 3 = Neither important nor unimportant, 4 = Important, 5 = Very important

****** 1 = Never, 2 = Sometimes, 3 = Often, 4 = Usually, 5 = Always

### 4.1.6. Constraints on Innovation Activities

Successful and evidence based policy interventions require an understanding of the constraints on business innovation. These constraints can be internal obstacles that the enterprise encounters while carrying out innovation activities as well as external factors preventing innovation.

The survey asked about a range of constraining factors and their effect on the ability to innovate. Constraining factors can be categorized as cost factor, knowledge factors, market factors and other factors. Cost factors are excessive perceived economic risks; direct innovation costs too high and availability of finance. Knowledge factors are lack of qualified personnel; lack of information on technology and lack of information on markets. Market factors are markets dominated by established businesses; uncertain demand for innovative goods or services. Other factor is needs to meet Turkish Government regulations.

Respondents were asked to rank the importance of the constraints in innovation activities on a scale ranging from 'exactly unimportant' to 'very important'. The most important constraints are about cost factors. Especially, excesively perceived economic risk (not shown in Table 6 but exists in the questionnaire) was evaluated as the most important cost factor on innovation. The ongoing effects of 2007 global financial crisis and its economic risks might have increased the importance of cost factors in enterprises. On the other hand, the least important factor is knowledge (**Table 6**). The enterprises might perceive themselves as having qualified personnel and enough information about technology and market.

**Table 6.** The importance levels of following factors as constraints on innovation activities influencing a decision not to innovate (n =76)

| Constraints on Innovation Activities | Mean* | Standard deviation |
|---|---|---|
| Cost Factors | 4,2105 | ,75197 |
| Knowledge Factors | 3,5789 | ,96051 |
| Market Factors | 3,5987 | ,92743 |
| Other Factors | 3,7895 | 1,06227 |

- 1 = Exactly Unimportant, 2 = Unimportant, 3 = Neither important nor unimportant, 4 =Important, 5 = Very important

## 5. Conclusion, Recommendations and Limitations the Study

### 5.1. Conclusion

Competing with rivals creates a great pressure on the firms. This pressure is growing since the buyers are becoming more demanding and fragmented, there is international competition besides domestic competition and also technology is improving very rapidly. Innovation is one of the most important features that creates a difference between competitors providing them the competitive advantage.

In this descriptive study, the innovation activities conducted by the enterprises; how much product related, process related and other factors lead to innovation activities; the frequency of engagement in the innovation related activities; importance and usage of information sources in innovation related activities; importance of certain constraints on innovation activities which leads to a decision not to innovate are aimed to be identified.

The firms that are chosen to be included in the sample are selected with respect to industry. The classification of industries by OECD is used. Electronics, chemical, plastics, pulp and paper industries are selected from high, medium-high, medium-low and low technology groups, respectively. The list of enterprises is acquired from the Aegean Chamber of Industry database. 240 questionnaires were e-mailed to the enterprises in April 2009 which were still operating and which could be reached by phone (to take permission). A total of 76 returned usable questionnaires were obtained, giving a response rate of 32 percent CIS 3 and CIS 4 are modified and used in the questionnaire which contained six sections. The respondents were asked to answer questions considering their internal activities between "1 January 2006-31 December 2008".

Majority of the enterprises in the sample sell their products in the local market which is followed by Europe and Asia. In general, most of the enterprises in the sample are small, have R&D departments, and they export their products. Innovation can be done in several ways like product innovation, process innovation, market innovation or organization innovation. More than half of the sample indicated, that they innovate their products and services. In general, majority of the sample mentioned that they improved new processes, introduced marketing innovations and implemented organizational innovations. In another research in Turkey, it was also found that more than half of the 2100 enterprises took innovation activities (Uzun, 2001).

Enterprises innovate to improve competitiveness, leading to enhanced profitability. The survey sought information about the intermediate effects of innovation, on the market position and internal processes and costs. The effect of innovation is analyzed in three categories. These are; product oriented factors, process oriented factors and other factors. Product oriented factors are found to be more important for enterprises and the least important factors are found to be other factors like meeting the regulatory requirements, environmental impacts, etc. The most important product oriented factor leading to innovation was to improve quality of the goods and services. In addition to this, improving the product quality and opening up new markets ranked at the top of the main objectives of innovation activities for the sample of the research which was done previously (Uzun, 2001).

Enterprises use different innovation activities like acquisition of machinery, equipment, and software, acquisition of external knowledge, training and market innovation activities. Market innovation activities are changes in product or service design, market research, changes to marketing methods and launching advertising. The most widely used innovation activity is acquisition of machinery, equipment and software. The least frequently used activity is acquisition of external knowledge like licensing. The reason for seeing licensing less important is the fact that firms prefer to do innovations in their own. Enterprises value owning physical assets more thinking that they can transfer it into cash in a shorter time. In addition, the outcome of investing in innovation activities other than acquisition of machinery equipment and software might take a longer time. This might effect the respondents to evaluate acquisition of machinery equipment and software than the others.

It is important to know how far enterprises engage in with external sources of technology

and other innovation-related knowledge and information, as innovation is increasingly complex, requiring the coordination of multiple inputs. Enterprises can gain guidance, advice or even inspiration for their prospective innovation projects from a variety of both public and private sources. The most important information source is found to be market because customers' decision is very important for enterprises to improve their products. In addition, the enterprises must follow their competitors for product innovations and applications not to lose their customers. This makes competitors an important information source. And the least important information source is institutional information sources like universities or other higher education institutions. Cooperation between universities and enterprises should be developed. In addition, as a public policy, the government should develop strategies and provide necessary funds to motivate research in universities. Associations like Chambers of Commerce, KOSGEB, etc. can strengthen the ties between enterprises and universities.

The enterprises in the sample give more importance to market sources and they also more frequently use market sources as information source. The internal sources are used least frequently. Although the respondents evaluated all kinds of information sources as important, the usage frequencies of these information sources are low. This might be due to the lack of necessary financial resources, training and motivation about usage of information sources, encouraging organizational culture and lack of infrastructure within the company. In a similar study done in Turkey, it was found that in-house R&D was the most important source of information. The next major source of innovation was found to be clients or customers (Uzun, 2001).

Successful and evidence based policy interventions require an understanding of the barriers to business innovation. These barriers can be internal obstacles that the enterprise encounters while carrying out innovation activities as well as external factors preventing innovation. Constraining factors can be categorized as cost, knowledge, market and other factors. The most important constraints are about cost factors as expected because of the current 2007 global economic crises. The least important factor is knowledge. Similar results were attained in the study of Uzun (2001). Among the many factors hampering, or even completely blocking innovation activities in the manufacturing industry in Turkey were found to be economical, e.g. cost were too high, appropriate financial sources were lacking, and perceived risks were excessive.

### 5.2. Recommendation

In future studies, a population of all Turkish firms can be used to determine the sample that would reflect the innovative attitudes and behaviors of Turkish firms. They may shorten the questionnaire since it takes time to answer all of the questions. They may do this research for only one sector and the questionnaire can be done face to face to get higher response rate. This study may also be done cross culturally.

Some recommendations can be done about Community Innovation Survey. In the original questionnaire, there are only yes-no type questions. But to get a better statistical data, in this research five point Likert scale is used in most of the questions. This provides the researcher to analyze the relations and impacts of variables in more developed statistical analysis.

The government may support the innovative firms more since the most important barrier to innovation is cost factors and SMEs might be negatively affected from this more. Therefore, especially SMEs can be supported by the government through associations like KOSGEB.

While improving new products, firms do not prefer using license agreements. This may be because of the lack of knowledge about licensing. They may keep away from license agreements since they may think that they will loose their independence with these agreements. If the firms do not have R&D departments, making license agreements will provide them competitive advantage. In addition, licensing is less costly than investing in R&D activities.

### 5.3. Limitations

One of the limitations in this research is related to the distribution of the sample. There are few firms operating in high technology industry and this affects the distribution of the number of firms in each industry. The research being done in Izmir limits the generalizability of the results to all manufacturing firms in Turkey.

The questionnaire was too long which created fatigue in respondents. That might affect the response rate. Hence, in future studies the questionnaire should be revised. In addition, the respondents were directed to a link in which the questions were uploaded. To pass to the next section, the respondents had to answer all of the questions. If they skipped one of the questions, they were redirected to the same page. Making the respondents answer all the questions is good but since in the redirection of the same page, all answers that were given by the respondent is cleared and the respondent reply the questions again. This affects the respondents, negatively. They do not want to repeat the answers.

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# VENTURE CAPITAL INTERESTS IN OPEN SOURCE SOFTWARE BUSINESS MODELS IN TURKEY

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## Abstract

This study analyses the types of business models that venture capital firms prefer when investing into open source software projects in particularly for Turkish companies. Interviews have been done with venture capital firms operating in Turkey in order to find out their approach to start-ups generating revenue with open source-related business models. The questions that have been asked to venture capital firms aimed to reveal the proportion of open source startup investments to the total investments. Then, investments were going to be classified according to the business models to find out which business models have attracted the venture capital firms most. Another focus of the questionnaire was to investigate venture capital firms perceptions about open source software companies. It is seen that venture capital firms perceive open source-related ventures as more innovative with higher probability of returns when compared to their proprietary counterparts. A main finding is that there are no applications to venture capital firms from open source-related software startups yet, but for future applications, venture capital firms would prefer dual or hosted strategies more when investing in open source-related ventures. Another major outcome is that researchers should step back and focus investigations on reasons related with immaturity of open source-based projects in Turkey.

**Keywords:** Venture capital, Open source software, Business model, Start-up, Turkey

## 1. Introduction

In the last years, free and open source software (OSS), i.e. software under a license that grants several rights like free redistribution to the user, has become more and more important, both in adoption and as a research topic. While proprietary software is keeping its position on desktop applications, open source software projects are strengthening their position at the server side. A recent IDC study reveals that worldwide revenue from open source software will grow at a 22.4% compound annual growth rate (CAGR) to reach $8.1 billion by 2013 (Fauscette, 2009). This again draws attention to the business side of this phenomenon. While there is a plethora of taxonomies of open source-related business models (Raymond, 1999; Koenig, 2004; West & Gallagher, 2006; Watson et al., 2008; Daffara, 2009), the research on the connection to start-ups and especially venture capital is lacking (Gruber & Henkel, 2006). While a number of companies specializing in commercializing Linux, such as Red Hat and VA Linux (now VA Software), have completed initial public offerings, and other open source companies such as Cobalt Networks, Collab.Net, Scriptics, Sendmail or JBoss have received venture capital financing (Lerner & Tirole, 2002; Cusumano, 2004), we do not yet know much about the early start-up phases and the viewpoint of venture capital companies. This is especially true for Turkey or emerging markets in general, as most attention is centered on well-developed countries like the U.S. or Europe. Venture capital funding has been found to be a major factor in growth, both in number of employees and equity value of start-ups (Davila et al., 2003), so the importance of this topic is quite high.

In this paper, we will focus on the question of why venture capital firms in Turkey would prefer to invest in open source-related ventures, and which business models are more attractive. The literature review will briefly introduce the main definitions of OSS, and then detail categories of related business models, concluding with prior work on venture capital and start-ups in that area. We will then describe our empirical study of venture capital companies in Turkey using a questionnaire-based set of interviews, giving the results as well as conclusions and recommendations for future research.

## 2. Literature Review

### 2.1 Open Source Software

In general, there are two ways to define open source software, and here we will first focus on the legal definition. It should be noted that several terms are in use within this field, most notably open source software and free software, which both need to be discussed briefly. The term open source as used by the Open Source Initiative (OSI) is defined using the Open Source Definition (Perens, 1999), which lists a number of rights a license has to grant in order to constitute an open source license. These include most notably free redistribution, inclusion of source code, to allow for derived works which can be redistributed under the same license, integrity of author's source code, absence of discrimination against persons, groups or fields of endeavor, and some clauses for the license itself, its distribution, and that it must neither be specific to a product nor contaminate other software. The Free Software Foundation (FSF)

advocates the term free software, explicitly alluding to “free” as in “free speech”, not as in “free beer” (Stallman, 2002), which defines a software as free if the user has the freedom to run the program, for any purpose, to study how the program works, and adapt it to his needs, to redistribute copies and to improve the program, and release these improvements to the public. According to this definition, open source and free software are largely interchangeable. The GNU project itself prefers copylefted software, which is free software whose distribution terms do not let re-distributors add any additional restrictions when they redistribute or modify the software. This means that every copy of the software, even if it has been modified, must be free software. This is a more stringent proposition than found in the Open Source Definition, which just allows this. The most well-known and important free and open source license, the GNU General Public License (GPL) is an example for such a copyleft license, with the associated viral characteristics, as any program using or built upon GPLed software must itself be under GPL. There are a number of other licenses, some of which can be considered copyleft, like the X11 license or clarified versions of the original, vague Artistic License, and others which can be considered free or open source, like BSD, Apache or the Mozilla Public License and Sun Public License. It should be noted that the exact license, especially GNU GPL, has an impact on some of the possible business models.

As a second way of approaching open source software, it is not only unique in its licenses and legal implications, but also in its development process and organization of work. The seminal work on this topic was written by Eric S. Raymond, ‘The Cathedral and the Bazaar’, in which he contrasts the traditional type of software development of a few people planning a cathedral in splendid isolation with the new collaborative bazaar form of open source software development (Raymond, 1999). In this, a large number of developer-turned users come together without monetary compensation to cooperate under a model of rigorous peer-review and take advantage of parallel debugging that leads to innovation and rapid advancement in developing and evolving software products. In order to allow for this to happen and to minimize duplicated work, the source code of the software needs to be accessible which necessitates suitable licenses, and new versions need to be released in short cycles. This means that open source software in essence is a community effort, and derives much of its value from wide-spread participation and world-wide collaboration.

