EXTERNAL ENVIRONMENT EFFECTS ON PRODUCT INNOVATION PERFORMANCE: THE FOOD AND BEVERAGE INDUSTRY IN ISTANBUL

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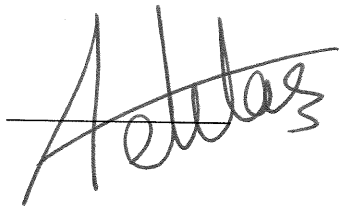

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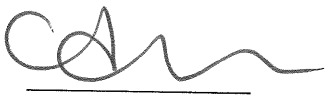

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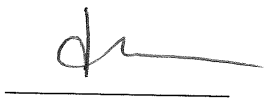

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Thesis Abstract

Merve Erkman, ''External Environment Effects on Product Innovation Performance: The Food and Beverage Industry in Istanbul''

Product innovation performance is gaining importance in today's world along with increasing globalization and the developments in technology. Firms, even the biggest market leaders, do not possess all the internal skills, knowledge and capabilities needed to cope with global competition. Therefore, innovation can come from outside and large multinationals are moving towards a double network structure which makes external environment vital.

Within this context, the primary objective of this thesis is to analyze the effects of some major factors and linkages related to the external environment of the firm on its product innovation performance. The factors are grouped as external knowledge inflow, cooperation with various external parties and international trade activities. To the best knowledge, literature lacks a study which involves the analysis of all these specific factors in a single study. The framework developed is implemented on the food and beverage sector empirically. For this purpose, an extensive literature survey is conducted and related data is gathered using a questionnaire developed for this purpose. Utilizing statistical tests such as frequency, crosstab, correlation and regression, the impact of external environment are analyzed.

This study can shed light on similar studies with the suggestion that external environment related various factors of the firm are worth analyzing in studying the product innovation performance of firms. The framework can also be implemented on companies from various sectors which would make it possible to benchmark sectors in terms of product innovation performance.

Tez Özeti

Merve Erkman, ''Dış Çevrenin Ürün Yenilik Performansına Etkileri: İstanbul'daki Yiyecek ve İçecek Endüstrisi ''

Gittikçe artan globalleşme ve teknolojik gelişmeler ile birlikte ürün yenilik performansı iş dünyasında önem kazanmaktadır. Firmalar, en büyük pazar liderleri bile, küresel rekabet ile başa çıkmak için gerekli tüm iç bilgi, beceri ve yeteneklere sahip değildir. Bu yüzden dış çevreden gelen yenilik önemlidir.

Bu kapsamda, çalışmanın temel amacı, firmanın dış çevre ile ilgili bazı önemli faktörler ve bağlantıların ürün inovasyon performansı üzerindeki etkilerini analiz etmektir. Faktörler dış bilgi girişi, çeşitli dış partiler ile işbirliği ve uluslararası ticaret faaliyetleri olarak gruplandırılmıştır. Literatürde tüm bu faktörleri tek çalışma altında analiz eden bir çalışmaya rastlanmamıştır. Geliştirilen çalışma gıda ve içecek sektörüne uygulanmıştır. Bu amaçla, geniş bir literatür taraması yapıldı ve ilgili veriler bu amaçla geliştirilen anket aracılığıyla toplandı. Frekans testi, ki-kare bağımsızlık testi, korelasyon ve regresyon gibi istatistiksel testler kullanılarak, dış çevrenin etkisi analiz edildi.

Bu çalışma, firmanın çeşitli faktörlere bağlı dış çevresinin ürün yenilik performansına etkisini analiz eden benzer çalışmalara ışık tutabilir. Aynı zamanda bu çalışma çeşitli sektörlerden şirketlere uygulanarak ürün yeniliği performansı açısından sektör kıyaslaması yapılmasını mümkün kılabilir.

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To my family

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CHAPTER I

INTRODUCTION

Enterprises used to grow in stable environment until recently; however, in today's turbulent and competitive environment, they try to internationalize and increase their market share. The result is a new commercial reality which is the emergence of global markets (Levitt, 1983). In order to strengthen their competitive power, companies have to learn how to adapt quickly to the changing landscapes and how to introduce new products and technologies in response to emerging market opportunities. Therefore, global competition forces the companies to focus on their business strategies, especially on innovations (Kuratko and Hodgetts, 1998). With the purpose of gaining competitive advantage, firms begin to evaluate and apply their innovation strategies and entrepreneurial abilities (Drucker, 1985; Hult, 2003). In general, innovation is described as the developments and new applications, with the purpose of launching newness into the economic area and can be conceived as the transformation of knowledge to commercial value.

Innovation is a principal driver for long-term economic growth (Schumpeter, 1934). It has significant impact on value creation and development of modern societies; therefore innovations are creations of economic significance (Edquist, 1997). Innovativeness is one of the essential instruments of growth strategies. It is a means to enter new markets, to increase the existing market share and to provide the company with a competitive edge. Its significant role in obtaining increased business

performance and in increased competitive edge, make innovativeness a key aim for the firms. Because it is vital for the companies to build a reputation in the market place and thus to increase their market share, companies give importance to innovation and procure additional competitive advantage and market share.

Because of the intense competition in most markets, companies are increasingly recognizing the necessity and advantages of regularly developing new products. Firms which introduce higher quality products faster than their competitors usually earn higher economic returns (Datar, 1997). For the creation of technological competencies, inter-firm collaboration becomes an important vehicle (Schoenmakers and Duysters, 2006), and is a viable solution to the problem of resources and capabilities not always being available within a firm and difficult to obtain efficiently in the market (Das and Teng, 2000). Most research on this topic focuses on the motives behind R&D collaboration (Fritsch and Lukas, 2001; Tether, 2002; Miotti and Sachwald, 2003; Belderbos et al., 2004) whereas a number of authors evaluate the impact of different types of collaborative networks including suppliers, customers, competitors, and research organizations on product innovation performance (Lööf and Heshmati, 2002; Criscuolo and Haskel, 2003; Miotti and Sachwald, 2003; Belderbos et al., 2004a; Faems et al., 2005; Nieto and Santamaría, 2007). These studies may moderate the relationship between collaborative networks and product innovation performance.

