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New Directions in Sustainable Growth and Innovation Strategies

June 27-29, 2013, Riga-Latvia
9th INTERNATIONAL STRATEGIC MANAGEMENT CONFERENCE

New Directions in Sustainable Growth and Innovation Strategies

June 27-29, 2013
Riga, Latvia

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• Murat Kayalar (Süleyman Demirel University, Isparta-Turkey)
• Musa Pınar (Valparaiso University, Indiana-USA)
• Mustafa Aykaç (Kırklareli University-Turkey)
• Mustafa Köksal (Kocaeli University, Kocaeli-Turkey)
• Müjdelen Yener (Marmara University, Turkey)
• Nazan Yelkikalan (Canakkale Onsekiz Mart University, Canakkale-Turkey)
• Necdet Timur (Anadolu University, Eskişehir-Turkey)
• Neil Bechervaise (Divine Word University, Madang - Papua New Guinea)
• Nevin Deniz (Marmara University, Turkey)
• Nezaket Aygül (Kırklareli University-Turkey)
• Nezat Hatun İlyas (Sıhhiye Training High School, Turkey)
• Nigar Demircan Çakar (Düzce University, Turkey)
• Nihan Yıldırım (Istanbul Technical University, Turkey)
• Nizamettin Bayyurt (Fatih University, Turkey)
• Nihat Yıldız (Süleyman Demirel University, Isparta-Turkey)
• Nurhan Papatya (Süleyman Demirel University, Isparta-Turkey)
• Oya Erdil (Gebze Institute of Technology, Kocaeli-Turkey)
• Orhan Elmacı (Dumlupınar University, Kütahya-Turkey)
• Paul Z. Jackson (The Solutions Focus, St. Albans, UK)
• Pauline Magee-Egan (St. John’s University, USA)
• Peer Venter (University of South Africa, Pretoria-South Africa)
• Pervez N. Ghauri (King’s College London-UK)
• Radhi El-Mabuk (University of Northern Iowa-USA)
• Recep Şener (Muğla University, Muğla-Turkey)
• Refik Culpán (Pennsylvania State University, Harrisburg-USA)
• Reşit Özkanca (Melikşah University-Turkey)
• Rezván Ghalambor (University of Isfahan, Iran)
• Richard Alan Nelson (Manship School of Mass Communication-USA)
• Richard Lynch (Middlesex University, London-UK)
• Robert Skapars (University of Latvia, Latvia)
• Sabahattin Sari (Beykent University, Istanbul-Turkey)
• Sefer Şener (Istanbul University, Istanbul-Turkey)
• Şerifeçeci Sari (Beykent University, Istanbul-Turkey)
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• Şerif Göksel (University of Salford, UK)
• Sharan L. Oswald (Auburn University, USA)
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• Sima Nart (Sacramento University, USA)
• Sima Nart (Sacramento University, USA)
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• Subodh Bhat (San Francisco State University, San Francisco - USA)
• Sudi Apak (Beykent University, Turkey)
• Süleyman Türkel (Çağ University, Mersin - Turkey)
• T. Diana A. De Macedo-Soares (Pontifical Catholic University of Rio de Janeiro, Brazil)
• Tanses Gülsoy (Beykent University, İstanbul-Turkey)
• Tatiana A. Burenina (State University of Management, Russia)
• Tijen Harcar (İzmir University of Economics, Turkey)
• Tuğba Karahulut (İstanbul Commerce University, Turkey)
• Tunca Tamer (Celal Bayar University, Manisa-Turkey)
• Uğur Yozgat (Marmara University, İstanbul-Turkey)
• Ülkü Dicle (Yeditepe University, İstanbul-Turkey)
• Ümit Alnaçık (Kocaeli University, Turkey)
• Ute Stoltenberg (University of Lüneburg-Germany)
• Viesturs Pauls Karnups (University of Latvia of Riga - Latvia)
• V. Dolyatovskyi (The Rostow State University, Russia)
• Victor Gnevko (St. Petersburg Institute of Management and Economics, Russia)
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• Warren J. Keegen (Pace University, USA)
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• Yonca Gürol (Yıldız Technical University, İstanbul-Turkey)
• Yücel Acer (Çanakkale Onsekiz Mart University, Çanakkale-Turkey)
• Zeyyat Hatipoglu (Dogus University, İstanbul-Turkey)
• Zoltán Veres (Budapest Business School, Budapest, Hungary)
PREFACE

Dear Colleagues,

Welcome to the 9th International Strategic Management Conference in Riga, Latvia. On behalf of the organizing committee of our conference, we would like to express our great appreciation and honor to all of you from all around the world for sharing your valuable work with us.