### 2.2 Open Source Business Models

Daffara (2009) defines business model as “kind of revenue model that is chosen for the software. Options on this axis include training, services, integration, custom development, subscription models, “Commercial Off The Shelve” (COTS), “Software as a Service” (SaaS) and more”. In the literature, starting with Raymond (1999), a huge number of categorizations for such business models can be found (Koenig, 2004; West & Gallagher, 2006; Watson et al., 2008; Daffara, 2009), but we will limit the discussion here to two different approaches. Most other approaches can be easily mapped to the categories and the wording in those examples.

In his guide for SMEs developed in the context of the FLOSSMETRICS and OpenTTT projects, Daffara (2009) defines the following categories:

*Dual licensing:* The same software code is distributed under the GPL and a proprietary license. This model is mainly used by producers of developer-oriented tools and software, and

works thanks to the strong coupling clause of the GPL that requires derivative works or software directly linked to be covered under the same license. Companies not willing to release their own software under the GPL can obtain a proprietary license that provides an exemption from the distribution conditions of the GPL, which seems desirable to some parties. The downside of dual licensing is that external contributors must accept the same licensing regime, and this has been shown to reduce the volume of external contributions, which are limited mainly to bug fixes and small additions.

*Open Core:* This model distinguishes between a basic OSS and a proprietary version, based on the OSS one but with the addition of proprietary plug-ins. Most companies following such a model adopt the Mozilla Public License, as it explicitly allows this form of intermixing, and allows for much greater participation from external contributions without the same requirements for copyright consolidation as in dual licensing. The model has the intrinsic downside that the Free Software product must be valuable to be attractive for the users, i.e. it should not be reduced to "crippleware", yet at the same time should not cannibalize the proprietary product. This balance is difficult to achieve as developers may try to complete the missing functionality in OSS, thus reducing the attractiveness of the proprietary version and potentially giving rise to a full Free Software competitor that will not be limited in the same way.

*Product specialists:* Companies that created, or maintain a specific software project, and use an OSS license to distribute it. The main revenues are provided from services like training and consulting. It leverages the assumption, commonly held, that the most knowledgeable experts on a software are those that have developed it, and this way can provide services with a limited marketing effort, by leveraging the free redistribution of the code. The downside of the model is that there is a limited barrier of entry for potential competitors, as the only investment that is needed is in the acquisition of specific skills and expertise on the software itself. Most activities revolve around training, consulting, installation and configuration support, custom development and maintenance.

*Platform providers:* Companies that provide selection, support, integration and services on a set of projects, collectively forming a tested and verified platform. In this sense, even GNU/Linux distributions were classified as platforms; the interesting observation is that those distributions are licensed for a significant part under Free Software licenses to maximize external contributions, and leverage copyright protection to prevent outright copying but not "cloning" (the removal of copyrighted material like logos and trademark to create a new product). The main value proposition comes in the form of guaranteed quality, stability and reliability, and the certainty of support for business critical applications.

*Selection/consulting companies:* Companies in this class are not strictly developers, but provide consulting and selection/evaluation services on a wide range of project, in a way that is close to the analyst role. These companies tend to have very limited impact on the Free Software communities, as the evaluation results and the evaluation process are usually a proprietary asset.

*Aggregate support providers:* Companies that provide a one-stop support on several separate OSS products, usually by directly employing developers or forwarding support requests to second-stage product specialists.

*Legal certification and consulting:* These companies do not provide any specific code activity, but provide support in checking license compliance, sometimes also providing coverage and insurance for legal attacks; some companies employ tools for verify that code is not improperly reused across company boundaries or in an improper way.

*Training and documentation:* Companies that offer courses, on-line and physical training, additional documentation or manuals. This is usually offered as part of a support contract, but recently several large scale training center networks started offering Free Software-specific courses.

*R&D cost sharing:* A company or organization may need a new or improved version of a software package, and fund some consultant or software manufacturer to do the work. Later on, the resulting software is redistributed as open source to take advantage of the large pool of skilled developers who can debug and improve it. A good example is the Maemo platform, used by Nokia in its Mobile Internet Devices (like the N810); within Maemo, only 7.5% of the code is proprietary, with a reduction in costs estimated in 228M$ (and a reduction in time-to market of one year).

In an empirical study, Daffara (2009) found that nearly 45% followed the product specialist model, followed by open core and indirect models (each at about 15-20%). Dual licensing had about 10%, all other models are pursued by less than 5% of the surveyed companies.

Koenig (2004) has also proposed a categorization, in which he defines the following business models:

*Optimization Strategy:* The optimization strategy is an open source manifestation of Clayton Christensen's "law of conservation of modularity". In the OSS application of Christensen's law, one layer of a software stack is "modular and conformable" allowing adjacent software layers to be "optimized". The modular and conformable layers are commodities, and are unprofitable or only marginally profitable software businesses. In one case, Electronic Arts needed fast, reliable servers for its online version of the popular "Sims" game. Oracle proposed the Linux version of its Oracle9i Real Application Cluster (RAC). To compete on the project, Oracle leveraged its database solution with commodity Linux and server hardware, optimizing the Oracle RAC product for Linux clusters, and thereby allowing Oracle to price its software at a higher margin.

*Dual Strategy:* Under the dual license strategy, a software company offers free use of its software with some limitations, or alternatively offers for a fee, commercial distribution rights and a larger set of features. The dual license approach is not typically one integrated license. It is a business policy that permits a customer to choose one of two licenses: either the commercial license or, typically, the General Public License (GPL). A free option facilitates new business in a number of ways, including improved customer awareness and faster adoption, stronger competitive positioning, and a large base of users to find bugs and recommend improvements to the software. The dual license strategy delivers complementary revenue streams of a traditional commercial software model, through maintenance offerings or services that earn consulting or training fees. A dual license strategy can capture a large user base. Free software often generates high numbers of downloads and broad awareness. By comparison, there have been, and still are, hundreds of software companies which have invested, in aggregate, billions of dollars, only to each gain a mere handful of customers,

some paying and some not, in the end. The dual license strategy provides a powerful tool to build a strongly defensible market position.

*Subscription Strategy:* In general, revenues from services increase in proportion relative to revenues in the software industry. Aside from Novell and Red Hat, there are many other open source segments and markets being addressed using the subscription model. Covalent for example, has built a subscription and support business around the popular OSS combination known as LAMP (Linux, Apache, MySQL and PHP). Sun is offering StarOffice and much of its developer and enterprise software using the subscription model, acknowledging that developers prefer subscriptions and memberships. Lindows provides access to a large library of open source desktop applications for an annual subscription fee. EJB Solutions provides distributions on a subscription basis to over 100 open source projects.

*Consulting Strategy:* One company in the open source consulting space, 10X Software, provides enterprise integration consulting for popular open source software including MySQL, Apache, JBoss, Tomcat and Eclipse. 10X customers include major corporations running mission critical applications. 10X partners with JBoss, to improve and accelerate middleware migration from proprietary software like BEA Weblogic to open source solution stacks. According to Red Hat, the operating system comprises only 4% of the overall revenue of a Linux-based solution. Delivering a customer solution involves integration of hardware, software and maintenance: middleware integration is one place where high margin consulting business can be won. With increasing frequency, custom application consulting is performed by system integrators and value-added resellers (VARs), the vendors closest to the customers. These vendors have seen the advantages of OSS, making existing VARs and resellers of Microsoft, BEA, and Oracle, prime converts to broad OSS-based solutions. Linux certification programs from Red Hat, Novell, and from Sun for JBoss, greatly reduce the support concerns that customers previously raised about OSS. Applying commodity servers, Linux, OSS databases, web servers and middleware, system integrators like 10X Software, see the opportunity to remove nearly all licensing costs from a proposed solution, and create winning bids for customers, at both lower prices and higher margins.

*Patronage Strategy:* When a company contributes open source software to an independent organization, it anticipates that a de-facto standard and supporting community will converge around that contribution. A company may also use the patronage strategy to commoditize a particular layer of the software stack, eliminate competitors that are extracting revenue from that layer. For example, IBM, as a major corporate patron of Linux, seeks to commoditize the x86 operating system, eliminating server fees for Microsoft Windows and Sun Solaris. This creates an opportunity for IBM to offer value higher up the stack through clustering, availability, provisioning, security, and management software.

*Hosted Strategy:* I This is an embodiment of an increasing shift to renting and subscription based pricing. Companies like Salesforce.com, eBay, and Google, while being in the software business, do not sell software, but charge for the use. This has many advantages for their customers, including higher flexibility.

*Embedded Strategy:* Linux is the operating system in over half of the embedded systems market. It has been used in consumer products such as TIVO and devices large and small, from servers to cell phones. Throughout the world, it is rapidly becoming the operating system of choice for many low-cost communications products. It is well known that hardware

vendors adopting Linux gain advantages in terms of a platform that is functional, extensible, and quickly implemented with minimal capital outlay. A hardware vendor starting a new project should encounter few complications using Linux to get started with design and feasibility testing. And because Linux runs on generic hardware, engineering, prototype, and demonstration hardware costs are a minimum. For a hardware vendor, these advantages free up budgets for potentially better uses in creating value for the customer.

### 2.3 Venture Capital Funding of Open Source Start-Ups

We will now turn to the interplay of open source software and venture capital funding. There is not yet a plethora of academic work on this topic, although examples of venture capital funding and discussions about business opportunities are quite frequent.

Gruber and Henkel (2006) give a the most detailed discussion and an empirical study based on 30 in-depth interviews and a large-scale survey of 268 developers on the interplay of start-ups and open source software, using the example of embedded Linux. They focus on three key challenges of new venture management, which are the liabilities of newness and smallness of start-ups and further market entry barriers. Their results show that several liabilities of newness and smallness, which are typically considered to be of high importance for venture management by the literature, are mitigated by the characteristics of OSS. In turn, other challenges become relatively more important, especially find a sufficient number of expert programmers that know their way through the huge quantities of embedded Linux code that are publicly available (Gruber & Henkel, 2006). Naturally, these results clearly point to the attractiveness of open source-based new ventures not only to entrepreneurs, but also venture capital companies. Wall (2001) also describes the case of a start-up where open source has helped to overcome capital shortcomings by providing cost-savings and yet high-quality software. On the other hand, if the business model is based on proprietary software, caution in incorporating open source code into the code is necessary (Wall, 2001), especially when dealing with copylefted open source components.

Coming from the motivational perspective, Lerner and Tirole (2002) argue that activity and reputation in the open source realm might ease access to venture capital, as this acts as a competence signal. They also give a list of individuals for which a certain fame in this context has translated to commercial roles (Lerner & Tirole, 2002).

According to Pienaar (2007), venture capital firms consider OSS as an ecosystem and are interested in open source-related ventures that have sustainable business models and a large size of community encompassing developers and users. Stam and Elfring (2008) have also examined how the configuration of a founding team's intra- and extra-industry network ties shapes the relationship between entrepreneurial orientation and new venture performance using a data set of 90 new ventures in the emerging open source software industry. They found that the combination of high network centrality and extensive bridging ties strengthened this link (Stam & Elfring, 2008) and should therefore also be a major focus of venture capital companies.

Haapanen (2007) on the other hand states that venture capital firms are interested in open source-related ventures because of their excellent business ideas, exceptionally high

profit potential for growth, value at the market, and successful exit within the planned timeframe.

Finally, Byfield (2008) claims that open source-based companies have higher probability of innovative ideas compared to their proprietary counterparts and this leads to a greater return on investment. In addition to that, open source-related firms build products based on existing code and can benefit from community contributions that let those firms to build products cheaper and market them in less time. Also the ability to develop niche markets is more probable for open source-related ventures, without having to compete with the giants and the possibility to generate decent return on investment with specialization.

Cusumano (2004), while acknowledging venture capital interest, on the other hand raises concerns mostly centered on sustainable business models, as he sees open source as the ultimate "commoditization" of at least some parts of the products business. In his view, selling services, convenient packages mixing open and commercial software and some commercial applications constitute major business opportunities, while probably a hybrid model making money from services and proprietary products that work with open source software is most promising (Cusumano, 2004). He concludes that it will be difficult for companies to differentiate themselves over the long term if they only offer services for widely available technologies, without proprietary product or technology knowledge, and that therefore open source is onkly a business opportunity for a few elite companies.

## 3. Methodology and Data Set

In our study, we focus on venture capital companies in Turkey, and their interest in open source business model-based start-ups. As an emerging market, Turkey generally provides unique investment opportunities for private equity investments primarily because of its investor friendly liberalization, deregulation, and privatization policies, fast growing business environment, and scarcity of capital. However, figures show that the industry has not grown to expectations (Bosut, 2004). Until 1995, there was no significant PE activity. Total invested capital reached approximately US$100m at the end of 1999. In 2000 alone, close to US$100m was invested following the trends in the world and as a response to the positive developments in Turkey. Even this record performance is small as compared to the country's potential. After its peak in 2000, PE investment was 0.25% of GDP in Europe and 0.60% in the US. For example, this ratio was 0.13% in Ireland, 0.18% in Spain, 0.25% in Hungary, 0.44% in Netherlands, 0.65% in UK and 0.87% in Sweden. If Turkey had the same PE investment to GDP ratio of Europe, PE investments in 2001 alone would have been close to US$500m. After the 2001 crisis, the PE activity almost ceased to exist and many newly founded PE funds pulled out. In the following years, the activity has continued at a rate less than US$40m a year.