In order to reduce the costs and risk of technology development and to introduce higher-quality products faster than competitors, firms may count heavily on the effectiveness with which they can gain access to external sources of technological knowledge and skills. In that sense, knowledge transfer becomes significant. Knowledge transfer involves the commercialization of skills and

expertise possessed by higher education with the purpose of catalyzing and facilitating innovation. Cohen and Levinthal (1989, 1990) argue that external knowledge is more effective for the innovation process when the firm improves its own R&D, that is, its internal capacities (Cassiman and Veugelers, 2002). A better understanding of the role of external linkages such as cooperation and knowledge transfer in the product innovation process should therefore result from taking into account the fact that firms may simultaneously use several actors and knowledge sources as 'inputs' to the innovation process, which is discussed in detail throughout the thesis.

International trade, namely accessing and transacting with international markets, are also presumed to affect innovation potential and performance. Motivation on importing and exporting relate to faster growth for both countries and firms. Importing and exporting can relate to higher firm performance in various ways. The use of foreign intermediate inputs can increase these firms' profits due to access to more variety of inputs or due to higher quality of these products. Moreover, the firms that either export or import are likely to earn the highest profits and show the highest performance (Seker, 2011). The role of export entry for the firm product innovation rests on the prominence of contacts with foreign final customers and, more in general, with the foreign market context. In the frame of foreign business relationships, buyer-supplier relationship is important for the enhancement of innovation efforts and competitiveness of downstream firms (Turco and Maggioni, 2011). Buyers in developed countries often transfer technology, knowledge, managerial practices, information about production techniques and processes to suppliers in developing countries and provide training to their workers (Egan and Mody, 1992; Rauch and Watson, 2003). This leads to new products' development,

quality improvements and restyling of existing products. The import market entry, then, discloses to firms the opportunity to purchase cheaper and/or higher quality input and new intermediate varieties unavailable in the domestic market (Halpern, Koren, and Szeidl, 2005). This results in modification of previously produced goods or in production of completely new goods (Goldberg, Khandelwal, Pavcnik, and Topalova, 2009).

Based on the above discussions, the primary objective of this thesis is to analyze the effects of some major factors and linkages related to the external environment of the firm on its product innovation performance. The factors are grouped as external knowledge inflow, cooperation with various external parties and international trade activities. To the best knowledge, literature lacks a study which involves the analysis of all these specific factors in a single study. The framework developed is implemented on the food and beverage sector empirically. For this purpose, an extensive literature survey is conducted and related data is gathered using a questionnaire developed for this purpose. The food and beverage industry is selected for this study since the sector is one of the competitive and developing manufacturing sectors which are important for product innovation. The sample is limited to companies in Istanbul due to accessibility and availability problems of data for other cities. However, production facilities and headquarters of most of the firms operating in food and beverage industry are located in Istanbul.

The remainder of the thesis is organized as follows. Following this introduction, chapter 2 discusses the innovation concept in relation to the business environment. Chapter 3 focuses on the product innovation performance and chapter 4 discusses the external environment related factors pertaining the product innovation performance. Chapter 5 is about the methodology and data and chapter 6 summarizes

the empirical results. Chapter 7 includes the conclusion, policy suggestions and possible directions for future research.

CHAPTER II

INNOVATION AND THE BUSINESS ENVIRONMENT

Innovation can be defined as all scientific, technological, organizational, financial and commercial activities which lead to, or are intended to lead to, the implementation of technologically new or improved products or services (OECD/Eurostat, 1997). Therefore, an innovation contains new ideas which influence the economic activity. The introduction of new technology, human capital and the improvements in the organization of production are oriented toward efficiency increases at firm level. Higher efficiency enables the organization to produce at lower costs than its rivals. In a similar manner, the introduction of new products provides consumers with new goods and services which lead to the expansion of firms in new segments of the market (OECD/Eurostat, 1997). It can be concluded that innovations enable firms to differentiate themselves from their rivals in terms of new products, processes, costs or organizational improvements (Hashi and Stojcic, 2010).

Universally, innovation is regarded as one of the main drivers for a sustainable and internationally competitive business environment (Romer 1986; Nadiri 1993; Edquist 1997; Agarwal et al. 2003). According to OECD based research, there is a strong linkage between innovation activities and GDP growth (Ahn 2002).

After 80's, global competition forced the companies to focus on their business strategies, especially on innovations (Kuratko and Hodgetts, 1998). In that sense, because of the tough global competition, both individuals and companies began to

evaluate and apply their innovation strategies and entrepreneurial abilities with the purpose of gaining competitive advantage (Drucker, 1985; Hult et al., 2003). Generally, innovation is described as developments and new applications, with the purpose of launching newness into the economic area and can be conceived as the transformation of knowledge to commercial value. Due to its potential for increasing the efficiency and the profitability of companies, innovation has great commercial importance.

Innovation and Growth

Schumpeter (1934) defines innovation as the principal driver for long-term economic growth. In the global business world, innovation is explained as utilizing accessible knowledge, leading to economic growth. Innovation can be defined as the actual use of a nontrivial change and improvement in a process, product or system that is novel to the institution developing the change (Freeman and Soete, 1997). Joseph Schumpeter (1934) is the pioneer of explaining innovation studies. He defines the innovation as the principal driver for long-term economic growth and social change. Schumpeter defines the concept of innovation comprehensively, and argues that it includes new products, new methods of production, new sources of supply, exploitation of new markets as well as new ways to organize businesses. After the works of Schumpeter, most following scholars and practitioners define and discuss innovation around these concepts and principles (Andersen and Opsal, 2010).

Innovation plays a crucial role in value creation and development of modern societies; so innovations are creations of economic significance (Edquist, 1997). The

importance of innovations for economic growth is thoroughly documented, both theoretically (Solow 1956; Romer 1986) and empirically (Mansfield, 1972; Nadiri, 1993; Agarwal, 2003). Most studies show that only an increase in input factors result in a small share of economic growth, however significant economic growth is only created when the factors are used in new and more efficient ways (Cameron, 1996).

Innovativeness is one of the essential instruments of growth strategies to enter new markets, to increase the existing market share and to provide the company with a competitive edge. With the increasing level of competition in global markets, companies have started to realize the importance of innovation. Because of rapid changes in technologies and severe global competition, the value added created by existing products and services are eroded. Therefore, innovations can be regarded as an indispensable component of the corporate strategies for several reasons. Innovations result in applying more productive manufacturing processes, performing better in the market, seeking positive reputation in customers' perception consequently gaining sustainable competitive advantage. Accordingly, innovativeness has turned into an attractive area of study for those researchers who try to define, categorize and investigate its performance impacts, especially due to its practical relevance. Innovations provide firms a strategic orientation to overcome the problems they encounter while striving to achieve sustainable competitive advantage (Drucker, 1985; Hitt et al., 2001; Kuratko et al., 2005).