We have organized this 9th conference with the academic collaboration of Gebze Institute of Technology University of Latvia and Istanbul Arel University. We have also enjoyed this year again the cooperation of Elsevier and Emerald Group which have also participated to this organization. I would like to thank to those who have contributed to the preparation and publication to the conference in a successful manner.

The 9th International Strategic Management Conference received a total 188 extended abstracts from 25 different countries. After carefully screening, 134 full papers were accepted for the Conference. Among accepted papers, 10 papers were selected to be published in Journal of Global Strategic Management.

Papers have been generally sent by academicians from Europe, The Balkan States, The Middle East, Australia, Russia and the USA. The countries providing papers are as follows: Albania, Australia, Denmark, Finland, Germany, Iran, Iraq, Italy, Latvia, Lithuania, Malaysia, Mexico, Papua New Guinea, Pakistan, Poland, Romania, Russia, Spain, Switzerland, South Africa, Saudi Arabia, Slovakia, United Kingdom, USA, and Turkey.

Unfortunately, some participants have been unable to attend the conference due to visa problems. This year, we have two valuable keynote speakers. One of the well-known academician from Purdue University, Calumet, USA, Prof. Dr. Jamaluddin Husain will address you “On Micro-finance as a New Strategies in Establishment of Small Sized Enterprises”. Second Keynote Speaker, well-known Professional Juris Binde (Ph.D) President of Latvijas Mobilais Telephons, Latvia, will address you “On Leadership and Strategy in Dynamic Business Environment”.

Dear colleagues and guests; Ladies and Gentlemen, with my sincere wish, I would like once again to welcome you and enjoy with 9th International Strategic Management Conference.

Erol EREN, Ph.D.
Chairman of the Conference
PREFACE

We are honored to welcome you to the 9th International Strategic Management Conference in Riga/Latvia. This year’s theme is “New Directions in Sustainable Growth and Innovation Strategies”.

We convened here, coming from different parts of the world, to discuss and explore for international competition and cooperative strategies in sustainable development. We are going to debate on different approaches and models in strategic management, industry analyses, ethical issues, innovation and many other issues, not only economic and technology point of view, but also addressing mainly the problems and issues of sustainable development.

Academicians from different countries submitted original papers for conference presentation and for publication in the Proceedings Book. All competitive papers were subject to a peer review. The results of these efforts produced 134 empirical, conceptual, and methodological papers involving all functional areas of strategic management with a specific focus on sustainability in growth and innovation strategies. I would like to express our appreciation to the reviewers for reviewing the papers that were submitted to this conference. We also thank to all those who submitted their work to be considered for presentation at the Conference.

All of us here worked very hard to make this conference a success. The conference could not have been held without the diligent work of Professor Erol Eren, Chairman of the Conference who made great effort to perfect all arrangements. Special thanks to him for his leadership and execution of 2013 Conference. I want to extend special appreciation to Mehtap Özşahin for her hard work and commitment to the conference development.

We hope that you will benefit from the Conference and enjoy your stay in this great land, Riga.

Oya Erdil, Ph.D
Co-Chair of the Conference
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PREFACE

That we have held such an international event called 9th International Strategic Management Conference for the 9th time is very meaningful for us. More and more countries as well as companies, NGOs and local administration have been giving importance to strategic management to have long-term perspective and tackle the problems they can face.

The main reason of this approach and tendency of strategic management is that we have been experiencing a world-wide economical crisis, basically, since 2007. It has also become the main steering force behind several global political crises. Since that date, in many countries, economic crises were followed by political ones. Many leaders of many countries had to resign after the economic crises. This situation indicates that politics and economics have been deeply affecting one another for last five years. In addition, political and economic crises have been not only global but also structural.