Fund raising is one of the major problems in the Turkish private equity market mostly due to insignificant domestic capital formation and insufficient foreign direct investments. Existing international funds loose interest after facing difficult local conditions such as long lasting evaluation, negotiation, due diligence, deal structuring stages as a result of complications with availability and accuracy of information, legal difficulties and cultural dissimilarity of local companies. Low quantity and quality of deal flows, macroeconomic,

political issues and lack of exit opportunities are other factors that inhibit private equity market development in Turkey (Bosut, 2004). Karadeniz and Yilmaz (2009) also find a low level of entrepreneurial dynamism in the Turkish economy. They cite lack of financial support, especially venture capital and IPOs, inadequate government policies, and insufficient intellectual property rights as main reasons (Karadeniz & Yilmaz, 2009).

As research methodology, we chose a mix of exploratory and descriptive research. As the review of the extant literature showed, there is not yet a massive body of knowledge to base a purely descriptive study on. Therefore we chose guided interviews based on ideas of prior work, but allowing for greater flexibility and openness in exploration than a fully closed questionnaire approach. The target were venture capital firms operating in Turkey. An in-depth Internet research was done to find those venture capital firms, as well as a search related to respective organizations and associations. The Internet research was conducted by searching "venture capital + Turkey" keywords in search engines in both English and Turkish language and aggregating the results. Finally the following companies were found and contacted: Burhan Karaçam Partnership, YoungTurk VC, iLab, Teknoloji Yatırım, Golden Horn Ventures, Turkven, and Boğaziçi VC.

The interview guide was exploratory one with mostly open ended questions. The main of of the interviews was to investigate VC interests in open source-related ventures, and identify the types of business models they are willing to invest in. We chose to use Koenig's categorization in the questionnaire because of its simpler categories with well known examples (Koenig, 2004). The first part of the interview dealt with the total investments (numbers and volumes) of the company, and the percentage of software-related, as well as open source-based ventures. The next part dealt with reasons for investing on open source-based startups, and had some examples taken from literature, like higher probability of innovative ideas, ability to build products more cheaply and market them in less time, or to develop niche markets that were previously too small to develop profitability. Also perceived risks in such investments were inquired, e.g. breach of OSS license terms, contamination of proprietary code, unbalanced liabilities with regard to OSS in supply agreements, infringement of third party Intellectual Property Rights. A separate section dealt with factors that are important for the company in evaluating a proposal in general, as well as any differences for open source-based startups. Finally, as one of the core parts, types of business models that have been invested in, as well as those that the company would be willing to invest in were asked. Finally, reasons for not investing in open source-based startups were checked, again using some possible answers as well as an open ended question. Possible reasons included were lack of applications, ill-prepared business plans, risks related to open source, and lack of innovative ideas.

## 4. Results

Overall, we have been able to conduct telephone interviews with 4 out of 7 venture capital firms in our population, which corresponds to more than 50% response rate. The first main result is that both open source-related business models and venture capital funding of such startups are at very early stages in Turkey. None of the venture capital firms have ever received an application from an open source-related startup, and therefore no funding took

place. When investigating possible reasons for this, according to the interviews, lack of applications mainly results from immaturity of open source-related business in Turkey. Firstly, there are major structural problems preventing open source-related developments in Turkey. Lack of support from institutions (especially universities) and insufficient community support blocks the development of related expertise. Venture capital firms seek long term investments which require a degree of maturity which does not exists in Turkey yet in this segment. Secondly, decrease in hardware prices leads to less need for financial resources to start up businesses and this weakens the relationship between open source-related ventures and venture capital firms. The final problem mentioned for OSS in Turkey is a widespread perception of OSS products as free of charge. This is one reason why the Turkish market does not put economic value on OSS products, and this fact blocks the development of open source-related business models and ventures.

On the other hand, interest in funding open source-related ventures exists in venture capital companies. When investigating reasons for this interest; findings are in line with literature (Pienaar, 2007;Haapanen, 2007; Byfield, 2008): Venture capital firms in Turkey also would prefer open source-related startups mainly because of the lower development costs, faster product development and higher probability of innovative ideas compared to their proprietary counterparts. Nevertheless, there is still an issue of trust in open source-based business models in Turkey. Venture capital firms complain about a lack of success stories and innovative ideas in Turkey such as MySQL and RedHat. Naturally, this sentiment constitutes a vicious circle, as successful ventures to act as examples would need to receive some funding first.

As no funding has yet taken place, we turned to questioning about business models that venture capital firms would be more willing to invest. For this, clearly hosted services such as cloud computing, and dual licensing came out as being most enticing. Hosted services are preferred because of the overall global trend in IT and expectations on return on investment, whereas well known success stories attract the attention to dual licensing-based business models. It is interesting that the main concept of selling associated services like consulting, or support, packaging etc., is no major factor, but we could explain that by the under-development of OSS in Turkey in general, which means no concentration of expertise as well as no important OSS projects originating from this country, which following the reasoning of Cusumano (2004), means such business models are problematic due to lack of proprietary knowledge.

As for evaluation criteria for OSS firms, venture capital companies do not differentiate from their general approach. The main evaluation criteria used by venture capital companies in Turkey are management team’s prior achievements and experience, passion and motivation of the team, innovative idea and a good business plan with high expected return on investments. Especially the first element ties in nicely with Lerner and Tirole's (2002) idea of open source involvement as a signal of competence to venture capital firms.

## 5. Conclusion and Future Research

Overall, the results of our study are twofold: We find that the open source-related business segment is not mature enough for this kind of a study in Turkey, leading to no

related proposals and naturally funding by venture capital companies in that area. On the other hand, we have found interest from venture capital companies in these kind of ventures, motivated mostly by elements also covered in literature (Gruber & Henkel, 2006; Pienaar, 2007;Haapanen, 2007; Byfield, 2008), centered around lower costs, faster time to market, and an image of innovativeness. With regard to business models, venture capital companies show a clear preference for dual licensing and hosted business models. Currently, venture capital companies that invest in technology mostly invest in e-commerce businesses, so an interest in hosted models can also be linked to this focus. With regard to dual-licensing, clearly international examples play a major role.

It will therefore be interesting to focus in the future on more basic reasons for the lack of business ideas and proposals that are open source-related. Our study can be a first starting point, major topics that came out of the interviews were a basically problematic association of open source with free of charge, as well as a lack of maturity and competencies which are linked to lack of support from institutions. This situation probably also contributes to the low priority given to business models based on selling services like consulting, which all basically build on difficult-to-imitate expertise. More clearly focused studies on these inhibiting factors could shed some more light on these issues, as well as innovativeness in the Turkish economy overall.

Finally, the point that a mix of decreasing prices for hardware, as well as the availability of open source software, have decreased the capital requirements for IT-related start-ups in general merits attention. This point came up in the interviews, and highlights the importance of open source software in enabling start-ups and innovative ventures overall. A lack of support in that field could therefore have consequences more far-reaching than open source-related ventures for an economy.

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# AN EMPIRICAL STUDY OF ENTREPRENEURSHIP EFFECT ON THE PRODUCTIVITY INDEX IN INDUSTRIAL MANUFACTURING SECTOR IN IRAN

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## Abstract

The main objective of this paper is to investigate the effect of entrepreneurship on productivity amongst manufacturing firms in Iran. This paper argues that the entrepreneurship has received too little attention in developing production strategies in manufacturing industries. Entrepreneurship has been considered by many economists as the Economy Developing Engine in new age. This can be seen in Iran's economy too. Therefore this research explores how despite of the importance of entrepreneurship in economic development and employment, a cohesive structure and management system for policy making, planning, supporting leading and supervising for developing entrepreneurship in manufacturing organizations in public sector in Iran has not been established. This research employs the Pane Data methodology in order to describe and analyze the data. The main source of the data is secondary data gathered from Iranian Statistical Centre data base for the period of 1995-2006. The entrepreneurship index is the number of issued licenses for new firms. The results of this study reveal that entrepreneurship significantly affects productivity level in the industrial manufacturing organization studied in Iran. The result of this study also indicates that entrepreneurship index has a positive and considerable effect on the production growth of Iran Industrial workshop. The research findings are valuable for policy makers, CEOs, top management teams and decision makers in manufacturing sector who are responsible for promoting technological entrepreneurship activity and for entrepreneurs who need to be aware of opportunities as a result of entrepreneurship policy.

**Key Words:** Entrepreneurship**,** Economy Growth, R&D, Panel Data

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## 1. Introduction

The idea that entrepreneurship and economic growth are very closely and positively linked together has undoubtedly made its way since the early works of Schumpeter (1911). Schumpeter has already described this innovative activity, "the carrying out of new combinations", by distinguishing five cases2: "(1) The introduction of a new good (2) The introduction of a new method of production (3) The opening of a new market (4) The conquest of a new source of supply of raw materials or half manufactured goods (5) The carrying out of the new organization of any industry (Schumpeter, 1963 (1911), p. 66). Through his innovative activity, the Schumpeterian entrepreneur seeks to create new profit opportunities. These opportunities can result from productivity increases, in which case, their relationship to economic growth appears quite clearly.

Entrepreneurship is 'at the heart of national advantage' (Porter, 1990, p. 125). Concerning the role of entrepreneurship in stimulating economic growth, many links have been discussed. It is of eminent importance for carrying out innovations and for enhancing rivalry. Research into entrepreneurship and regional development particularly in developing countries has become one of the main focuses of academia and industry. Perhaps this is because, with the accelerating dynamics of competition, the key role of entrepreneurial firms in generating employment, promoting innovation, creating competition and generating economic wealth. There are various ways in which entrepreneurship may affect economic growth. Entrepreneurs may introduce important innovations by entering markets with new products or production processes (Acs and Audretsch, 1990 and 2003). Entrepreneurs often play vital roles in the early evolution of industries, examples of such (successful American) entrepreneurs include Andrew Carnegie, Michael Dell, Thomas Edison, Henry Ford, Bill Gates, Ray Kroc and Sam Walton. Entrepreneurs may increase productivity by increasing competition (Geroski, 1989; Nickel, 1996; Nickel et al., 1997).

This paper will provide evidence that entrepreneurship should be included as an important cause of economic growth independent of the other factors. We will begin with a review of relevant literature, and then move to an overview of the data and variables used along with a description of the statistical methodology. We present the analysis of the relevant empirical results discusses possible theoretical and practical implications of the study.

## 2. Litreture review

Ever Since Robert Solow(1956) based his model of economic growth on the neoclassical production function with its key factors of production, capital and labor, economists have relied upon the model of the production function as a basis for explaining the determinates of economic growth. Thus, under this theory, the economic growth of a given country is determined by the amounts of labor and capital that country possesses and the technological possibilities to which that country has access.

Paul M. Romer's (1986) critique of the Solow approach was not with the basic model of neoclassical production function, but rather what he perceived to be omitted from that model – knowledge. Not only did Romer (1986), along with Robert E.Lucas (1988) and others argue that knowledge was an important factor of production, along with the traditional factors of

labor and capital, but because it was endogenously determined as a result of externalities and spillovers, it was particularly important.

Adretsch and Keilbach (2004) suggest that another key factor has been omitted from the neoclassical production function as entrepreneurship capital. By entrepreneurship capital we mean the capacity for economic agents to generate new firms.

William j.Bamol (2002) has argued that entrepreneurial activity may account for a significant amount of the growth left unexplained in traditional production function models. While the traditional factors of labor and capital, and even the addition of knowledge capital are important in shaping output, the capacity to hardness new idea by creating new enterprises is also essential to economic output.

However, the fact that entrepreneurship can be influenced by some of the traditional factors of economic growth does not necessarily rule it out as a separate predictor of economic growth. If there is even one factor influencing entrepreneurship not included among the traditional factors of economic growth and entrepreneurship does have an effect on economic growth, then entrepreneurship should be regarded as an additional separate factor of economic growth. The reason for this is that, if entrepreneurship is affected by one or more factors apart from the traditional factors of economic growth and entrepreneurship has an effect on economic growth, then entrepreneurship is essentially acting as a proxy for these other factors. Including entrepreneurship as an independent factor of economic growth would thus ensure that the influence of these other factors on economic growth was at least partly taken into account. There have been many theories which suggest that entrepreneurship is indeed influenced by factors beyond those traditionally thought to influence economic growth.

Entrepreneurship capital exerts a positive impact on economic output (See Figure 1) for a number of reasons. The ***first one*** is the knowledge spillover. Romer (1986), Lucas (1988 and 1992) and Gene M. Grossman and Elhanan Helpman (1991) established that knowledge spillovers are an important mechanism underlying endogenous growth. , it is also important to recognize that the mechanisms for spillover transmission may also play a key role and may also serve as a focus for public policy enhancing economic growth and development. The literature identifying mechanisms actually transmitting knowledge spillovers is sparse and remains underdeveloped. According to the Griliches (1979) model of the knowledge production function, the firm will invest in knowledge inputs, such as R&D and human capital, in order to generate innovative output. The knowledge filter can impede such knowledge investments from resulting in commercialized new products and/or processes. In some cases the firm will decide against developing and commercializing the new ideas emanating from its knowledge investments, even if an employee, or group of employees, think they have a positive expected value. B. Jaffe (1989) and Audretsch and Maryann P. Feldman (1996) found that the knowledge created in university laboratories "spills over" to contribute to the generation of commercial innovations by private enterprises. Acs, Audretsch, and Feldman (1994) found persuasive evidence that spillovers from university research contribute more to the innovative activity of small firms than to the innovative activity of large corporations. Agarwal and et.al(2008) believe that Entrepreneurship has identified the key role of knowledge spillovers in the formation of new ventures, and subsequent growth of industries and regions. The result of Acs and et al’s study (2009) showed that there is a

strongly positive relationship between entrepreneurship, knowledge creation, and knowledge spillovers.