Innovation Types

Innovation as a term is not only related to products and processes, but also to marketing and organization. Schumpeter (1934) describes different types of

innovation as new products, new methods of production, new sources of supply, the exploitation of new markets, and new ways to organize business. Drucker (1985) defines innovation as the process of equipping in new, improved capabilities or increased utility.

In the OECD Oslo Manual (2005), four types of innovation are described. These are product innovation, process innovation, marketing innovation and organizational innovation. Among the four types; product and process innovations are strongly related to the technological developments. A product innovation is the introduction of a new good or service or significantly improved regarding its characteristics or intended uses; such as significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics (OECD Oslo Manual, 2005).

Product innovations can basically be determined as the utilization of new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. The term product includes both goods and services. Product innovation can be defined as a difficult process driven by advancing technologies, changing customer needs, shortening product life cycles, and increasing global competition. To be successful, it must involve strong interaction within the firm and further between the firm and its customers and suppliers (Akova et al., 1998).

Process innovation is the implementation of a new or significantly improved production or delivery method. This involves significant changes in techniques, equipment and/or software. Process innovation is planned to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or

significantly improved products (OECD Oslo Manual, 2005). Fagerberg et al. (2004) emphasizes that while the introduction of new products is commonly assumed to have a clear, positive effect on the growth of income and employment; process innovation, due to its cost-cutting nature, can have a more hazy effect.

Marketing innovation can be described as the implementation of a new marketing method including significant changes in product design or packaging, product placement, product promotion or pricing (OECD Oslo Manual, 2005). Marketing innovations concentrate at addressing customer needs better, opening up new markets, or newly positioning a firm's product on the market with the intention of increasing firm's sales. Marketing innovations are significantly related to four pricing strategies, product package design properties, product placement and promotion activities along the lines of four P's of marketing (Kotler, 1991).

Organizational innovation is the application of a new organizational method in the firm's business practices, workplace organization or external relations. Organizational innovations have a tendency to increase firm performance by reducing administrative and transaction costs, improving workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies (OECD Oslo Manual, 2005)

Innovation and Business Performance

Innovativeness is one of the key factors for firms due to its impact on business performance and increased competitive edge. It is vital for the companies to build a

reputation in the marketplace for increasing their market share; therefore, companies give importance to innovation and procure additional competitive advantage and market share. Metcalfe (1998) expresses that when the flow of newness and innovations desiccates, firms' economic structure settles down in an inactive state with little growth. Hence, innovation plays an important role in creating the differences of performance and competition among firms, regions and even countries. For example, the research by Fagerberg (2004) concludes that innovative countries are more productive and generate higher income than the less-innovative ones. OECD reports show that companies that develop innovations rapidly and in a more decisive way, has also more qualified workers, pay higher salaries and provide more conclusive future plans for their employees. Actually, the effects of innovations on firm performance differ in a wide spectrum from sales, market share and profitability to productivity and efficiency (OECD Oslo Manual, 2005).

McAdam and Keogh (2004) investigate the relationship between firms' performance and its familiarity with innovation and research and they point out that the firms' inclination to innovations is of vital importance for the competitive environments in order to obtain higher competitive advantage. Geroski (2005) examines the effects of the major innovations and patents on various corporate performance measures such as accounting profitability, stock market rates of return and corporate growth. The observed direct effects of innovations on firm performance are relatively small, and the benefits from innovations are more likely indirect. But, innovative firms seem to be less susceptible to cyclical, sectorial and environmental pressures than non-innovative firms.

It is apparent that firms have different levels of innovative capabilities, nevertheless innovative activities need to be focused on many aspects such as new products, new organizational and marketing practices or administrative systems, and

new process technologies (Drejer, 2002; Garcia and Calantone, 2002; Johannessen et al., 2001; Lin and Chen, 2007). In addition, as Damanpour and Evan (1984) state a balanced rate of adoption of administrative and technical innovations is more effective in aiding firms to preserve and improve their level of performance than implementing them alone. Innovation literature does not reveal a conclusion if a specific innovation type is likely to provide more or less an impact on corporate performance or not, however it can be concluded that innovations influence each other and need to be implemented in conjunction (Walker, 2004).

Innovations can actually increase the firm performance in several aspects. Particularly, four different performance dimensions are stated in the literature to represent firm performance (Narver and Slater, 1990; Barringer and Bluedorn, 1999; Antoncic and Hisrich, 2001; Hornsby et al., 2002; Hagedoorn and Cloodt, 2003; Yilmaz et al., 2005). These dimensions are innovative performance, production performance, market performance and financial performance.

Innovation effects corporate performance by producing an improved market position that transfers competitive advantage and superior performance (Walker, 2004). A large number of studies focusing on the innovation-performance relationship provide a positive estimation of higher innovativeness that cause an increase on corporate performance (Damanpour and Evan, 1984; Damanpour et al., 1989; Deshpande et al., 1993; Dos Santos and Peffers, 1995; McGrath et al, 1996; Gao and Fu, 1996; Han et al., 1998; Olson and Schwab, 2000; Hult and Ketchen, 2001; Du and Farley, 2001; Calantone et al., 2002; Garg et al., 2003; Wu et al., 2003). The researches by Marcus (1988), Ittner and Larcker (1997), Whittington, (1999), Olson and Schwab (2000), Knott (2001) and Baer and Frese (2003) focus on process innovations while studies of Atuahene-Gima (1996), Subramanian and

Nilakanta (1996), Han et al., (1998) and Li and Atuagene-Gima (2001) focus on product innovations. Many of these research conclude more or less a positive association between innovations and firm performance, but there are also some studies stating a negative link or no link at all (Capon et al., 1990; Chandler and Hanks, 1994, Subramanian and Nilakanta, 1996).