Since crises have been structural and global, and since the topic of strategic management has been global, we need strong policies of innovation, in order to manage them effectively. By the concept of global we mean countries and states, not for profits, are interested in strategic management as well as for profit organizations. Crises and their managing policies based on innovation require such an approach. In this context, and in the framework of strategic management, in order to fight crises and implement strategic management successfully, an evaluation including various and alternative innovation policies can be revealed and summarized as follows:

There are three types of innovation, some of which are focused on crises and each poses different levels of risk: The first one, the “empowering innovations” can transform products that historically were so complicated and expensive that only the rich had access to them. The Model T of Ford was one of those. The personal computer was one of those. The smart phone is this again. These kinds of innovations also create new jobs. The second type, which is called “sustaining innovations”, make existing good products even better. They don’t create new jobs. The third, which is called “efficiency innovations”, help us make the same products cheaper, and they reduce jobs in the economy.

Over the recent years, executives and investors have stopped investing in empowering innovations, because they pay off in five to eight years, and instead, invest in efficiency innovations, which pay off in one or two years. We are awash in cash, and yet we continue to invest as if capital was scarce. And so we’re not investing in the kind of innovations that would create growth. In order to avoid for us from the crises, we need to invest in empowering innovations primarily.

Efficiency innovation is really a lot about our business model. We often call it the productivity loop, and it’s really operating with lower expenses, more efficiency, lowering prices for customers and as a result having more customers, which allows for more efficiency.

* for more information: Time Magazine Jan 2013, (online), The TIME at Davos debate : The rewards of mastering innovation risk...
We think that some companies have had two versions of a lot of empowering or disruptive innovation. One has been in the area of sustainability. Another area of empowering or disruptive innovation would be the area of e-commerce, using technology today.

We’re on the cusp of what is a major uptrend in innovation. Even the world of academia has been very obsessed with this phenomenon of frugal innovation coming out of Asia. Even Apple is facing the rise of companies like Samsung that are doing more for less.

What is going to happen is that we’re going to see cutting-edge innovation is required. That is why we are not going to be able to get to our aspirations and visions by doing more for less. We have to be able to do pioneering, cutting-edge innovation. That is why, first priority for countries as well as companies must be empowering innovation like mentioned above in order to tackle chaos and any sort of crises and bring innovative products and services to markets in a way crisis management and innovation policies are integrated in strategic management. Not only crises but also strategic management has been global, like we mentioned before. In this context, at the levels of organization, companies, local administration and state, strategic management must be prepared together with crisis management and innovation policies. At this point, the main mention we are trying to lay out is that crisis management and innovation policies must be integrated in strategic management...

For these reasons, the 9th International Strategic Management Conference has been important and significant to hold in this theme, in Latvia. I am sure the presentations of the 9th International Strategic Management Conference are going to give significant contributions to the perspective we mentioned above. Before ending my words I would like to thank to Chair of Conference Prof. Dr. Erol Eren, Co-chair Prof. Dr. Oya Erdil and Dr. Mehtap Ozşahin, for working very hard and effectively for this event. I would like also to thank to participants and presenters for joining our event and presenting presentations.

Ali Akdemir, Ph.D.
Co-Chair of the Conference
The Relationships Between Technological Investment, Firm Size, Firm Age and The Growth Rate of Innovational Performance

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Abstract

In many different sectors, firms—not only technical departments, but also organizational structures—have been under the constant influence of technological improvements. The recent research in business literature shows that innovation and technology tactics, strategies and management style are important elements for success of companies in the market today. Earlier studies focus on the effects of these factors on firms’ financial profit, market share position, and also success or problems of personal adaptation. Some argue that the firm age and structure are associated with the uniqueness of innovations in firms and suggest that once small and medium firms (SME) succeed in innovation through technological tactics, strategies and management directives, they can be easily imitated by their competitors. From this point, the present study examines the relationships between technological investments, firm size, firm age and innovation performance in Turkish firms which are in the technopolis at Middle East Technical and Hacettepe University, based on the firms’ datasets and indicators in statistic methods.

Keywords: Technology strategies, Firm size, Firm age, Innovational performance

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Introduction

Traditional industrial economic and modern management studies show that the basic indicator of firm performance is to stay in the market successfully (Audretsch, 1995; Caves, 1998; Klepper, 2002). In addition, management studies emphasize the necessity of exiting the market as a part of life cycle strategies (Graebner and Eisenhardt, 2004; Villalonga and McGahan, 2005). Firms may exit business sector by either closing down or selling out to another company. Firm characteristics such as mode of entry, firm age and size are important aspects to be considered before making decisions (Cefis, 2012). Additionally, firms should take into account the competition level in their sector prior to strategic decisions. An increasing competition is affected by developing structure of the global markets and division of labor today. A key point in the competitiveness of manufacturing and service firms is innovation performance (Alvarez, 2009). In this paper, we examine three dimensions of innovation performance in relation to: a) firm size, b) firm age; and c) technological investments. It is highly likely that these three factors shape the outcomes of innovation performance.