**Figure 1.** The relationship between entrepreneurship and economic growth ( Wennekers and Thurik, 1999)

A ***second*** way that entrepreneurship capital exerts a positive influence on economic output is through the increased competition by the increased number of enterprises. Feldman and Audretsch (1999) as well as Glaeser, Kallal, Sheinkman and Schleifer (1992) found empirical evidence supporting the hypothesis that an increase in competition, as measured by the number of enterprises, in a city increases the growth performance of that city. The study of Heger (2009) showed that There is relationship between Entrepreneurship, Innovation and Competition. Young firms need more for Entrepreneurship and creating innovation because they have to compete to big firms and other SMEs. For that they need more investment in R&D.

A ***third*** way that entrepreneurship capital generates economic output is by providing diversity among the firms. . The first important test linking diversity to economic performance, measured in terms of employment growth was by E. Glaeser, H. Kallal, J. Sheinkman and A. Schleifer (1992), who employ a data set on the growth of large industries in 170 cities between 1956 and 1987 in order to identify the relative importance of the degree of regional specialization, diversity and local competition play in influencing industry growth rates. The authors find evidence that diversity promotes growth in cities. Feldman and Audretsch (1999) identified the extent to which the extent of diversity influences innovative output. They link the innovative output of product categories within aspecific city to the extent to which the economic activity of that city is concentrated in that industry, or conversely, diversified in

terms of complementary industries sharing a common science base. Lopes(2005) said that The level of innovation and diversity in firms depends more directly on the specific organization of each industry and the structure of its market than on the degree of market concentration. Also Youllee and et al.(2010) argue that Innovation at the regional level is positively and significantly associated with human capital, creativity, and diversity in firms. Thus, with increasing the entrepreneurship among firms, the effects of spillovers reinforcing and competition and diversity increased among the firms, and eventually will facilitate economic growth.

## 3. Methodology

The secondary data for this study were gathered in period of 1995-2006 among the 254 industrial manufacturing firms in Iran. Data collected from Statistics Center of Iran in different industries. According to the model of Adretsch and Keilbach (2004), in this study to examine effect of entrepreneurship on productivity index, is used a specification of Cobb-Douglas Type for analyzing data:

$$Y_i = \alpha K_i^{\beta_1} L_i^{\beta_2} R_i^{\beta_3} E_i^{\beta_4} e^{\varepsilon_i}, \quad (1)$$

So:

**Y**: showing the amount of production(value add) in firms

**K**: showing the factor of physical capital

**L**: showing Labor

**R**: showing Knowledge Capital. In this study, R&D expenditure is used instead of Knowledge capital in following section

**E**: showing entrepreneurship capital that in this study The entrepreneurship index is the number of issued licenses for new firms

To achieve a linear pattern of econometrics, the logarithm is taken from the above relation:

$$LY_{it} = c + \beta_1 LK_{it} + \beta_2 LL_{it} + \beta_3 LR_{it} + \beta_4 LE_{it} + \varepsilon_{it} \quad (2)$$

є: Disturbing Part

i: showing the 23 sections of industry

t: is presented the period 1995 to 2006.

## 4. Measurement and data analysis

Before estimating panel data model is needs to determine the method of model with appropriate tests. There are several types of panel data analytic models. There are constant coefficients models, fixed effects models, and random effects models. The following tests can be selected the best one among three methods:

-Fixed Effect Hypothesis testing versus cumulative model:

We may wish to hierarchically test the effects of the fixed effects model. We use the pooled regression model as the baseline for our comparison. We first test the group effects. We can perform this significance test with an F test resembling the structure of the F test for $R^2$ change.

$$F_{(N-1,NT-N-K)} = \frac{(R^2_{UR} - R^2_R)/(N-1)}{(1-R^2_{UR})/(NT-N-K)} = \frac{(0.97-0.23)/(23-1)}{(1-0.97)/(254-23-4)} = \frac{0.0336}{0.000132} = 254.55$$

Here *T*=total number of temporal observations. *n*=the number of groups, and *k*=number of explanation Variables in the model. As can be seen, F obtained is very high and panel shows the cumulative model is rejected.[32]

*- Fixed Effect Hypothesis testing versus Random Effect model:*

The Hausman specification test is the classical test of whether the fixed or random effects model should be used. The research question is whether there is significant correlation between the unobserved person-specific random effects and the regressors. If there is no such correlation, then the random effects model may be more powerful and parsimonious. If there is such a correlation, the random effects model would be inconsistently estimated and the fixed effects model would be the model of choice. The test for this correlation is a comparison of the covariance matrix of the regressors in the LSDV model with those in the random effects model. The null hypothesis is that there is no correlation. If there is no statistically significant difference between the covariance matrices of the two models, then the correlations of the random effects with the regressors are statistically insignificant. The Hausman test is a kind of Wald $\chi^2$ test with *k-1* degrees of freedom (where *k*=number of regressors) on the difference matrix between the variance-covariance of the LSDV with that of the Random Effects model. The results of this test shows fixed effects is confirmed. (table1). The result of using fixed effects model have been represented in table 2.

[32]Green, 2002, pp. 285-289

**Table 1.** The results of Hausman test

| | |
|---|---|
| chi-sqr(4) = | 34.32462 |
| p-value = | 0.000000639 |

**Table 2.** Results of model estimation using fixed effects

| Dependent variable lnY | Coefficient | t-Statistic | Prob. |
|---|---|---|---|
| C | 4.311806 | 17.31811 | 0.0000 |
| LL? | 0.03633 | 0.047087 | 0.9625**0.9625** |
| LK? | 0.123718 | 2.396576 | 0.0174 |
| LR? | 0.248734 | 4.968105 | 0.0000 |
| LE? | 0.305297 | 2.747719 | 0.0065 |
| $R^2$ | 0.965993 | | |
| $\overline{R}^2$ | 0.96-352 | | |
| Number of Observation | 254 | | |
| D.W | 1.68806 | | |

**Table 3.** Hetroscedasticity variance test

| Methods | Degree of freedom | Amount of $(\chi^2)$ | Prob. |
|---|---|---|---|
| Bartlett | 21 | 16.56895 | 0.7369 |
| Levene | (21, 232) | 0464403 | 0.9797 |
| Brown-Forsythe | (21, 232) | 0.361245 | 0.9961 |

According to table 2, Column B, respectively, the constant regression coefficients are presented and therefore this model as a regression equation is: LnY=4.31+0.12 LnLK+0.036LnLL+0.24 LR+0.30 LE. To compare the effects of variables in the model on the dependent variable, the standard coefficients are used. So therefore, the result to be explained is as follows:

Logarithm of labor variable has positive but no significant on productivity in industry sector. The reason of no significant of LL coefficient can be for lower labor productivity in Iran. Also logarithm of capital has positive and significant on productivity in industry so that one percent (1%) changes in investment causes to 124% percent growth in productivity in firms. R&D index has positive and significant effect on growth and productivity in firms even more than physical capital. Therefore showing the importance of this variable in developing productivity in industry. As can be seen, among the variables in the model, entrepreneurship index has the

highest, positive and significant effect on growth. So that one percentage increase the number of issued licenses for new firms will increase 31 percent in value added in industrial sectors. obtained Results emphasize that the importance of entrepreneurship and the creation of new businesses in developing the process of production and productivity growth in industry.The model correlation coefficient equal to 0.965 indicating high and strong correlation among variables. According to Durbin-Watson test, (1.688) there is no autocorrelation between errors. To ensure the non- Hetroscedasticity variance in error components, we used Hetroscedasticity variance test. The results indicate acceptance of the existing homoscedasticity variance.

## 5. Conclusions and Managerial Implications

Research into entrepreneurship and regional development particularly in developing countries has become one of the main focuses of academia and industry. Perhaps this is because, with the accelerating dynamics of competition, the key role of entrepreneurial firms in generating employment, promoting innovation, creating competition and generating economic wealth. The result of this study also indicates that entrepreneurship index has a positive and considerable effect on the production growth of Iran Industrial workshop. The research findings are valuable for policy makers, CEOs, top management teams and decision makers in manufacturing sector who are responsible for promoting technological entrepreneurship activity and for entrepreneurs who need to be aware of opportunities as a result of entrepreneurship policy. Encouraging entrepreneurship amongst the manufacturing industry must be considered as a crucial and strategic factor, which in turn will increase the firms' performance. Entrepreneurship has a key and important role in creating new business, new knowledge, new ideas and products and productivity in firms and industry as a whole. Managerial Implications of this study are Facilitate the process of creating new businesses, Reduce administrative barriers, Reduce costs of establishing new enterprises, Tax exemption for newly established enterprises, Increase entrepreneurial spirit in industry that Leads to productivity and high performance of the firms and industry as well as economic growth of the country.

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# ENTREPRENEURSHIP, INNOVATION AND GLOBAL COMPETITIVENESS IN THE CLEAN TECHNOLOGY INDUSTRY: A FRAMEWORK AND A CASE STUDY

Nir Kshetri

**Abstract**

The evolution of an industry changes the competitive climate faced by individual firms as well as nations. Many analysts consider the clean technology (CT) industry as a game changer for businesses' and nations' competitiveness in the 21st century. From a theoretical standpoint, the CT industry contains many idiosyncratic features, which affect the natures of entrepreneurial opportunities and roles in this industry. The issues of the evolution of the **c**lean technology industry and nations' competitive advantages in this industry are a critical but little-examined problem in the social science research. We contribute to filling this research gap with an analysis of the entrepreneurship in the global CT industry. Specifically, this paper proposes a framework to examine the development of the *CT industry and* assesses some major economies in terms of the major dimensions in the framework. We also present a case study of entrepreneurship in the Chinese CT industry.

**Keywords:** Clean technology, disruptive innovations, solar cells, *China,* venture capital, externality mechanisms

## 1. Introduction

The evolution of an industry changes the competitive climate faced by individual firms as well as nations (Utterback 1996). The rapidly evolving clean technology (CT) industry is touted as a potential source to bring changes in businesses strategic orientation as well as significant changes in the global economic and political power structures. Despite their current small size, some CT sectors such as solar and wind energy are the fastest growing forms of electric power (Kennard 2008).

Facing the trend toward CT, some companies have developed new competences and capabilities that have the potential of being clean and sustainable. To take an example,

DuPont has shifted its portfolio away from its traditional core competencies and is developing new internal competences and capabilities compatible with the recent global green movement (Hart 2005).

One can present convincing arguments to show that the current universal drive toward CT[i] is likely to be a long-term trend rather than a fad or hype[ii]. Reflective pieces from the popular press as well as academic articles have illustrated influential arguments regarding the CT industry's likely powerful impacts. Many observers in the U.S., for instance, think that despite the Silicon Valley's leadership in technology, it is doubtful that it will be a CT leader (Wadhwa 2010). Additionally, part of the fascinating character of CT is that compared to other industries, innovation per se is likely to make a smaller, independent contribution to success in this industry. For one thing, the CT industry inherently requires the whole new systems instead of merely developing individual technologies (Johnson and Suskewicz 2009). For instance, while Japan has been a global epicenter for the advanced CT innovations, analysts have forcefully argued that the innovations alone may not be sufficient to develop the CT industry (Dickie 2010).

In recent years, CT has come to the top of the agenda of policy, management and research communities. The emergence of concepts such as ecopreneurs (Isaak 1998), sustainable entrepreneurs (Anderson 1998) and sustainability entrepreneurship (Tilley 2007) are very appealing and are triggering provoking discussions of proactive, environmentally and ecologically oriented entrepreneurial activities and business strategies. The CT market has been growing rapidly[iii].

The all-encompassing nature of the CT industry has created new opportunities as well as threats for organizations in diverse industries and settings. Managers may benefit from ensuring that they redefine their actions to better reflect the global trends towards the CT industry. Hart (2005) argues that being more innovative in the long-term requires companies to develop internal capabilities and resources to address the trend toward CT and eco-effectiveness.

There are several indications that policy makers have been persuaded by the economic, environmental, and national security arguments. Governments worldwide are competing to develop CT industries. French finance minister, Christine Lagarde noted: "[CT] is a race and whoever wins that race will dominate economic development. The emerging markets are well-placed" (Bennhold 2010). In April 2009, U.S. President Obama warned: "The nation that leads the world in 21st-century clean energy will be the nation that leads in the 21st-century global economy". In February 2010, he further noted: "Countries like China are moving even faster. . . . I'm not going to settle for a situation where the United States comes in second place or third place or fourth place in what will be the most important economic engine in the future" (cf. Mufson and Pomfret 2010). Speaking of the CT industry's potential global impacts, Parker and Youngman (2009) more forcefully argued: "There will be big winners and big losers".

From a theoretical standpoint, the CT industry contains many unusual and idiosyncratic features. The issues of the evolution of entrepreneurship in the CT industry and

nations' competitive advantages in this industry are a critical but little-examined problem in the social science research. Gibbs (2009) notes: "…the concept of a sustainable entrepreneur may remain as much of a 'black box' as sustainable development itself" (p. 65). We contribute to filling this research gap with an analysis of the global CT industry. Specifically, this paper proposes a framework to examine the development of the CT industry and assesses the world's major economies in terms of the important elements in the framework. We also present a case study of the Chinese CT industry.

Before proceeding, we offer a clarifying definition. CT includes the traditional energy and renewable energy such as wind power, solar power, biomass, hydropower, biofuels, information technology, electric motors and other advanced vehicles such as high-speed rail, lighting, nuclear power, and other energy efficient appliances.

In the remainder of the paper, we first provide a review of the CT industry. Then, we discuss our proposed model to examine the development of the CT industry. Next, we classify major economies in the world in terms of the framework. It is followed by a case study of the Chinese CT industry. The final section provides discussion and implications.