Miller (2001) states that most firms look for technological innovation to gain competitive advantage in their market. Therefore, all these efforts need to be supported by marketing and organizational measures. Generally, researchers disregard organizational and/or marketing innovations, which are equally necessary to the growth and effective operation of a firm (Damanpour and Evan, 1984, Damanpour 1991). There are few studies on organizational and marketing innovations. They state that more innovative firms place more emphasis on management techniques (Baldwin and Johnson, 1996) and reach sustainable levels of higher performance (Han et al., 1998; Ravichandran, 2000; Hult and Ketchen, 2001; Guan and Ma, 2003). Wolff and Pett (2004) and Walker (2004) examine comparative research for the effects of product and process innovations on firm performance. They indicate that particular product improvements are positively associated with firm growth. Gopalakrishnan (2000) broadens the topic while emphasizing that innovation speed and innovation magnitude are also relevant innovativeness features both of which have a positive effect on firm performance.

Although finding weak linkage, Lin and Chen (2007) associate innovations with increased firm sales; and they conclude that organizational innovations rather than technological innovations seem to be the most significant factor for total sales. On the other hand, Johne and Davies (2000) argue that by increasing product

consumption and yielding additional profit to firms, marketing innovations increase sales.

Determinants of Innovation

There exists extensive research on determinants of innovation. Literature focuses on a number of key factors that influence or enhance innovation at firm level and increase innovation performance. Determinants can be classified as internal and external. Internal factors are generally the controllable factors that are related to the environment inside the company such as number of workers. On the other hand, external factors are related to the external environment and external linkages of the firm which are more difficult to control. The latter will be discussed in more detail in the following chapters. Following is a summary about the determinants of innovation compiled from various researches.

Hyvärinen (1990) Personnel participation, inventions, science, different technologies, information, outside know-how, timetables, life cycles, internal know-how, ideas, financial input, motivation, attitudes, working hours, education, strategy, competition, cooperation between departments, economical support, infrastructure, political input, branch, market, competition, hostility, location, interest groups

Hoffman et al. (1998) Qualified scientists and engineers, owner-manager leadership (and education), nature of commercialization and marketing efforts, degree of marketing involvement, macro-economic conditions, finance, external linkages

Brouwer and Kleinknecht (1996) R&D intensity, sales growth, SME presence, employees, R&D function, dependence on mother company, R&D focus, consultation of innovation manufacturing and center, sector, location, external knowledge, collaboration.

Hadjimanolis (2000) Owner characteristics (age, education, prior experience, cosmopolitanism), SME characteristics (size, age, sales revenue, existence of written strategy, degree of internationalization, R&D expenditure, employment of scientists and engineers, environmental scanning, cooperation with technology providers), environmental factors (intensity of competition, environmental change, importance of external barriers, level of networking)

Bougrain and Haudeville (2002) Industrial cooperation (sector of production, technical partners, linkages to external resources), R&D intensity, number of executives, existence of design office

Romijn and Albaladejo (2002) Professional background of founder, skills of workforce, internal efforts to improve technology (including R&D expenditures, training, licenses electronic firms bought), intensity of networking, proximity advantages, institutional support

Acs and Audretsch (1988, 1990) R&D expenditures, capital intensity, employee-union membership, 4-firm concentration ration, advertising expenditures, skilled labour, firms and highly large-firm industry employment, value-of-shipments

Kim et al. (1993) Environment (dynamism, complexity), strategy (scanning, internal control, R&D intensity, external technology linkages), structure (formalization, centralization, professionalisation, administrative intensity), top

management characteristics (internal locus of control, risk taking propensity, tolerance for ambiguity)

Roper (1997) Workforce qualification and utilization, in-house R&D capability, manufacturing

Bhattacharya and Bloch (2004) Size, profit, growth, R&D expenditure, R&D intensity, 4-firm concentration ration, export and import

Rogers (2004) Employment, age, profit margin, training intensity, management training, foreign-ownership, employee union-membership, business comparison, networking, export activity, R&D activity, R&D intensity in industry, patent intensity in industry, market share, 4-firm concentration ratio

Oerlemans et al. (1998) Transaction, transformation, public knowledge infrastructure, private knowledge infrastructure, production column, intermediaries, technology policy

Freel (2003) Networking, R&D expenditure, skill level of employees

All the studies mentioned above include both internal and external factors, however; this study analyze s the factors related to the external environment and external linkages of the firm which will be discussed in more detail in the following chapters.

CHAPTER III

PRODUCT INNOVATION PERFORMANCE

Product innovation is classified in the literature as new product innovation, greatly modified/ improved products or slightly improved products. New product development describes the complete process of bringing a new product or service to market. Processes are involved in the path of new product innovation; the idea generation, product design, detail engineering and market research and marketing analysis. Improvement of existing product includes improvements in functional characteristics, technical abilities, or ease of use. This innovation often takes place when a product's sales are in decline to extend the life of a product (Policy Studies Institute, 2010).

When the aim of product development activity is to reinforce and maintain moderately innovative products (platform focus), increased resource allocation shows a positive relationship to product innovation performance. Knowledge utilization is an important predictor of the benefits of developing highly and moderately innovative products. Moreover, it helps to mitigate the drawbacks of a breakthrough focus and strengthens the positive impact of a platform focus (Zhang and B· ·detto, 2009).

Due to the intense competition in most markets today, companies are increasingly recognizing the necessity and advantages of regularly developing new

products. Firms who introduce higher quality products faster than their competitors usually earn higher economic returns (Datar et al., 1997).

Because of rapid changes, firms depend on external technological knowledge and skills in addition to internal technological resources. Using strategies such as technology licensing and collaborative agreements, many firms today are relying more extensively on external linkages to acquire new technological knowledge. For the creation of technological competencies, inter-firm collaboration is an important vehicle (Schoenmakers and Duysters, 2006), and is a viable solution to the problem of resources and capabilities not always being available within a firm and difficult to obtain efficiently in the market (Das and Teng, 2000). Most research on this topic focuses on the motives behind R&D collaboration (Fritsch and Lukas, 2001; Tether, 2002; Miotti and Sachwald, 2003; Belderbos et al., 2004) whereas a number of authors evaluate the impact of different types of collaborative networks on product innovation performance (Lööf and Heshmati, 2002; Criscuolo and Haskel, 2003; Miotti and Sachwald, 2003; Belderbos et al., 2004a; Faems et al., 2005; Nieto and Santamaría, 2007). These studies may moderate the relationship between collaborative networks and product innovation performance. Inter- firm collaboration is an effective vehicle for organizational learning, prior research argues that a sufficient degree of absorptive capacity which is firm's ability to recognize the value of new information, assimilate it; and apply it to commercial ends, is required for effective learning in a collaborative agreement between firms (Mowery et al., 1996; Lane et al., 2001). In spite of a growing interest in the link between organizational learning and product innovation (Adams et al., 1998; Erwin, 2002), relatively little research examines how absorptive capacity moderates the relationship between external linkages and product innovation. Some important works (Cohen and