First and second of all, we claim that firm size and firm age play an important role in the innovative performance of firms. An increasing amount of research has placed firm age and firm size in the center of interest on management literature (Archibugi, 1995; Antonelli, 2004, 2006 and 2007; Branscomb, 2001; Brush & Chaganti, 1998; Coccia, 2005; Damanpour, 2012; Edquist, 1999; Faucheux, 1998; Figueroa, 2000; Galende, 2006; Ganter, 2012; Gopalakrishnan, 1997; Halkos, 2007; Harrison, 2003; Hart, 2001; Hritonenko, 2010; Kannebley, 2005; Kim, 2009; Levitas, 2006; Magnani, 2009; Molero, 1996; Nicholls & Nixon, 1995; Rogers, 2004; Rycroft, 2006 and 2007; Schätzle, 1998; Shaffer, 2002; Tovar, 2011; Tyler, 2001; Zahra, 1999). The competitive market environment has grown due to shorter product and technological life cycles. Under the influence of these forces, firms have had to take innovative strategies since 1980s (Nijssen et al., 2001). Third and last factor is technological investments in linking technology investments to the innovation performance of firms. In the literature, technological investment is discussed as the element of a recombination process to generate innovation. This point is an important part of the study. Since 1995, event studies about technological
investigation have investigated and emphasized that technological investment provides many advantages for firms in competitive markets (Adeoti, 2001; Apostolopoulos & Pramatari, 1997; Basole et al., 2013; Berghout et al., 2011; Besson & Rowe, 2012; Caggese, 2012; Carlin et al., 2011; Rognant et al., 2011; Cragg et al., 2011; Dawid et al., 2009; Dehning et al., 2004; Dimov & Milanov, 2010; Gatian et al., 1995; Ghosal & Reichert, 2009; Gomez & Vargas, 2012; Granados & Knoke, 2013; Holsapple & Wu, 2011; Huisman & Kort, 2003; Inderst & Peitz, 2012; Jurison, 1996; Kim & Sanders, 2002; Kivijarvi & Saarinen, 1995; Konchitchki & O'Leary, 2011; Kong & Kwok, 2007; Lang et al., 1996; Leahy & Montagna, 2012; Lee et al., 2011; Li, 2013; Lim et al., 2011; Liu et al., 2011; Love et al., 2009; Love et al., 2011; Meng, 2008; Merali et al., 2012; Merlin, 2012; Mittal & Nault, 2009; Neuhausler, 2012; Nielsen, 2002; Nishihare & Fukushima, 2008; Petit & Randachio, 2000; Pick & Azari, 2011; Power, 2013; Rai et al., 1997; Ramos et al., 2011; Renkema & Berghout, 1997; Shober & Gebauer, 2011; Smit & Trigeorgies, 2007; Teo et al., 2000; Wrzaczek & Kort, 2012). Event studies deliver a strong theoretical foundation about technological investments for the present study. Although these studies also provide reviews of different aspects of the technological investment and related incomes for firms, this paper focuses on whether firms investment in technology effects their innovation performance regardless of the distinction between the product innovation and process innovation.

Within the contexts of shorter product and technological life cycles, it is considered that innovation cooperation activities are a crucial factor for being successful in industrial and information sectors. The improved complexity of innovation processes, which are the backbone of competition in market, leads firms to search beyond their own boundaries for valuable innovational knowledge and skills, and gain an advantageous position against their competitors. It seems that event studies on relationships between factors such as firm age and firm size and innovation performance have attracted relatively less attention in the literature. Those which investigated the issue has not yielded consistent findings. Our study aims to contribute to the emergence of literature that focuses on these two factors which are the backbones of firm structure, and their relationships with innovational performance. Besides, we examine the relationship between technological investment and innovational performance. We explore the factors influencing the innovation performance, which acquires product and service package innovations, by using detailed datasets and observations. How relevant is innovation performance to technological investment, firm size, and firm age? In quantitative terms, this question is yet to be answered in the business literature. The aim of this study is to fill this major gap by examining the roles of technological investment, firm size and firm age for innovation performance using a combination of datasets and indications. Figure 1 illustrates an inter-connected model of the four elements.