## 2. A note on the CT industry

One of the most striking features of the CT industry is its all-encompassing nature, which touches diverse industries and settings. CT requires re-engineering an economy that has run on fossil fuels since the Industrial Age. The transportation infrastructure, for example, encompasses comprehensive network of energy production and distribution that have been shaped by a century of investment and innovation in oil drills, pipelines, tankers, refineries and gas stations (Harris 2010; Johnson and Suskewicz 2009). Parker and Youngman (2009) have rightly pointed out: "[C]leantech is not a sector in the traditional sense (like IT or biotech), more a theme". Johnson and Suskewicz (2009) noted: "Conventional approaches to renewable energy are falling short. The key is to shift the focus from developing individual technologies to creating whole new systems".

Before we proceed, it is important to note one thing: major strengths of entrepreneurs in the Silicon Valley and other global innovation centers have lied in their ability to develop disruptive technologies and products such as desktop computer, the Internet and targeted cancer therapies. Most innovations developed by biotechnology ventures are typically disruptive in nature (Renko, Carsrud and Brännback 2009; Thomassin and Cloutier 2001). Disruptive innovations in the areas of biotech and information and communications technologies (ICTs) quickly created new markets and major brands. The Internet, for instance, was a new medium and marketplace that created powerful brands such as Yahoo, eBay and Google (Wadhwa 2010).

Our point about disruptive technologies may warrant elaboration. Despite initial inferior performance, disruptive innovations tend to be "cheaper, simpler, smaller, and more convenient to use " (Christensen, Raynor and Anthony 2003). They either create new markets by targeting non-consumers or compete in the low end of an established market.

While some innovations in the CT industry might have disruption potential (Parker and Youngman 2009), they might not be so in the same way as in other industries. As noted above, most disruptive innovations tend to be cheaper (Christensen, Raynor and Anthony

2003).To the contrary, while the costs of solar and wind energy have reduced significantly, they remain more expensive than coal-generated electricity (Walet 2010). The CT industry is thus unlikely to follow Moore's Law[iv] of cost-improvement curve (Karlgaard 2010).

Instead of focusing on a particular economic sector, CT entails the development, manufacturing, deployment, and sustainment of technologies that help improve the economic productivity and environmental performance of many sectors of the economy and improves national security (Ernst & Young 2007; Parker and Youngman 2009). The development of the CT industries depends upon reducing the costs of products based on existing technologies instead of creating new low-cost products.

CT's development depends upon emotional rather than rational behaviors of consumers and businesses. CT industry's success thus requires a fundamental shift in behaviors of consumers and businesses. Likewise, companies' responses to the global trends toward CT are also functions of factors such as contribution to international/ national security and environmental protection in addition to profit maximization. Some CT leaders, for instance, are likely to be consumer companies that are "de-materializing" and are seeking to improve resource efficiency (Parker and Youngman 2009).

Green capitalism is not likely to work in the same manner as in traditional industries. Wallis (2010, p. 33) notes: "At a conceptual level, it is clear that "green capitalism" seeks to bind together two antagonistic notions. To be green means to prioritize the health of the ecosphere, with all that this entails in terms of curbing greenhouse gases and preserving biodiversity. To promote capitalism, by contrast, is to foster growth and accumulation, treating both the workforce and the natural environment as mere inputs". A corollary of the above observation is that the traditional venture capital (VC) model that worked for IT may not work for the CT industry**.** A *Business Week* article quotes a VC attorney, a CT specialist: " The scale and the risks are much greater" (Engardio 2009). For this reason, some advocates of CT industry maintain that the government needs to act as a source of patient capital. Engardio (2009) observes: "Unlike info tech, where $25 million could launch a Google or Amazon.com, plants for building next-generation solar cells, digital lighting, or electric-car batteries can cost *billions*" (emphasis added).

The line of argument developed above leads us to the suggestion that nations' competitive advantages in this emerging industry is likely to be different from other industries. A related point is that while the U.S. performs remarkably well in invention, discovery and scientific breakthroughs, this may not guarantee a success in this new industry. By several measures Asia's "clean-technology tigers"—China, Japan, and South Korea have passed the U.S. in the development of the CT industry. For instance, the U.S. produces less than 10% of the world's solar cells (Atkinson, 2010). Moreover, the U.S. is falling behind on the adoption of hybrid and electric vehicle technology and CT manufacturing (Atkinson 2010).

## 3. A proposed framework to examine the development of the CT industry

The development of the CT industry in an economy can be understood in terms of three main building blocks (Figure 1)[v]. In this section, we briefly discuss the elements of the building blocks.

*Figure 1 about here*

### Impacts of CT

Impacts of CT reflect the national welfare created by the CT industry and are the ultimate objectives that policy makers want to accomplish (Ahmad and Hoffmann 2008). The reason perhaps most often cited for policy makers' preference for CT development concerns the shift towards a new form of "capitalist development" that can address concerns related to negative environmental impacts such as global warming and climate change (Gibbs 2009). In addition, CT may also contribute to the economic and national security. In the U.S., for instance, in addition to climate change related concerns, factors such as increasing oil prices, growth of emerging markets and perceived national security implications of energy dependence on foreign countries have been major drivers of the CT industry (Ernst & Young 2007).

### Performance of the CT industry

Performance indicators are CT related actions that are instrumental in delivering the desired impacts. Put differently, target indicators used in measuring CT performance tell the progress towards achieving the ultimate objectives. Various indicators related to the development of the CT industry can be used to measure the performance. Businesses' and consumers' CT awareness, attitude and preferences are tightly linked to the CT industry's performance. It is argued that companies in Japan have a "non-political, long-term view" of energy (San Miguel 2010). In some countries, consumer perceptions are often the biggest roadblock for the development of the CT industry. For instance, due to efficiency and cost-effectiveness of conventional energy in the U.S., consumers have failed to see the benefits of CT (Johnson and Suskewicz 2009; Wadhwa 2010).

Production of CT and CT adoption levels of businesses and consumers are also important performance indicators. The width of CT adoption or the number of different uses of CT, and the depth of CT adoption or the amount of usage of a particular CT can also be used to assess a country's CT performance. Other indicators include entrepreneurship and emergence of competitive local firms in the CT sector, export of CT related products and CT related innovations.

### Determinants of CT development

Determinants of CT development are the factors that affect CT performance. In examining the determinants of CT development, one would do well to recall the comment by Adams (1996): "like fire technology depends on its environment to flare or die". A technology's ecosystem and environment are influenced by numerous factors.

The left box in Figure 1 presents interdependent and mutually reinforcing elements that determine the development of the CT industry.

**Government incentives, supports and strategic regulations that favor the local CT industry**

As is the case of any industry, the development of the CT industry is a function of the level of priority and focus of national industrial and technological policies on fostering and strengthening the industry (Beise 2001; National Academy of Science 1985). Trade policy and other strategic regulations also affect the CT industry's growth (Tilton 1971; Beise 2001). Strategic regulations provide frameworks and processes required for CT related actions that may lead to the planned and targeted results (Medley 1994).

Some argue that the market mechanisms do not work perfectly and are associated with various imperfections and impurities. Prior research indicates that the government can take various measures to overcome businesses' myopia, greed, and economic power (Hart 1998). Government intervention is thus necessary to correct the failure of the market forces (*Dahlman 1979*). Indeed, some go even further to argue that government intervention may be desirable (Hvistendahl 2009).

Different theoretical contributions and various empirical studies have led to the accepted view that the government can attack barriers to the development of an industry such as those related to skills, information, market and infrastructures by legal and non-legal influences. Scholars examining the development of information and communications technology (ICT) industry have identified these influences in the form of new laws, investment incentives, foreign technology transfer, and other supply-push and demand-pull forces (King et al. 1994; Montealegre 1999). For instance, Singapore has developed itself as an ICT hub of Asia by providing attractive infrastructure, skilled workers and a stable labor environment which attracted a large number of ICT firms to locate there (Kraemer et al. 1992; Wong 1998). Similarly, strong university-industry linkages and a large pool of highly trained scientists and engineers have driven the development of ICT industries in Israel (Porter and Stern 2001).

In most cases, CT *products such as* solar power tend to be more expensive than conventional alternatives (Galbraith 2009). CT startups often need to make huge investments in R&D and wait for a long time to develop a business plan (Gangemi 2007). Developing expensive production facilities and scaling them up may prove to be a challenge of another magnitude (Wadhwa 2010). A consultant noted that a CT company could take up to nine years to become profitable (Gangemi 2007).

Moreover, some CT sectors such as solar panel manufacturers are facing dropping profits. During 2007-2009, the price of solar panels reduced by more than half (Asiamoney 2009). The CT *industry thus* faces non-price barriers. One way to overcome such barriers would be to increase public sector investments and provide substantial subsidies or other incentives, which is likely to play a key role in stimulating entrepreneurship in such technologies. In sum, government incentives are more important for CT industry compared to other industries.

**R&D and innovation profile**

An observation is that deployment rather than scientific breakthroughs is critical in the development of the CT industry (LaMonica 2010). However, there may be equally compelling arguments regarding the importance of innovations in the CT industry. Innovation undoubtedly contributes to national competitiveness in CT (NSF 2010). Innovation is

especially important in the high-end segments of the CT industry. For instance, consider China's showcase of high-tech renewable energy in Ordos City, Inner Mongolia. Due to a lack of local high quality photovoltaic installations manufacturers, China is importing photovoltaic panels from U.S.-based First Solar for a 2,000-megawatt power plant in Ordos (Mufson and Pomfret 2010).

**Adverse environmental and health impacts of conventional energy sources**

Relative advantage is perceived benefits of a technology over previous technologies and the extent to which it is better than the idea it supersedes (Rogers 1962 1983 1995). In this regard, adverse environmental and health impacts of conventional energy sources would lead to a perception of higher relative advantage of CT and encourage its adoption.

**Forward and backward linkages**

Of special interest is the development of related and supporting industries (Porter 1990; Bain 1956; Porter 1990). Efficient channels for forward and backward linkages, labor mobility and stimulation of knowledge and technology transfer affect the development of the CT industry (Markusen and Venables 1999).

**Market size and economies of scale**

Market size and economies of scale affect an industry's growth (Tilton 1971; Beise 2001). Economies of scale are more important for the CT industry than most other industries. Some analysts argued that even the world's biggest markets such as China and the U.S. lack the scale required to succeed in the CT industries (Woetzel 2009).

**Availability of externality mechanisms**

According to Demsetz, "[e]very cost and benefit associated with social interdependencies is a potential externality" (1967, 348). Put differently, economic actors with interdependent relations jointly produce an externality and whether it is positive or negative is a function of how and who produces it (Frischmann and Lemley 2007).

An issue that deserves mention thus relates to various externality mechanisms generated by the development of industries that are related to the CT. Behaviors of firms in related sectors may have self reinforcing effects. They may generate externalities by making CT-related specialized inputs and services available, forming a specialized "labor market", and facilitating the exchanges and spillovers of information and technology (Marshall 1920). These externalities, which originate from other firms in the same industry, are called MAR externalities (Marshall 1890; Arrow 1962; Romer 1986). MAR externalities represent the positive role of specialization on growth through knowledge spillovers (Bun et al. 2007). There is also a possibility of "inter industry knowledge spillovers", which are referred as Jacobs (1969) externalities.

**Availability of CT related skills, and labor and natural resources**

The diffusion of a technology is influenced by the nature of inputs (Linder 1961; Vernon 1966). In this regard, CT related skills, and labor and natural resources are critical ingredients for the success of this industry.

## 4. Determinants and drivers of the CT industry: Assessing major global economies

For accelerating the growth of CT industry, Johnson and Suskewicz (2009) have proposed a framework with four elements: (a) an enabling technology, (b) an innovative business model,

(c) a careful market-adoption strategy, and (d) a favorable government policy. A close reading of the literature suggests that the development of enabling technology and government policy are probably the most important factors affecting entrepreneurial performance and national competitiveness in the CT industry. The OECD/EUROSTAT framework for entrepreneurship indicators, for instance, has six categories of determinants**:** Regulatory Framework (related to (a)), Market Conditions, Access to Finance, R&D and Technology (related to (d)), Entrepreneurial Capabilities and Culture (Ahmad and Hoffmann 2008). Indeed, the government's involvement is critical in discovering an appropriate business model and a market-adoption strategy (b and c in Johnson and Suskewicz 2009).

We would thus argue that government policy and development of enabling technology influence international heterogeneity in entrepreneurial performance and national competitiveness in the CT industry. Figure 2 provides a 2 x 2 matrix that classifies major economies in the world on these two dimensions and illustrates how they are positioned to benefit from the global trend towards CT.

*Figure 2 about here*

**Dimension 1: Government incentives, supports and strategic regulations that favor the local CT industry**

Solomon (2009) noted the emergence of two primary strategies in the CT arena: a top-down approach, which involves the government imposing regulations that force companies to embrace CT and a bottom-up approach in which CT entrepreneurs come up with solutions for the marketplace (Solomon 2009). Because of the all-encompassing nature of CT and the importance of the development of a whole system, the latter approach is less likely to be effective in the CT industry.

As noted above, government incentives matter in stimulating entrepreneurship in the CT industry (Hvistendahl 2009). In this regard, a 2009 study by Deutsche Bank (DB) 'Global Climate Change Policy Tracker: An Investor's Assessment', which ranked 109 countries, Germany, China and Japan present the lowest risks for green investors and CT firms (PR Log 2009). In particular, there have been direct and targeted public investments in Asia's "clean technology tigers"—China, Japan and South Korea. Substantial and well-targeted incentives and greater public investments have attracted private capital flows in these economies (Atkinson 2010). These three countries are projected to invest a US$509 billion in CT during 2009-2013 compared to the U.S. investment of US$172 billion (Issues in Science and Technology 2010). Likewise, German government policies have made the country a CT leader (Altman 2010).