Levinthal, 1990; Kim, 1997, 2001; Teece, 2000) emphasize that a firm's absorptive capacity determines the extent to which it is able to utilize external knowledge by asking the question '' do firms with a high level of absorptive capacity realize higher product innovation from close collaboration than firms with a low level of absorptive capacity?'' In addition, these studies examine the effect of the use of external knowledge for product innovation. Since product innovation is associated with firms that depend to a large extent on technology acquired from collaborating with different partners, the answer to the question is vital. In order to reduce the costs and risks of technology development and to introduce higher-quality products faster than competitors, firms may count heavily on the effectiveness with which they can gain access to external sources of technological knowledge and skills. Additionaly, some previous studies suggest that collaborating with different partners is an effective way to improve product innovation (Belderbos et al., 2004; Nieto and Santamaría, 2007).

In terms of interaction with different types of partners, some research suggests that a firm can advance its product innovation by interacting with different collaborators, primarily suppliers, customers and competitors. Regarding the parts and components which may be critical to a firm's new product development, suppliers usually have greater expertise and more comprehensive knowledge. Therefore, supplier collaboration can allow firms to incorporate the expertise and different perspective of a supplier to improve its solutions or create new methods for product development (Bonaccorsi and Lipparine, 1994; Eisenhardt and Tabrizi, 1995). Moreover, supplier involvement helps firms identify potential technical problems, thereby speeds up new product development and responses to market demands (Kessler and Chakrabatri, 1996). Miotti and Sachwald (2003) empirically find the positive effect of collaboration with suppliers on the share of innovative

product revenue. Faems et al. (2005) find a positive association between suppliers and the proportion of revenue attributed to improved products. Nieto and Santamaría (2007) analyze the impact of product innovation on collaborative networks and find a positive link between collaboration with suppliers and the degree of product innovativeness. On the other hand, Sánchez and Pérez (2003) conclude that collaborating with suppliers does not improve new product performance. Similarly, Freel (2003) finds that supplier collaboration does not have a significant impact on new product performance. Ledwith and Coughlan (2005) point to the insignificant correlation between collaboration with suppliers and product innovation performance. In addition, Belderbos et al. (2004) find a negative but insignificant relationship between collaboration with suppliers and product innovation performance.

Collaborating with customers is another significant way for a firm to improve its product innovation performance (Gupta et al., 2000; Fritsch and Lukas, 2001; Brockhoff, 2003). Working with customers provides benefits in identifying market opportunities for technology development and also reduces the likelihood of poor design in the early stages of development. Additionally, understanding the needs of influential customers may help firms gain new ideas about solutions (Hippel et al., 1999) and identify market trends early on, thereby increases the chances of new product development and success. Therefore, customer involvement may lead to product innovation advantages (Souder et al., 1997; Li and Calantone, 1998). Miotti and Sachwald (2003), Freel (2003), and Faems et al. (2005) find that collaboration with customers has a positive impact on product innovation performance. However, Lööf and Heshmati (2002) conclude a negative relationship between customer collaboration and product innovation performance. Nieto and Santamaría (2007) find

that customer collaboration has a positive impact on product innovation with marginal changes, but does not affect significant innovation with new functions. Belderbos et al. (2004) reveal an insignificant association between collaboration with customers and changes in new product sales. Monjon andWaelbroeck (2003) find that customer collaboration has an insignificant impact on product innovation.

The least frequent type of collaborative network is collaboration with competitors to achieve product innovation (Bayona et al., 2001; Nieto and Santamaría, 2007); however, this type of collaboration still provides some advantages. Firms that are involved in a cooperative agreement may share technological knowledge and skills with each other, producing a synergistic effect on solving common problems outside the competitor's area of influence (Tether, 2002). Inkpen and Pien (2006) suggest that firms collaborating with competitors may perform better in innovation than they would otherwise. Similarly, firms can accelerate their capability development by R&D cooperation, which allows them to reduce the time and risk involved in technological innovation (Belderbos et al., 2004). Collaborating with competitors provides firms to verify their competitors' technological level; firms that are more knowledgeable about their competitors' technology strategies are better able to differentiate themselves (Linn, 1994). Lööf and Heshmati (2002) find that collaborating with competitors is positively related to new product sales. On the other hand, Monjon and Waelbroeck (2003), Miotti and Sachwald (2003), and Belderbos et al. (2004) conclude that competitor collaboration has a negative but insignificant impact on product innovation performance. Nieto and Santamaría (2007) also state that collaboration with competitors does not impact product innovation with marginal modifications, whereas it negatively affects product innovations with new functions.

Increasing number of firms are pursuing product innovations by collaborating with universities and research institutions via government subsidies. Universities and research institutes are important centers for creating and disseminating scientific knowledge (Hemmert, 2004). To benefit from their product or process innovations, firms can interact formally and informally with universities and research institutes (Caloghirou et al., 2004). Firms who choose not to acquire technological knowledge from universities and research institutions may fall behind, reducing the likelihood that it will make a technological breakthrough leading to a commercial product (Spencer, 2003). Most of the studies suggest that technological innovation relies heavily on knowledge from universities and research institutions (Bozeman, 2000; McMillan et al., 2000; Vuola and Hameri, 2006). Belderbos et al. (2004), Faems et al. (2005), and Nieto and Santamaría (2007) regard that collaboration with research institutes and universities positively affect product innovation performance. In contrast; Monjon and Waelbroeck (2003), Caloghirou et al. (2004), and Ledwith and Coughlan (2005) conclude that collaboration with universities and research institutes has a negative effect on product innovation performance. Moreover, Lööf and Heshmati (2002) reveal an insignificant relationship between collaboration with research organizations and product innovation performance (Tsahi, 2007).

Product innovation is the major driver of growth and profits since new products mean new consumers, the ability to enhance or add new marketing claims or make a splash with a new line extension, and the possibility of reducing costs by altering ingredients, manufacturing processes, packaging or suppliers. Every company is competing to develop more products faster and be the first to launch them in the market, since a head start on the competition is the best way to ensure a product's profitability and a place on the retailer's crowded shelf. If firms get their products to

the shelf too late, they are forced to compete at commodity price points and suffer poorer returns on R&D investments. For most processors, product innovation more often means changes to products already in the market. Such improvements, which include packaging, formulation, etc. are driven by a constant flow of market, customer and regulatory events (Jackson, 2009).