![Diagram](image.png)

**Figure 1.** Theoretical framework and hypothesis

In the first section of the study, we review some studies about technological investment, firm size, firm age and innovational performance in the information management literature in detail. Then, the second section presents an analysis of firms’ datasets and indicators by the statistical methods. We investigate the links between firms’ age, size and technological investment and innovation performance by analyzing the data. Lastly, in the third section, results are discussed and suggested hypotheses are evaluated in the light of the findings.

**Literature Review And Hypotheses**

**Technological Investment**

The important role of technology in economic developments has been acknowledged many times so far. For instance, Solow residual is mainly a measure of technological input into the production process, and investments in technology have become a strategic issue in economic development. Several event studies emphasize the benefits of such investments for countries’ economies. For example, in the study of objection, Adeoti (2012)
traces the link between investment in technology and export of firms. Casse (2012) argue that innovation and technological progress have been continued by entrepreneurial firms, which are responsible of employment and productivity growth in countries. Recently, new entrepreneurial firms’ creation or development based on financial factors is highlighted by many academic studies. However, research on the effects of uncertainty and risk factors on entrepreneurial investment decisions has remained relatively little. Firms’ investment on technology is rather difficult to take into account concerning the benefits for the economy of a country. Similarly, Keen (1991) points out that we are still at the learning stage for evaluation regarding the benefits of technological investments. Since IT investments are evaluated by suitable time framework, the evaluation process of IT infrastructure investments is much more difficult. In the literature, Hochstrasser and Griffiths’ survey is used by researchers for measuring it (Apostolopoulos & Pramataris, 1997).

Past studies examined firm’s investment in innovation in the case of uncertainty. The original model of this condition belongs to Dixit and Pindyck (1994), who offered the Irreversible investment model, which is an extension by the optimal investment strategy on oligopolistic market model. Following their work, Lambrecht and Perrauding (1996) suggested that investment to threshold proves that there is a relationship between the threshold for even-breaking and the monopolistic investment threshold. Claiming similar views, Nielsen (2001), argued that the investment threshold makes the firm break even (p. 743). Many other empirical event studies approach investment on uncertainty innovation. For example, Caggese’s (2012) study on 11,417 Italian manufacturing firms uses new simulates model of entrepreneurial firm and derives testable predictions concerning the relation between financial market relation, uncertainty, and the decisions to undertake risky productivity – enhancing projects. This empirical analysis results show that investment on uncertainty innovation projects prove a significant and large negative effects. Business cycle fluctuation and growth have been taken as a negative effect by uncertainty innovation project results for entrepreneurial firms. David (2010) studied the speed of technology adoption and the wage differential on total labour income in the home country by taking into account the transition dynamics and using numerical dynamic optimization methods. The result of this study demonstrates that firms’ activities in foreign countries may prove negative in the long term while competitors benefit from their superior production and service technology. So, the productions of intellectual property rights are of great importance for foreign direct investment firms. Schumpeter (1934) argues that innovation leads to the emergence of winners and losers in the market. In competitive economy, innovation is a crucial process for individuals and families’ rise or fall (Cefis, 2012: p. 795).

IT investments pose an interrelated effect on firm value. Thus, managers should be rethinking about uncertainty innovation investments as the value of shareholders priority has been maximized by managements. Process Oriented Approach and Productivity Paradox have been used to assess IT investments that contribute to firms’ performance and value. Based on the important implications of firm value approach, we can understand that many IT managers take into account of industry and company specific effects on IT investments, competitive advantage, and its effect on firm value and investment risk (Dehning et al., 2005; p. 990).

Finally, some studies argue that the main factor is competition for taking risk of investment on uncertainty innovation projects. This point is emphasized by Nielsen (2002), who suggests that the dominated strategic effects always precipitate investments in noncompetition markets (p. 732). If firms expect profit from their investments, they should seek to delay risky investments.

Firm Size and Firm Age

Barney (1991), Conner (1991) and Peteraf (1993) argue that physical, financial, human and technological resources are the parts of organizations. According to Grant and Barney (1991), one of the most critical steps in managing firms is taking the decision to use outsourcing or internal resources which are improved as unique resources. While resources are changed or renewed, firms grow in size and their organization structures are reorganized by new managements. As technological decisions are an important part of reorganization, many studies in the literature reviewed above have focused on the intensity of technological changes.