The United Arab Emirates (UAE*)* is another high profile example of an economy which is characterized by government incentives, supports and strategic regulations in the CT industry. Masdar City set up the Abu Dhabi government will run entirely on CT (Johnson and Suskewicz 2009). The US$22 billion zero-emission, zero-waste city was launched in 2006 and is scheduled to be completed by 2016 (Singh 2010).

In this paper's context, strategic regulations are regulations that are developed and applied strategically to provide a framework or process for actions that lead to planned CT results. It is worth noting that the literature is often plagued with claims and counter claims

regarding the potential benefits to firms from environmental regulations. Porter and van der Linde (1995) observed that environmental regulations foster innovations and thus benefit firms. Palmer, Oates, and Portney 's (1995) models, on the other hand, demonstrated that regulations impose costs on firms, and firms can offset only a portion of those costs through innovation. Mohr and Saha (2008) provide various theoretical examples that are consistent with the Porter and van der Linde's assertion. They consider various possible scenarios associated with environmental regulations and discuss some mechanisms by which firms may benefit from environmental regulations. Specifically, they argue that under some conditions, regulations impose costs that can be fully offset via induced innovation (Mohr and Saha 2008). In addition, Mohr and Saha (2008) also point out the possibility that a regulation itself is beneficial even without innovation. Firms may get additional benefit from innovation. It is quite possible that that the cost of regulation is passed along to the consumer in the form of a higher price.

**Dimension 2: Innovation and R&D profile**

As discussed earlier, innovation per se is likely to make a smaller contribution to success in the CT industry (Johnson and Suskewicz 2009). Innovations, however, undoubtedly contribute to national competitiveness in CT (NSF 2010). For instance, Masdar City is planning to use 100% renewable energy and most of the innovations will be generated on-site (Johnson and Suskewicz 2009). Our second dimension is thus the degree of innovations in the industry. Table 1 presents some important indicators related R&D and innovations profiles of some major economies in the world.

*Table 1 about here*

One way to understand inventive entrepreneurial activity around the world would be to look at the distribution of patents awarded to inventors in the U.S. Traditionally inventors in the U.S., the European Union (EU) and Japan produced most patents. According to the U.S. National Science Foundation, Taiwan and South Korea have intensified patenting activities in the U.S. in recent years. Chinese and Indian inventors' patenting activities, on the other hand, remain modest (NSF 2010). According to The European Patent Office (EPO), the number of CT patents increased significantly after the Kyoto Agreement. Germany, Japan, the UK, the U.S., South Korea and France have been the countries with the most CT patenting activities (cpaglobal.com 2009).

**Classifying some major economies in terms of the two dimensions**

We assess some of the major economies in terms of the two dimensions discussed above.

**Cell I: South Korea**

In 2008, South Korean government set "green growth" as the national vision. In 2009, it announced that US$31 billion of its US$38 billion stimulus package would be spent in the CT industry. The package was second only to China in terms of percentage of 2008 GDP (3.4 %) and the world's largest as a percentage of the stimulus package (81 %) (Morrison and Yoshida 2009). The package covered various economic sectors and was expected to create about 1 million green jobs. In 2009, a five-year plan was also announced, which aims to spend 2 % of

its GDP in the development of environmentally friendly businesses and projects. In July 2009, an additional US$85 billion stimulus was announced for CT industries, which is expected to create about 1.81 million jobs in five years (Morrison and Yoshida 2009).

In January 2010, the president signed the Basic Act on Low Carbon Green Growth. The law mandates the government to establish a national strategy for green growth and set national and corporate targets for carbon emissions. The law also provides legal grounds for state investment in CT (Jang-jin 2010). The country's presidential committee selected 10 green technologies to promote as new growth engine businesses for 2010. By 2012, the country will add 28,000 environment-friendly buses and provide incentives to reduce food waste by 20 % (Jang-jin 2010). It has set an explicit goal of increasing South Korean companies' share of the global CT export market by 8 % points (Atkinson 2010).

As noted above, South Korea has intensified patenting activities in the U.S. in recent years. South Korea is also among the top 6 countries in the world for CT patenting activities (cpaglobal.com 2009).

**Cell I: Japan**

The Japanese government announced in the early 2010 that it would provide US$33 billion incentives for the CT industry. The targeted deployment would be in solar, hybrid-electric vehicles, and energy-efficiency technologies. The government also announced plans to spend an additional US$30 billion by 2015 on achieving price and performance improvements of the CT industry (Atkinson 2010).

Japan's innovation profile in CT is advanced. Japan leads the world in CT patents (Parker and Youngman 2009). Between 2002 and 2006, Japan applied for 60,261 patents for environmental technology compared to 25,047 applied by the U.S. (Fuller 2010). For clean-coal technology, the top six holders of patents are Japanese (Stokes 2009).

**Cell II: The U.S. and the U.K.**

The U.S. and the U.K. historically were the most popular destinations for global private CT investors (Atkinson, 2010). From 2000 to 2008, the U.K. and the U.S. attracted high levels of green capital investment --$17 billion and $52.1 billion respectively (PR Log 2009). In 2008, however, China overtook the U.S. in CT related private investments. In 2009, China gained in its global share of VC in CT, while North America lost its share. North America's share of global CT VC funding declined from 72 % in 2008 to 62 % in 2009 (Red Herring 2010).

According to the Deutsche Bank mentioned earlier, the U.K. and U.S. have a high risk policy and CT investment environment (PR Log 2009*).* According to the report, the U.S. primarily relies on "volatile market incentive approach ". The recent trend of private investment reveals a declining confidence in the U.S. CT industry.

Critics blame the U.S. for "wavering policies, complex permitting, and a skittish financial community" (LaMonica 2010). The American Clean Energy and Security Act was passed by the U.S. House of Representatives in 2009. The Act arguably includes too few proactive policy initiatives and allocates relatively little funding to support R&D, commercialization and production of clean-energy technologies (Atkinson, 2010). Speaking

of the U.S. government's approach, a *Business Week* article comments: "Small, indirect, and uncoordinated incentives won't be enough to out-do China, Japan, and South Korea" (Atkinson 2010). Current U.S. energy and climate policies focus on stimulating domestic demand primarily through indirect demand-side incentives and regulations.

Analysts argue that the proposed U.S. climate and energy legislation may not close the CT investment gap. Some analysts argue that one of the biggest problems facing the U.S. CT concerns a political system. Powerful interest groups and the society arguably have acted as barriers to CT friendly policies (Parker and Youngman 2009). Wadhwa (2010) noted: "The Valley may develop some breakthrough technologies, but without government help these are unlikely to translate into global leadership".

While the U.S. has a R&D and innovation profile, the country overall lags behind Japan on CT patents. However, U.S. firms lead in some clean tech sectors. For instance, U.S. firms hold two-thirds of the patents on carbon-capture technology (Stokes 2009). While the U.S. runs a CT trade deficit of over $6 billion (Gerwin 2010), some U.S. companies such as First Solar are exporting high-end CT products.

**Cell III: China**

CT sectors that were prioritized by the government actions have experienced rapid growth (Parker and Youngman 2009). David Sandalow, a U.S. assistant secretary of energy for policy and international affairs—a CT expert recently put the issue this way: "China's investment in clean energy is extraordinary. Unless the U.S. makes investments, we are not competitive in the CT sector in the years and decades to come" (Lean 2010).

China is behind the U.S. and other industrialized countries in terms of CT innovations. According to Chatham House, no Chinese companies is among the top CT patent holders (Stokes 2009). For instance, there is no Chinese company among the top 20 holders of patents for clean-coal technology (Stokes 2009). Most Chinese players are concentrated in the low end of the CT industry. For instance, while China has a large number of players in the solar devices sector, most focus on low-tech rooftop water-heaters or cheap, low-efficiency photovoltaic panels (Mufson and Pomfret 2010). Likewise, quality levels of China's wind-turbine manufacturers lag far behind those of General Electric, Vestas and Siemens (Mufson and Pomfret 2010).

**Cell IV: India**

In June 2009, the Indian National Solar Mission announced that it had set a target to reach 20 GW installed solar capacity by 2020, which was more than the entire world's solar generation capacity for 2009. India, however, expects to pay for the US$20 billion plan primarily through international financing (Peace 2009). As of July 2009, India's total fiscal stimulus was US$6.5 billion (0.5 % of GDP) compared to China's US$586 billion (Fuller 2009).

According to Chatham House, no Indian company is among the top CT patent holders (Stokes 2009). In general, India's innovation and R&D profile has been low (Table 1).

## 5. A case study of the Chinese CT industry

The CT market in China has "gone from niche to mainstream" (Brenhouse 2009). Table 2 presents major events shaping the development of the Chinese CT industry. An article in *New Yorker* in December 2009, explains that the roots of China's current leadership in CT can be traced back to a letter written by China's four weapons scientists to Deng Xiaoping in 1986 (Osnos 2009).

*Table 2 about here*

In recent years, there has been a focused priority in the development of this sector. An environmental goal of China's Eleventh Five-Year Plan was to reduce sulfur dioxide emissions by 10 % during 2005-2010 (Field 2009). In the 2009 Copenhagen climate conference, China's Prime Minister Wen Jiabao announced that by 2020, his country would reduce greenhouse gas intensity by 45 % compared to the 2005 levels (*China Chemical Reporter* 2009).

China has far exceeded many of its CT goals. A goal for the Eleventh Five-Year Plan for Renewable Energy was to have an accumulated installed capacity of 10GW wind power by 2010. In 2008, the accumulated installed capacity of wind power was 12.2 GW, which was 106% higher than in 2007 and far exceeded the goal for 2010 (Business Wire 2009).

### 5.1. A survey of the CT industry in China

According to Tsing Capital, a Chinese clean-technology VC firm, the Chinese CT market is growing 20 % annually (Brenhouse 2009). Some estimates suggest that the CT market is China will soon reach US$1 trillion (Lovins 2010).

Most of the technologies employed in China including those in power stations and manufacturing plants are primitive. In the mid-1990s, coal accounted for 75% of total energy consumption and has contributed to considerable air pollution in Chinese cities, especially in the North (Hertsgaard 1997). China accounted for 42 % of global coal consumption in 2008 (Stokes 2009). Similarly, in 2000, China had 112 state-owned car factories and all of them were using old technologies (McCarthy 2000).

Unsurprisingly, China is taking measures to reduce its dependence on coals. Hydropower and wind power accounted for 32.3 % of new energy-generating capacity in 2009 (Guobao 2010). In recent years, the Chinese government's attention has been turning to new areas such as smart grid and water (Parker and Youngman 2009). In 2009, China closed over 1,000 small-coal mines (Guobao 2010). The country set a goal to generate 15-18% of its electricity from renewable sources by 2020. Chinese officials have recently increased the goal for this proportion to 20 %. Likewise, China plans to deploy up to 86 GW of new nuclear capacity by 2020 (finfacts.ie 2009). China's share of electricity generated by nuclear power is expected to increase from 1% in 2000 to 5% in 2030 (Bureau of East Asian and Pacific Affairs 2007).

Beijing has also set a goal to double renewable energy production by 2020. Domestic economies of scale and a low-cost workforce will continue to make Chinese CT companoes' exports cheaper than their American and European counterparts (sustainablebusiness.com 2010).

## 5.2. CT related performance indicators

### Consumers' CT awareness, attitude and preferences

One study found that Chinese consumers have a strong emotional attachment to CT and ecological issues (Chan 2001). Comparing with Benton's (1994) study conducted with U.S. students, Chan (2001) concluded that Chinese consumers' "ecological affect" is stronger than that of U.S. consumers.

### Production of CT and CT adoption levels of businesses/consumers

**Green cars**

According to JD Power & Associates China, hybrid cars accounted for only 0.01 % of passenger vehicle sales in China in 2009 (hybridcars.com 2009). The green cars industry, however, is taking off rapidly. In December 2009, China announced incentives to buy green cars (Shirouzu 2009). By 2011, China is estimated to have 500,000 all-electric battery vehicles or plug-in hybrids (Randolph 2010) and overtake Japan in the production of hybrid vehicles (Cuttino 2010).

In February 2010, Chinese government declined to approve Sichuan Tengzhong Heavy Industrial Machinery's bid to buy the General Motors' Hummer brand. Analysts attributed the failed deal to Beijing's new focus on energy-efficient vehicles (Los Angeles Times 2010).

Intensification of CT investments is at the heart of China's green ambition. In 2009, SAIC invested US$300 million in developing hybrids and electric vehicles. The company is planning to launch a hybrid car by 2010 and a pure electric car in 2012. Chery announced that the company would introduce plug-in electric car, S18, in 2010. Likewise, Chongqing Changan Automobile is building a plant with an annual capacity of 600,000 low-emission and hybrid vehicles (hybridcars.com 2009). In the same vein, Harbin Hafei Automobile Industry Group signed a deal with a Chinese advanced automotive R&D consortium to jointly produce electric cars for the Chinese market (hybridcars.com 2009).

**Solar power**

In 2005, China produced 100 MW of solar cells, which increased to 1,088 MW in 2007 (Lean 2010). In 2010, the country is predicted to produce more than 5 GW of solar electricity, which is a third of the world's total and is expected to reach 10 GW in 2015 (Lean 2010). Likewise, China is expected to produce 2 GW of solar thermal power by 2020 (Lean 2010).

By the early 2010, China accounted for over 50 % of the global market for solar panels (Alibaba.com 2010; Walet 2010), which is likely to increase to 70% soon (Hodge 2010). Note that the U.S. produces less than 10% of the world's solar cells (Atkinson 2010). In 2010, China is projected to more than triple its photovoltaic installations (Mufson and Pomfret 2010).