When innovation in new product developments is well recognized (Wind and Mahajan, 1997), it brings to market innovative products ahead of competitors. This can generate various benefits in economic, preemptive, technological, and behavioral factors (Kerin, Varadarajan, and Peterson, 1992; Lieberman and Montgomery, 1988). Thus, a successful innovator can build a large market share, and enjoy a sustainable competitive advantage (Bowman and Gatignon, 1996; Carpenter and Nakamoto, 1989; Robinson and Min, 2002). Based on this view, firms should always invest heavily in R&D and speed new products to market; an innovation strategy is key to long-term success (Zhou, 2004). Firms can exploit the innovator's efforts in developing the products and markets and then overtake it with their improved products (Shankar, Carpenter and Krishnamurthi, 1998; Zhang and Markman, 1998). More effective innovation strategies may depend on external factors, such as market environments, as well as internal factors, such as firm resources (Kerin et al., 1992; Lieberman and Montgomery, 1998; Szymanski, Troy and Bharadwaj, 1995).

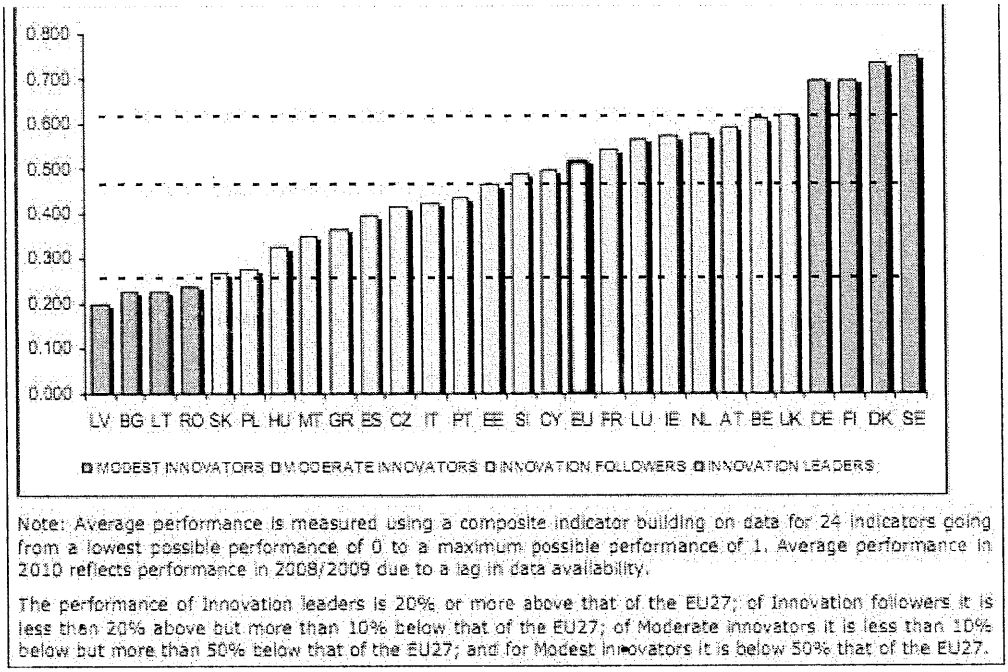
In literature, there exists vast amount of literature on innovation performance but research specifically on product performance is limited. Most of the studies imply the innovative performance measures. Innovative performance is the combination of overall organizational achievements as a result of renewal and improvement efforts made considering various aspects of firm innovativeness, i.e. processes, products, organizational structure, etc. Hence innovative performance is a

complex construct (Hagedoorn and Cloodt, 2003) which depends on various performance indicators pertaining, for example, to the new patents, new product announcements, new projects, new processes, and new organizational arrangements.

Innovative performance especially when linked with the new product; creates an increase in sales and market shares, since it contributes considerably to the satisfaction of existing customers and gaining of new customers (Pelham, 1997; Wang and Wei, 2005). In addition to this, not only new product success, but also success in marketing, process and organizational innovations together lead to a general increase in customer satisfaction and direct more customer attention towards the innovative firm (Gunday and Ulusoy, 2010).

Innovation Performance of Turkey

The Innovation Union Scoreboard (IUS) is an instrument of European Coimmission and it is revised after the adaptation of the Europe 2020 strategy to provide a comparative assessment of the innovation performance of EU Member States. New EU strategy is adaptation to innovation, therefore, name of the EU is revised to Innovation Union. IUS forms a it forms a comprehensive benchmarking and monitoring system of research and innovation trends and activities in Europe (The Innovation Union Scoreboard, 2013).



Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2010 reflects performance in 2008/2009 due to a lag in data availability.

The performance of Innovation leaders is 20% or more above that of the EU27; of Innovation followers it is less than 20% above but more than 10% below that of the EU27; of Moderate innovators it is less than 10% below but more than 50% below that of the EU27; and for Modest innovators it is below 50% that of the EU27.

Figure 1. Innovation union scoreboard 2013 (Innovation Report, 2013)

Based on their average innovation performance across 24 indicators, the Member States fall into four performance groups (see thresholds in footnote of Figure 1): innovation leaders, innovation followers, moderate innovators and modest innovators:

- Denmark, Finland, Germany, Sweden all show a performance well above that of the EU27. These countries are the Innovation leaders.

- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27. These countries are the Innovation followers.

- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27. These countries are moderate innovators.

- The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27. These countries are modest innovators.

Innovation leaders have a number of common features. Countries at the top of the ranking share a number of strengths in their national research and innovation systems. Most innovation leaders perform very well in business R&D expenditures and other innovation indicators related to firm activities while there is not one single way to reach top innovation performance. All of the innovation leaders have higher than average scores in the public-private co-publications per million population indicator. This fact points in the direction of good linkages between the science base and businesses. All European top innovators also excel in the commercialisation of their technological knowledge, as demonstrated by their good performance on the indicator license and patent revenues from abroad. Moreover, the overall good performance of the innovation leaders reflects a balanced national research and innovation system.