According to Garcia and Calantone (2002), firms’ innovation characteristics and the degree of innovativeness are well understood when they are classified in taxonomies. Durand (1992) states that to analyze the significance of technological changes, one can benefit from four perspectives: a) technological input: technical novelty or scientific merit; b) competence throughout: new requirements on the competencies, transilience; c) perception of the market: market novelty, new functions proposed to customers; and d) strategic output: impact on the competitive position of the firms (Coccia, 2005; p.119).
Strategic decisions effect technological changes. Although these changes do not directly aim to maximize and improve the profit, they take it into account based on the product and market factor (David, 1975, 1985; Antonelli, 2003). The localisation in multidimensional spaces matters theory consists of four reasons (Antonelli, 2004, p.258):

a) the bounded rationality effects agents’ structure. In the specific learning context, technological and organizational innovation are only possible. b) It should be possible to flow advantage of communication among complementary innovations by proximity in regional and space to other learning agents; c) the best possible usage of existing inputs is chosen by irreversibility of fixed production factors limits the mobility in the technical space and constraints agents; d) the most effective usage of locally abundant inputs of technologies prefer to used by relative factor prices.

Innovational Performance

Inventions, technology and research consist of innovations. We can explain a variety of models of the innovation process as the important factor in developing public policies for encouraging innovations as well as for managing their creation. The differencies in innovative capacity in different societies can be explained by these models to assess complementary assets and social capital (Kline, 2001, p. 15498). Entrepreneurship researchers emphasize the importance of innovative performance for firm success in event studies (Chandler and Hanks, 1994; Cooper Gascon, and Woo, 1994; Cooper and Artz, 1995; Mosakowski, 1993). This work suggests that managers must consider the analysis of resources in strategy and performance relationships before innovational decisions (Brush & Chaganti, 1998, p. 236 – 237). According to Sahal, technology has three the main concepts (Coccia, 2005, p. 947): a) The neo-classical approach of technology in the form of production function; b) the Pythagorean account of technology theory in the form of the chronologies of major innovations; c) The other approach is the systems concept of technology. Certain measurable, functional characteristics of the phenomenon under consideration are the best understood by this approach. Analysis of the three concepts and results show that the system concept of technology is much more advantageous than the other two concepts. Evidence supports the thesis underlying the system concept on which innovations based the development of existing technology. The neo – classical indication of technology does not point out the measurement of technological change. Also, Pythagorean has not a formulation of the production activity, too. However, the system concept has both measurement technology change and framework of formulation of production activity.

The main effects of technological change according to the innovation degrees are as follows (Coccia, 2005; p. 122; Rogers, 1995):

- First-degree innovation (lightest): There are only marginal changes in relation to the overall system (product, process, organization, etc.).
- Second-degree innovation (mild): The main effects are minor changes in product and process. These innovations occur almost continuously within the economic system. They mainly affect the firm that promotes them.
- Third-degree innovation: moderate.

Hypotheses

In this study, we suggest four hypotheses as follow:

H1: There is a relationship between Technological Investment and Innovation Performance.
H2: There is a relationship between Firm Size and Innovation Performance.
H3: There is a relationship between Firm Age and Innovation Performance.

The aim of the hypotheses is to understand the relationship between technological investment and innovation performance in firms by using their datasets; to see how a possible change in firm size can affect the innovation performance; to investigate firm age differences in relation to innovation performance and lastly, to demonstrate the overall effect of all the dependent variables over innovation performance.
Methodology

Research Goals

In this survey, we aim to identify the relationships between the technological investment, firm size, firm age and innovation performance for techno-polis firms in METU (Middle East Technical University) and Hacettepe University, Turkey. The data will be collected through questionnaires distributed to the middle and senior firm managers operating in firms in different industry at techno-polis of universities in Turkey between, and the analysis will be conducted via correlation analyses on SPSS statistical packet program.