As of the early 2010, 10% homes in China had installed solar water heater, which accounted for two-thirds of the world's solar hot water capacity (Lean 2010). China is expected to become the world's biggest solar market by 2014 (Norris 2009). By 2030, half of the country's households are expected to have solar water heater (Lean 2010).By the early 2010, China had about 1,000 solar water heater manufacturers (Lean 2010). German companies have found it cheaper to buy solar cells from the Chinese than making their own (Hodge 2010).

**Wind power**

According to the Global Wind Energy Council (GWEC), China doubled its wind power capacity each year since 2005 (Wynn 2010). In 2009, China installed 13 GW compared to 9.9 GW by the U.S. and became the largest wind market in the world (Hodge 2010). China accounts for about a quarter of the world's newly installed wind power capacity (Randolph 2010). The 30 GW goal originally set for 2020 is likely to be met in 2010 (Business Wire July 3 2009). Unsurprisingly, in 2009, China increased the 2020 target to an ambitious 100 GW (Lean 2010). China is expected to announce a target of 150 GW of wind power for 2020, which will be met by simply maintaining the current growth rate (Wynn 2010). While China is using only 70 % of its available wind power, the country is investing in more turbines in an attempt to strengthen its position in the global CT industry (Foroohar 2010).

Until 2004, China had virtually no wind turbine production. In 2009, China overtook the U.S. in wind-turbine manufacturing and installations (Martin and Efstathiou 2010). By 2009, China had 70 turbine manufacturing companies and was the largest wind turbine producer in the world (Parker and Youngman 2009).

**Entrepreneurship and emergence of competitive local firms in the CT sector**

Many promising entrepreneurial firms have evolved in the Chinese CT industry. China's Yingli Green Energy Holdings and Suntech Power Holdings are two of the world's largest solar panel makers (Alibaba.com 2010). GCL-Poly Energy Holdings became the world's third-largest polysilicon maker following its US$3.4 billion acquisition of solar assets in China in 2009 (Walet 2010). Sinovel, which was not making wind turbines until 2005, is soon expected to be the largest turbine maker in China (Galbraith 2009). According to the International Energy Agency, China's Sinovel and Goldwind are the world's top 10 turbine makers (Wynn 2010).

In recent years, there has also been some consolidation in this industry. During 2007-2009, due to falling prices, over 300 solar panel manufacturers, or about 10% of the Chinese solar companies went out of business (Asiamoney 2009).

Entrepreneurial activities in the Chinese CT sector are associated with and facilitated by increasing investments in this sector. During 2000 to 2008, US$41 billion in private capital

was invested in the Chinese CT industry. China's share of global CT investment is increasing rapidly. In 2008, China surpassed the U.S. in private capital investment for renewable energy (Atkinson 2010). It may well be that China's "generous and well-targeted incentives" and the low-risk environment for investors (LaMonica 2010) helped attract private investment in this sector.

During 2010-2020, China is expected to invest US$440-660 billion in the CT industry (Harrison 2010). In 2009, there were 32 IPOs in the CT sector which raised US$4.7 billion world-wide. China accounted for about 50 % of the IPOs and 75 % of total global IPO capital (Coppa 2010). The Chinese wind power company Longyuan Electric Power Group raised US$2.2 billion on the Hong Kong exchange, which was the biggest renewable energy IPO in 2009 (Gold, 2010).

In 2009, China gained its global share of VC in the CT industry. VC investments in the Chinese CT industry increased from US$330 million in 2008 to US$331 million in 2009. M&A activities in CT reached a historic high of US$5.5 billion in 2009 (Red Herring 2010)[vi]. Entrepreneurial activities in the CT sector are also reflected in job creation. CT industry has been a big employment generator in China. China's renewable energy industries add 100,000 jobs each year (sustainablebusiness.com 2010). By the early 2010, China's solar water heater manufacturers employed 600,000 people (Lean 2010).

**Export of CT related products**

Some Chinese companies are gearing up to respond to the global trend toward CT. In September 2009, CLP Holdings Limited (CLP) entered into an agreement with Vestas Wind Technology India Private Limited to develop a 99 MW Theni project in the Indian state of Tamil Nadu. It was CLP's sixth Indian wind farm (EBR 2009).

The Chinese auto- and battery maker, BYD offers a case in point. BYD announced a possibility of selling rechargeable electric cars in the U.S. as early as in 2010 (pr-inside.com 2010). Chinese companies are also planning to export wind turbines (Alibaba.com 2010; Walet 2010). China would export wind turbines worth US$1.5 billion to the U.S. in 2010 (finfacts.ie 2009). Likewise, GCL-Poly and China Guangdong Nuclear Wind Power have announced that they will be entering the U.S. market soon (Hodge 2010). Similarly, a *Wall Street Journal* article reported that Duke Energy was talking with China's biggest electricity distributor, State Grid for a joint venture on power transmission lines in the U.S.

**CT related innovations**

Patents are an important proxy for innovations in the CT industry (Kachan 2009).CT patents are among the leading category of filings with China's State Intellectual Property Office (SIPO). The filings have been from both domestic and international companies. In 2009, China's SIPO was the third largest patent office in the world. Analysts expect that if current trends continue, it would be the largest patent office by 2012. A comparison of five major patent offices' patent volumes during 2004-2008 indicated that filings in China had been growing at the fastest rate (Kachan 2009).

### 5.3. Determinants and drivers of the CT industry

**Government incentives, supports and strategic regulations that favor the local CT industry**

While some argue that the Chinese government has exercised its power over its firms in a "chaotic way", which has hindered entrepreneurship in the country (Gilboy 2004), the state control on the economy seems to have played an important role in stimulating the CT industry. In general, observers have noted that the government's policies are friendly to entrepreneurs as long as they structure their strategies to integrate governmental agenda (Pei 2006). In China, the base of regime legitimacy is shifting from MarxLeninism to economic growth (Chen 2002; Zhao 2000). Chinese leaders have set economic growth as the top priority (Zhao 2000). China arguably has "inbuilt" and "government-fostered" mechanisms to promote entrepreneurship (Monro 2007). Forecaster Gerald Celente put the issue this way: "China is invigorated with a sense of entrepreneurship that is supported by its government, while in the USA, such a spirit is on the decline" (USA Today 2006).

About 40% of the Chinese economic stimulus package of US$586 billion announced in 2008 went on environmental and energy-efficient projects (Brenhouse 2009). The stimulus package allocated to the CT industry as a percentage of 2008 GDP was the highest for China (Morrison and Yoshida 2009).

In 2009, 13 Chinese cities received subsidies to convert their public transport to clean energy vehicles (Randolph 2010).China's massive subsides have encouraged consumers to adopt solar energy and to drive down costs for companies in this sector ( King 2010). China provides a US$3-a-watt subsidy for solar projects or about half the capital cost, which is arguably "the most generous subsidy in the world" (Mufson 2009).

China's strategic regulation has also led to cost competitiveness in CT. While CT firms ofter face public resistance in Western countries, China lacks cumbersome regulations, which means that Chinese companies can deliver CT projects in the shortest time. Moreover, state loans are available at cheap rates (Alibaba.com 2010; Walet 2010).

A complaint that is often heard among some foreign investors concerns the legal and regulatory environments in China. There are problems related to investment structures and protection and enforceability of intellectual property rights (IPRs). It is probably fair to say, however, that the Chinese regulative landscape is improving drastically from the foreign investors' standpoint, especially on the intellectual property protection front (Harrison 2010). China's central government leaders no longer "ignore or promote the infringement" of IPR (Massey 2006, p. 236) and many new laws related to IPR have been enacted. In 2006, the government announced a plan to make China an "innovation-oriented" society by 2020. China has also initiated aggressive approaches to set its own technical standards and to enhance value from its IP (Kshetri 2009). Chinese firms have started exercising their rights in foreign courts. For instance, in 2006, the Shenzhen-based flash drive maker, Netac, sued PNY Technologies in a U.S. federal court for patent infringement. Similarly, Baijia, a Chinese noodle maker, fought a trademark infringement case in Germany.

*The state's control on the economy and the development of the CT industry*

Chinese CT industry is getting a big boost from a "cozy relationship" among state-owned banks, utilities, and grid companies. China is characterized by the state's deep entrenchment in the economy, which means that the government's intervention strategies are likely to have more immediate effects that are directly attributable to particular desired outputs. Overholt (2009/2010) notes: "Compared to the United States, China had many more shovel-ready projects and its system presented fewer legal or regulatory obstacles to their rapid implementation. Moreover, the Chinese fiscal stimulus was far more focused on actual crisis stimulus than its U.S. counterpart, which was heavily a social improvement agenda that included health care, education, alternative energy, and the like (as contrasted for instance with revamping badly deteriorated physical infrastructure), and with spending spread out over a good many years".

An observation is that since a scale is not feasible in the private sector, a government-owned entity is in a better position to enjoy advantages in the CT sector (Johnson and Suskewicz 2009). In this regard, according to the Union Bank of Switzerland (UBS), the state accounts for at least 70 % of the Chinese economy compared to less than 7 % in India [vii](Pei 2006). As of 2001, in 70 % of large- and medium-sized "corporatized" enterprises, the communist party members were in the board of directors (Pei 2006). The state owns 76 % of the country's wealth (Klein and Cukier 2009). The government controls the banking and financial sector and oversees state-owned enterprises, which account for about one-third of the national GDP. This allowed China to direct a surge in lending for stimulus purposes. Among the greatest barriers to the development of the CT industry concerns the "fundamental error of focusing on parts rather than on the whole" (Johnson and Suskewicz 2009 ). In this regard, Thomas Friedman of the New York Times recently put the issue this way: "One-party autocracy certainly has its drawbacks. But when it is led by a reasonably enlightened group of people, as China is today, it can also have great advantages" (Mufson and Pomfret 2010).

*China's strategic regulations*

China has introduced a number of CT related strategic regulations and rules. For instance, in 2007**,** China raised national drinking water standards and established teams to examine and monitor water quality. The country's Health Ministry added 71 benchmarks to the existing 35 (Brenhouse 2009). The trade service division of the Chinese Ministry of Commerce has announced a plan to build 10,000 green hotels by 2012, which are required to install the latest water treatment technology (Brenhouse 2009). Likewise, in September 2009, China's Ministry of Industry and Information Technology was reportedly considering additional restrictions on the production and export of REEs as well as other industrial raw materials (Mei 2009).

China has encouraged the growth of CT industries within its borders by reducing exports of raw materials. China has also given foreign CT companies incentives to set up operations in the country so as to secure access to supplies (Mei 2009). How would such moves promote the development of the Chinese CT industry? An innovation's success hinges on having well-developed systems that help the creation of externalities. Such products help

create a promising innovation ecosystems (Adner 2006). Some of China's CT-related strategic regulations have created frameworks and processes to meet various challenges associated with the development of the local CT industry and have paid off brilliantly. In 2003, China restricted imports, requiring its wind farms to source 70 % of its parts from the domestic market. The restriction was lifted in 2009. By that time, home production dominated the business (Lean 2010).

To better understand China's incentives to foreign CT companies, it is important to note that in cases where patent protections and other forms of intellectual property rights are imperfect, knowledge about the CT is a public good. As this knowledge increases with more users, the fixed cost of adopting the CT declines (Mohr and Saha 2008).

As noted earlier, it is possible that that the cost of regulation is passed along to the consumer in the form of a higher price. Government supports are arguably more effective when they also focus on nascent business models in addition to nascent technologies (Johnson and Suskewicz 2009). A sound business model pays close attention to customer value proposition as well as the key resources and processes required in delivering customer value (Johnson and Suskewicz 2009). Creation of a favorable consumer predisposition toward CT is critical for the success of this industry. For instance, consumers may have a preference for goods that are produced using "green" production techniques and are willing to pay a premium for such goods, but cannot observe the production process. China is training 30,000 salespeople to sell new clean technologies to consumers (Wadhwa 2010).

**R&D and innovation profile**

Despite China's relatively low R&D and innovation profile, the country has made significant progress on this front in recent years. In terms of research publications, China currently ranks No. 2 only behind the U.S. China currently produces 8 % of the world's research publications, compared to 2% in 1995, when it ranked No. 14 (NSF 2010).

**The degree of adverse environmental and health impacts of conventional energy sources**

Chinese cities are among the world's most polluted ones. Water sources in China are considered to be unreliable for drinking (Brenhouse 2009). There has been a significant adverse health impacts from high levels of pollution. According to a World Bank's report published in 2004, 16 of the world's 20 most polluted cities are in China (Ernst and Young 2007). Likewise, a World Health Organization report on air quality in the world's 272 cities indicated that seven of the world's 10 most polluted cities were in China (Bureau of East Asian and Pacific Affairs 2007).

Water and air pollution levels in the country exceed by the Western safety standard (Ernst & Young 2007). Studies conducted by the Chinese government agencies indicated that of the 338 cities for which air-quality data are available, two-thirds were considered polluted. Moreover, two-thirds of the polluted cities were moderately or severely polluted. Air pollution-led respiratory and heart diseases are the leading cause of death in the country.

Estimates suggest that 300 million people in the country drink contaminated water. 90% of water bodies in urban areas are severely polluted (Bureau of East Asian and Pacific Affairs 2007). Insufficient water resources and air pollution have also reduced economic growth in some areas (Harrison 2010). In 2006, China overtook the U.S. as the world's largest producer of greenhouse gases (Osnos 2009). Pressure for CT adoption has been thus building in China.