Turkey is one of the modest innovators with a below average innovation performance. Turkey's relative strengths are in open, excellent and attractive research systems and innovators while relative weaknesses are in human resources, firm investments and intellectual assets. Moreover, high growth is observed for business R&D expenditure and patent applications whereas a strong decline is observed for patent applications in societal challenges. As it is indicated in the figure; growth performance in human resources, open, excellent and attractive research systems, firm investment, and intellectual assets is above average and the other dimensions are below average (EU innovation report, 2010). Therefore; Turkey should improve the economic effects such as SMEs introducing product or process innovation and sales of new to market and new to firm innovations.

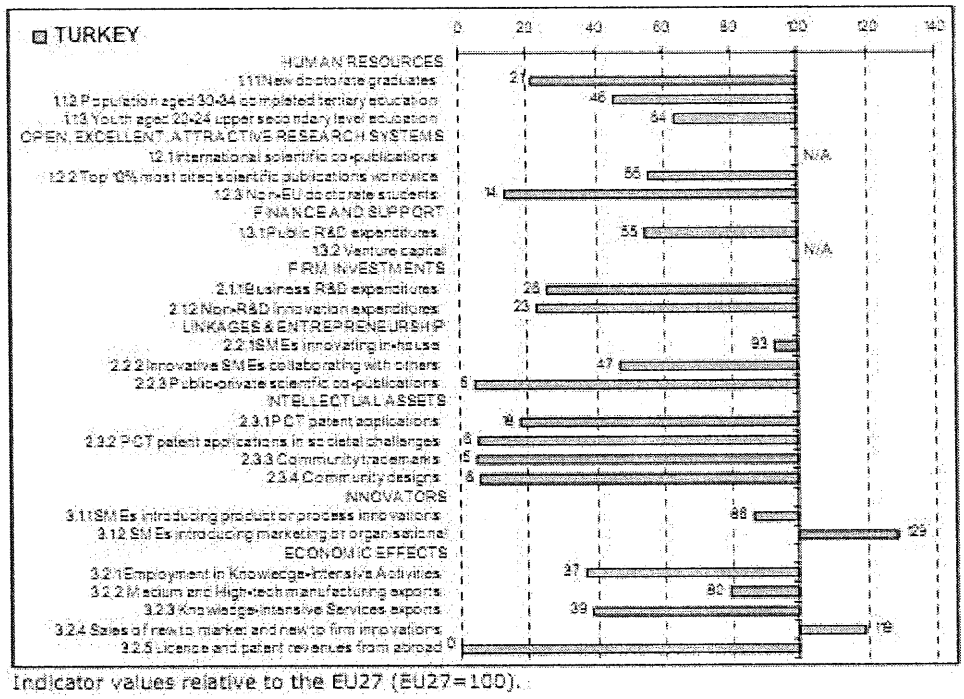


Figure 2. Innovation indicator values of Turkey (EU innovation report, 2010).

Global innovation index is an annual publication which features, among others, a composite indicator that ranks countries/economies in terms of their enabling environment to innovation and their innovation outputs. The index is based on a wide range of different indicators such as;

- Enablers- capture the main drivers of innovation that are external to the firm

- Firms activities - captures innovation efforts of companies

- Outputs- capture, on the basis of available indicators, the outputs of firm activities.

The index is used as the most popular measure of the level of innovation. It reflects the innovation in terms of both growth factors that stimulate innovation and indicators reflecting the effects of pro-innovation activities. The highest values of innovation index reflect the economies more innovative than others, what should lead to stronger and more competitive economies (Mazurkiewicz, 2010). Turkey ranks at the seventy-fourth in 2012, sixty-fifth in 2011 and sixty-sixth in 2010 on the

other hand; global competitiveness index of Turkey is forty-third, fifty-nineth and sixty-first in the 2012, 2011 and 2010 respectively. Rankings demonstrate that global innovation index of Turkey is improving whereas its global competitiveness index is deteriorating. This reflects the vital importance of innovation for Turkey (Global Competitiveness Report, 2012).

CHAPTER IV

EXTERNAL ENVIRONMENT FACTORS AND PRODUCT INNOVATION PERFORMANCE

An organization's internal environment is composed of the elements within the organization and innovation comes from these elements; whereas all innovation is comes from the outside with the external environment. In order to analyze product innovation performance it is not enough to look at internal environment of the firms but also to consider the external effects since a significant part of the innovation received from outside. In this section the effects of external environment related factors on product innovation performance are examined. For this study external environment related factors are grouped into three: external knowledge inflow, cooperation with external parties and international trade activities.

External Knowledge Inflow

The knowledge, which leads to the production and commercialization of innovation, can be classified as internally generated or externally acquired. Firms acquire different types of knowledge by simply buying it, by collaborating with other institutions or universities, by partiicipating in diffrent networks and by taking

advantege of knowledge spillovers (Muscio, 2007). It is necessary to manage knowledge effectively, in order to take advantage of opportunities (Kostov, 2010).

The concept of acquiring external knowledge is disscussed under the open innovation concept. Open innovation is described by Henry Chesbrough (2003) in his book; The new imperative for creating and profiting from technology, though the idea and discussion about some consequences (especially the interfirm cooperation in R&D) date as far back as the 1960s. Open innovation assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. In other words, it is innovating with partners by sharing risk and sharing reward. The boundaries between a firm and its environment have become more permeable; innovations can easily transfer inward and outward. The main idea of open innovation is that, in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies (Schuttle, 2010). Moreover, internal inventions not being used in a firm's business should be taken outside the company (e.g. through licensing, joint ventures or spin-offs). Open innovation can be explained as follows: by using external sources of innovation such as customers, rival companies, and academic institutions, and can be as much a change in the use, management, and employment of intellectual property as it is in the technical and research driven generation of intellectual property. Therefore, it is regarded as the systematic encouragement and exploration of a wide range of internal and external sources for innovative opportunities, the integration of this exploration with firm capabilities and resources, and the exploitation of these opportunities through multiple channels (West, 2006). The advantages and disadvantages of open innovation can be stated as below:

The benefits to companies operating on a program of global collaboration (West, 2006):

- Reduced cost of conducting research and development

- Potential for improvement in development productivity

- Incorporation of customers early in the development process

- Increase in accuracy for market research and customer targeting

- Potential for viral marketing

In terms of risk and challenges:

- Possibility of revealing information not intended for sharing

- Potential for the hosting organization to lose their competitive advantage as a consequence of revealing intellectual property

- Increased complexity of controlling innovation and regulating how contributors affect a project

- Devising a means to properly identify and incorporate external innovation

- Realigning innovation strategies to extend beyond the firm in order to maximize the return from external innovation

Open innovation is gaining more importance because of the new global trends and being innovative alone is not enough to be competitive.