2.1. Sample and Data Collection

In this study, a field survey using questionnaires were conducted for analysis. Firms operating in various sectors at techno-polis in Ankara were chosen as the research population. Randomly selected 30 firms were taken as the sample of the research. The number of firms registered to techno-polis at METU and Hacettepe University is 76 (population), which have been supported by KOSGEB, in Ankara 2013. The rate of randomly selected sampling is 47% which is depending on ensure equality of firm size, age and technology investment situation between firms. Analysis has been carried out using data which were obtained from the firms at techno-polis by using a questionnaire form. The respondents were chosen from the middle and senior managers of firms. Questionnaires were subjected to respondents by e-mail. Data obtained from those 30 questionnaires were analyzed through the SPSS 15 statistical program and tested.

2.2. Analyses and Results

First the Descriptive Statistics test was applied to data in order to obtain descriptive information about firms. The values obtained from the test are given in Table 1.

Table 1. Descriptive Statistics for SMEs

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of Firms</td>
<td>Production: 66.7%, Service: 33.3%, Trade:</td>
</tr>
<tr>
<td>Size of Firms</td>
<td>Number of Employees: 1-5 employees: 83.3%, 6-10 employees: 13.3%, 26-30 employees: 3.3%</td>
</tr>
<tr>
<td>Amount of Sales (* $1000)</td>
<td>1-50: 33.3%, 151-200: 10%, 201-250: 3.3%, 250+: 36.7%, 16.7%</td>
</tr>
<tr>
<td>Duration of Activity (years)</td>
<td>1-3: 66.7%, 4: 33.3%</td>
</tr>
<tr>
<td>Existence of R&amp;D Dep.</td>
<td>Yes: 100%, No</td>
</tr>
<tr>
<td># of personnel in R&amp;D Dep.</td>
<td>1-3: 46.7%, 4-7: 46.7%, 8-11: 6.6%</td>
</tr>
<tr>
<td>Sectors</td>
<td>Food: 6.7%, Industrial design: 13.3%, Industry: 3.3%, Information Technology: 33.3%, Other: 43.3%</td>
</tr>
</tbody>
</table>

The questionnaire consisted of 25 items belonging to three sets of questions. The first set was about descriptive information of firms. For a total of 8 items respondents were asked. The second set of questions measured innovation performance. The scale was adapted from Glaister and Falshaw (1999), Dincer et al. (2006) and Glaister et al. (2009). For a total of 9 items respondents were asked, on a seven-point scale rating from “1: strongly disagree” to “7: strongly agree” to indicate the innovation performance of firms (Cronbach alpha = .798). The third set of questions measured technological investments. The scale was adapted from Rigby and Bilodeau (2011). For a total of 8 items respondents were asked, on a seven-point scale rating from “1: strongly disagree” to “7: strongly agree” to indicate technological investments of firms (Cronbach alpha = .859). The Cronbach’s alpha for all the data was .668 for reliability. Alpha coefficients obtained were accepted because they were higher than 0.50, as defined by Bagozzi and Yi (1988), and 0.70 as defined by Nunnally (1978), respectively.

The number of data was 30. Therefore, Kolmogorov-Smirnov test was used to measure the normality of the data. According to the 5 percent significance level, the values of significance were greater than 0.05. As a result, we could say that data were normally distributed.

Table 2. Test of Normality (Kolmogorov-Smirnov’s Test Results)

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Kolmogorov-Smirnov Values</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological Investment</td>
<td>0.146</td>
<td>0.102</td>
</tr>
<tr>
<td>Innovation Performance</td>
<td>0.138</td>
<td>0.150</td>
</tr>
</tbody>
</table>
Kaiser-Meyer-Olkin (KMO) value is 0.742 and Sig. is 0.000 in Bartlett’s test of sphericity for innovation performance. This KMO value is greater than 0.50. Therefore, data set is suitable for factor analysis. The cumulative percent in rotation sums of squared loadings is 81.696. According to this result, the one factor (with 4 items) resulted in factor analysis explained 81.696 percent of the total variance. All communalities values are greater than 0.50. Moreover, Kaiser-Meyer-Olkin (KMO) value is 0.772 and Sig. is 0.000 in Bartlett’s test of sphericity for technological investment. This KMO value is greater than 0.50. Therefore, data set is suitable for factor analysis. The cumulative percent in rotation sums of squared loadings is 85.719. According to this result, the one factors (with 5 items) resulted in factor analysis explained 85.719 percent of the total variance. All communalities values are greater than 0.50.