In 2009, China added over 2,000 cars a day (Osnos 2009). By 2030, it is expected to have 330 million cars and pass the U.S. as the nation with the most vehicles (Field 2009). By 2050, China is expected to have over 600 million cars (hybridcars.com 2009). Relative advantage of CT is thus higher in China than in most countries (Rogers 1962 1983 1995).

**Forward and backward linkages**

China's energy and transportation infrastructures are still being defined. CT thus has a potential to lead to environmental and competitive benefits in China (Hart 1997). China is in a better position to create forward and backward linkages.

**Market size and economies of scale**

The CT sector will require scale to succeed. In this regard, China's market size has been driving the growth of this sector. Chinese market is uniquely placed and sufficiently large to scale up to benefit from the economies of scale and scope.

**Availability of externality mechanisms**

U.S. companies are increasingly relying on China in design and manufacturing operations, which provide China with additional advantage (Wadhwa 2010). While China doesn't yet have a breakthrough innovation, it is likely to build on technologies developed by companies from the U.S., Japan and other developed countries and gain significant advantage by combining with its manufacturing prowess.

China is providing incentives to attract foreign companies such as the U.S.-based First Solar. Such companies in the CT sector generate MAR externalities for the local CT industry. At the same time, China has been among the most attractive destinations for design and manufacturing operations for foreign multinationals, which have created a possibility of "inter industry knowledge spillovers" or Jacobs (1969) externalities.

**Availability of CT related natural resources, skills and labor resources**

China has the advantage of being well-endowed with natural resources required for the success of the CT industry. One estimate suggests that China produces 97 % of the world's Rare earth elements (REE)[viii]. The country has tightened the export or REE since 2003 (cleantech.com 2010).

Thanks to China's labor resources, the distinguishing mark of Chinese CT players is their cost competitiveness. Chinese companies are in a position to undercut their foreign

competitors' costs and price more aggressively than foreign CT manufacturers (Alibaba.com 2010; Walet, 2010). Consider, for instance, polysilicon, which is a critical raw material for solar panels that convert sunlight to electricity. Chinese solar panel makers procure polysilicon at cheap prices from manufacturers that have lower electricity and labor costs (Walet 2010). In the early 2010, Chinese companies sold solar panel modules at about € 1.20 per watt compared to € 2 charged by European manufacturers (Alibaba.com 2010). Likewise, GCL-Poly Energy Holdings expects to sell the solar raw material at US$45 per KG in 2011, down from over US$50 now. Outside China, polysilicon costs US$60 per KG (Walet 2010).

To understand higher costs of CT, consider electric cars. Electric cars are expensive primarily because of the high costs of lithium ion batteries. In this regard, China has a reputation of bringing down the costs.

A final issue that deserves mention relates to China's attempt to develop higher levels skills. China has increased funding for 10 universities, which is aimed at producing specialists in diverse areas of science and technology *(*Kao 2009).

**6. Discussion and conclusion**

This article disentangled the mechanisms behind the development of the CT industry. Disruptive innovations are quite possible in the CT industry, especially when there is a sizable segment of the population adopting this technology. As in other disruptive innovations, the incumbents (e.g., the industrialized nations-based firms) may lack the ability to play the new game in the field of CT (Christensen, Raynor and Anthony 2003). As noted above, companies such as DuPont have entered into a completely new game of CT (Hart 2005). Chinese CT firms' internationalization activities may be the latest sign to suggest that Chinese firms may emerge as winners in the global CT race.

The case study presented in this paper also suggested that the Chinese CT industry is more sophisticated than first meets the eye. The government is playing an influential role to drive the Chinese CT industry. The Chinese government is counting on the CT to enhance its image. The Communist Party expects that a richer and greener economy might help increase respect for it. There has already been some results. In recent years, air quality has improved in some Chinese cities (Bureau of East Asian and Pacific Affairs 2007).

While the Chinese CT industry performs well in the government's incentives and support as well as strategic regulation, its R&D and innovation profile has been low. To achieve various objectives related to economic, environmental and national security (impacts of CT), China needs to slip into a higher gear. Lampton (2005) noted that "China can be weak and strong simultaneously". And so can its CT industry. China continues to gain strength in CT industries. Government's measures are the key to China's success. Of particular interest are the proposed regulatory measures, which are further likely to drive the growth of this industry.

More than a decade ago, Koo (1998) noted that the "progress in China has been scarcely noted in the Western media and overshadowed by the focus on the human rights abuses as perceived by the West". This observation remains generally true today as well. Several analysts have warned that Western managers may have underestimated the innovation taking place in China (Rein 2010). The Western media have neglected to pay enough attention

to transformations undergoing the Chinese CT industry. Brian Fan, senior director of research at the Cleantech Group noted: "A lot of people underestimate how focused China is on becoming a global leader in CT" (Mufson 2009).

Some analysts argue that neither China nor the U.S. has the scale required to succeed in the CT industries (Woetzel 2009). The above discussion indicates that China can achieve better
economies of scale and has various mechanisms to build it. However, China and the U.S. have complementary characteristics. For instance, China's low cost advantage in the CT industry can be combined with the strengths of the U.S. such as innovation and VC.

Our framework also allows us to examine international trade and factor mobility in the CT industries. As noted above, Japan is ahead of the U.S. in CT innovations. The fact that China has already overtaken the U.S. as Japan's biggest trading partner makes China-Japan collaboration in Green technology more likely than U.S.-Japan collaboration (economist.com 2010).

As to China's rise, from the U.S. standpoint, the New York City Mayor Michael Bloomberg (2008, p. 58) put the issue this way: "The challenge that we face is not preventing China from catching up with where we are today, but preventing ourselves from slowing down". Bloomberg's observation broadly provides a helpful perspective to all economies, especially industrialized ones, for responding to the development in the Chinese CT industry. Other developing economies, on the other hand, can borrow a page from the lesson book of the Chinese CT development locus.

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Table 1: R&D and innovations profiles of some major economies in the world

| | Patents granted to residents (per million People) 2000–05 | Receipts of royalties and license fees (US$ per person) 2005 | Research and development (R&D) Expenditures 2000–05 | Researchers in R&D (per million people) 1900–05 |
|---|---|---|---|---|
| Japan | 857 | 138.0 | 3.1 | 5,287 |
| The U.K. | 62 | 220.8 | 1.9 | 2,706 |
| The U.S. | 244 | 191.5 | 2.7 | 4,605 |
| South Korea | 1,113 | 38.2 | 2.6 | 3,187 |
| China | 16 | 0.1 | 1.4 | 708 |
| India | 1 | 0 | 0.8 | 119 |

Source: UNDP (2008)

**Table 2: A timeline of events shaping the development of the Chinese CT industry**

| Time | Event | Remarks |
|---|---|---|
| March 3, 1986 | Four weapons scientists sent a private letter to Deng Xiaoping. They called for an élite project devoted to *technology* ranging from biotech to space researchμ. | Their letter argued that China must join the world's "new technological revolution" or it would be left behind. |
| March 1986 | China funded the 863 Program or State High-Tech Development Plan. | The name 863 comes from the fact that the program was created in the year 1986 in the third month. |
| 1993 | China became a net importer of oilχ. | A large portion comes from the Middle East. |
| Mid-1990s | China and the U.S. started an active program of bilateral environmental cooperationχ. | The emphasis has been on CT and effective environmental policy. |
| 1998 | The State Environmental Protection Administration (SEPA) wasupgraded to a ministry-level agencyχ. | It reflected the growing importance the Chinese Government places on CT. |
| 2001 | The 863 Program launched a "clean coal" projectμ | |
| 2003 | A new regulation required Chinese wind farms to source 70 % of the parts from the domestic marketκ. | |
| 2005 | China joined the Asia Pacific Partnership on Clean Developmentχ. | The program works with industries and governments to reduce pollution and address climate change. |
| 2006 | China passed the U.S. to become the world's largest producer of greenhouse gasesμ. | |
| 2006 | China's renewable energy law went into effect. | It calls for 10% of the energy to come from renewable energy sources |

| | | |
|---|---|---|
| | | by 2020[χ]. |
| 2008 | China hosted the Olympics. | Before the Olympics, China made heavy investments in pollution control as part of its<br>campaign to host the global event[χ]. |
| 2008 | 40% of the economic stimulus package of $586 billion was allocated for environmental and energy-efficient projects[θ] | |
| 2009 | The import restriction in wind farms industry was lifted [κ] | The regulation required to source 70 % of parts from the domestic market. |
| 2009 | China became the world's biggest car market. | |
| 2009 | China overtook the U.S. in wind-turbine manufacturing and installations[η] | |
| 2009 | The Three Gorges Dam had a total capacity of 18 GW[χ]. | |

μOsnos (2009); [θ]Brenhouse (2009); [κ]Lean (2010); [η]Martin and Efstathiou 2010), [χ]*Bureau of East Asian and Pacific Affairs (2007).*

Figure 1: A framework for understanding CT related indicators

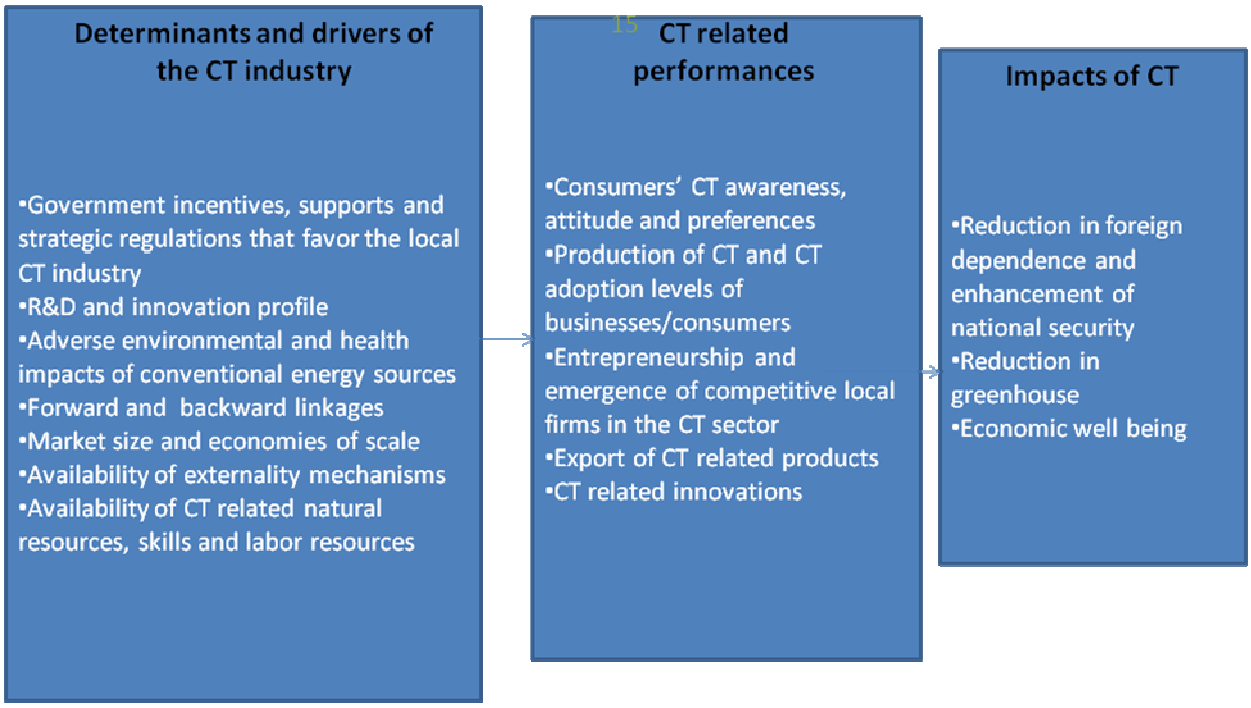


**Figure 2: Assessing major world economies in terms of some determinants of CT development**

| | | Degree of government incentives and support | |
|---|---|---|---|
| | | High | Low |
| Degree of R&D and innovation | High | [I]<br>Japan<br>South Korea<br>Germany | [II]<br>The U.S.<br>The U.K. |
| | Low | [III]<br>China<br>The *UAE* | [IV]<br>India |

**Notes:**

[i] In the U.S., CT was the only sector that received more VC in 2009 compared to 2008, which experienced a 52% increase to $2.7 billion (Zaborowski 2009).

[ii] While the CT market has been growing since the 1970s (solar panels and wind energy have had a small but loyal consumer), investment in this sector is taking off in recent years (Gangemi 2007).

[iii] Annual revenue for four CT sectors--solar photovoltaics, wind power, biofuels, and fuel cells—increased from $40 billion in 2005 to $55 billion in 2006, which is likely to reach $226 billion by 2016 (Gangemi 2007).

[iv] The well-known Moore's Law states that the number of transistors on a chip doubles every 18 to 24 months, driving exponential growth rate of computing power. Over the past 40 years, Moore's Law has been found to be remarkably accurate. For instance, the number of transistors on a single chip increased from 2,300 on the 4004 chip developed in 1971 to 42 million on the Pentium IV processor developed in 2000 (Hamilton, 2001). Moore (2001) was confident that his law 'will be true for another 20 years'. A corollary of Moore's Law is that the cost of computing declines by about 35% every year (Palem 2001).

[v] This framework draws upon Ahmad and Hoffmann (2008).

[vi] According to Cleantech Network, CT-related VC investment in China in 2006 was US$420 million, which was 147% higher than in 2005 (Business Week 2007).

[vii] It is, however, important to note that about 10 families in India control over 80 percent of the stock in the country's largest corporations (Malhotra 2009).

[viii] Rare earth elements (REE) or rare earth metals are a collection of seventeen chemical elements in the periodic table: scandium, yttrium, and the fifteen lanthanoids. REE are used in technologies such as wind turbine generators, electric vehicle motors, fuel cells and energy efficient lighting.