Table 3. Rotated Component Matrix

<table>
<thead>
<tr>
<th>Factors</th>
<th>Questions</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>TI7</td>
<td>0.939</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TI8</td>
<td>0.939</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TI6</td>
<td>0.889</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TI5</td>
<td>0.858</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TI4</td>
<td>0.711</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>IP4</td>
<td>0.887</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>IP6</td>
<td>0.856</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP3</td>
<td>0.845</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IP5</td>
<td>0.845</td>
<td></td>
</tr>
</tbody>
</table>

The Pearson correlation was used to investigate the relationship between the Technological Investment, Innovation Performance, Firm Size and Firm Age. The results \((r = 0.689, \rho < 0.01)\) for technological investment indicates that this variable significant correlate with innovation performance (Table 4). Firm age \((r = 0.453, \rho < 0.05)\) has a significant correlation with technological investment.

Table 4. Pearson Correlation Results for Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>TI</th>
<th>IP</th>
<th>FS</th>
<th>FA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TI</strong></td>
<td>1.000</td>
<td>.689**</td>
<td>.124</td>
<td>.453*</td>
</tr>
<tr>
<td><strong>IP</strong></td>
<td>.689**</td>
<td>1.000</td>
<td>.334</td>
<td>.290</td>
</tr>
<tr>
<td><strong>FS</strong></td>
<td>.124</td>
<td>.334</td>
<td>1.000</td>
<td>-.076</td>
</tr>
<tr>
<td><strong>FA</strong></td>
<td>.513</td>
<td>.072</td>
<td>.692</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Pearson Correlation and Significance
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Regression analysis was used to determine the direction and strength of the relationship between technological investment and innovation performance. The results indicate that technological investment (parameter estimate 0.651, \(\rho\) value less than 0.01) has a strong positive relationship with innovation performance (Table 5).

Table 5. Extract of Regression Results for Technological Investment and Innovation Performance

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Sig. ((\rho))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std.Error</td>
<td>Beta</td>
</tr>
<tr>
<td>Constant</td>
<td>-.386</td>
<td>.502</td>
<td></td>
</tr>
<tr>
<td>TI</td>
<td>.651</td>
<td>.152</td>
<td>.651</td>
</tr>
<tr>
<td>FS</td>
<td>.266</td>
<td>.143</td>
<td>.254</td>
</tr>
<tr>
<td>FA</td>
<td>.030</td>
<td>.315</td>
<td>.014</td>
</tr>
</tbody>
</table>

\(R^2 = .538\)
\(F = 10.088\)
Dependent Variable “Innovation Performance”

As a result of findings, the equation considered as a mathematical model is given numerically below:

\[ IP = .651 \times TI \]
The results of multiple linear regression analyses belonging to innovation performance and technological investment were shown schematically in a collective manner in Figure 2 below. The relationships accepted were shown by arrows with thick lines.

![Figure 2: Conceptual Model Linking Human Capital, Social Capital, Financial Capital and Performance](image)

The results regarding the hypotheses are shown in Table 6. Totally 3 hypotheses are ranked in the Table. With regard to the results, Beta coefficients ($\beta$), Significance ($\rho$) and Accepted/Rejected (A/R) status are also given in the Table. According to these results, 1 hypotheses was accepted at significance level of 0.01 and

<table>
<thead>
<tr>
<th>No</th>
<th>Hypothesis</th>
<th>$\beta$</th>
<th>$\rho$</th>
<th>A/R</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>There is a relationship between Technological Investment and Innovation Performance</td>
<td>.689**</td>
<td>.000</td>
<td>A</td>
</tr>
<tr>
<td>H2</td>
<td>There is a relationship between Firm Size and Innovation Performance</td>
<td>.334</td>
<td>.072</td>
<td>R</td>
</tr>
<tr>
<td>H3</td>
<td>There is a relationship between Firm Age and Innovation Performance</td>
<td>.290</td>
<td>.120</td>
<td>R</td>
</tr>
</tbody>
</table>

### 3. Conclusion

We have used the view to examine the relationships between innovation performance and technological investment, firm size and firm age in firms operating in Ankara technopolis, Turkey. The results shown on Table 6 have showed that there is a relationship between technological investments and innovation performance of firms. In addition, the findings have also showed that the relationship between technological investment and innovation performance is strong. However, our analyses have also revealed that there are no relationships between innovation performance between firm size and firm age.

### REFERENCES