Knowledge spillover is created when part of the knowledge can't be or isn't kept in the boundaries of the organization and becomes available for the other

companies in the industry or the region (Fuentes and Dutrenit, 2007). The accession of that knowledge creates value. Knowledge spillovers emerge through a number of mechanisms: free knowledge flows arising through various inter-firm interactions; spillovers arising from the employee circulation and in the clusters and attitudinal changes favoring innovations (Caniels and Romijn, 2003). The knowledge spilled-over is not equally accessible to all firms, but firms from the same industry or the same technologies can more easily access and exploit it (Henderson and Cochburn, 1996; Yang et al., 2010). In order to innovate, they can imitate successful products or acquire technological knowledge. For the influence of the external knowledge into an organization and the level of innovation, there are four factors stated: geographical proximity, absorptive capacity, complementarity between R&D, knowledge spillover and management. Geographical proximity is the physical closeness between innovative firms or between firms and universities or research centers. Some scholars suggest that organization can learn by observing the others and in this way an innovation guide can be created (Yang et al., 2010). Absorptive capacity can be described as the ability of firm to recognize the value of new external information, assimilate it and apply it to commercial ends (Thorpe et al. 2005). When the knowledge from R&D is similar to the spilled-over knowledge, complementarity between R&D and knowledge spillover is higher. Knowledge management includes the technology, people and processes of company involving the use of accessible knowledge from outside sources, the embedding and sorting of knowledge in business processes, products and services, the gathering and storing of knowledge in databases and documents, the promotion of knowledge growth through an organization's culture and incentives, transfer and share of knowledge, and the assesment on a regular basis of the knowledge assets (Awad and Ghaziri, 2007).

Cohen and Levinthal (1989, 1990) argue that external knowledge is more effective for the innovation process when the firm improves its own R&D, that is, its internal capacities (Cassiman and Veugelers, 2002). When firms have higher absorptive capacity, they can be more able to access and implement a great amount of knowledge (Negassi, 2004; Schmidt, 2005).

Knowledge transfer can be defined as the means by which expertise, knowledge, skills and capabilities are transferred from the knowledge-base (for example, a university or college, a research centre or a research technology organisation) to those in need of that knowledge (for example a company, social enterprise or not-for-profit organisation). Therefore, knowledge transfer involves the interface between universities and business, and involves the commercialisation of skills and expertise possessed by higher education with the purpose of knowledge transfer to catalyse and facilitate innovation. This kind of technology transfer can also be between consultancy instutions and business by acquiring training or concultancy from these instutions. In addition to this, knowledge transfer by consultancy instutions provides value creation for the industry firms. The example of knowledge transfer mechanisms and paradigms include, but are not limited to:

- The UK Technology Strategy Board (TSB) Knowledge Transfer Partnership (KTP) product

- Spin-out companies

- Incubators and entrepreneur schemes

- University-industry contracts and consultancy

- Licensing of university-originated intellectual property

- Other modes of knowledge transfer and technology transfer, e.g. work-based learning projects

- The knowledge transfer, knowledge origination and knowledge exchange process

- Innovation, open innovation and the generation of new ideas (InnovationKT, 2013).

The need for sharing knowledge between research institutions and industry has become increasingly evident in recent years. Although in the past research institutions have been perceived as a source of new ideas and industry offered a natural route to maximizing the use of these ideas; nowadays many companies are developing open innovation approaches to R&D, combining in-house and external resources aiming to maximize economic value from their intellectual property, even when it is not directly linked to their core business. It makes public research a strategic resource and in addition it has become evident that research institutions need to play a more active role in their relationship with industry in order to maximize the use of the research results. This new role requires specialist staff to identify and manage knowledge resources with business potential, i.e. how best to take a new idea to market and ensure appropriate resources (funding, support services, etc.) to make it happen. In that sense, the number of technical staff in the firms becomes important factor (EU Comission, 2007).

R&D activities are another critical source of knowledge transfer. Knowledge in turn is the result of a firm's own R&D or information spillovers from outside. Information spillover possibly results from research activities conducted by research institutions, suppliers or customers but the most important source is perhaps

information from competing companies. Another contribution to this literature is d'Aspremont and Jaquemin (1988) who consider the effects of spillovers on the incentives to conduct R&D as well as the incentives to form R&D joint ventures. Spillover includes the involuntary leakage of knowledge and also voluntary exchange of information through research joint ventures. If the firm is able to use information without paying for it, incoming spillovers are expected to have a positive impact on profits (Czarnitzk and Kraft, 2007).

The information communication technology (ICT) knowledge transfer seeks to bring competitive advantage by promoting collaboration and knowledge sharing between the users and providers of Information and Communications Technologies, helping to drive innovation in the sector. People communicate, express, and coordinate their activities dynamically and geospatially, and to a significant degree by using smart phones, mobile devices, and the Internet, social media and weblogs. Social networking websites connect people with others who share similar interests. According to Nielsen, people spend twice as much time (22.7%) using social networking sites (SNS) as compared to any other online activity (Nielsen, 2010). In addition, social networking is displacing other forms of online communication. Professional networking began as a way for business professionals to meet and greet others in their fields, whether it was to market oneself, market a product, or just share a common interest. Among the numerous studies in the literature, Rogers (1995); Kwon and Zmud (1987); and Tornatzky and Fleischer (1990) define innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Furthermore, innovation process is communicated through certain channels over time and among the members of a social system (Peslak and Ceccucci, 2010).

As a systemic process, innovation is vital for the interactions between different innovation players (innovators, enterprises, research centers, innovation and development agencies, technology transfer offices, education and training institutes, investors, etc.) For instance European Union, therefore fosters these interactions, within regions and clusters, and their opening up through initiatives such as:

-Many Structural Funds' Operational programs aim at facilitating and intensifying the interactions of innovation players in regions through cluster initiatives, technology transfer offices or the support of cooperation and networking - between universities and enterprises for example. Beyond the regions' or Member States' boundaries, the Structural Funds can support cross-border and trans-national cooperation of innovation players;

- The European Cluster Observatory helps, among others, to identify regions with clusters of sectorial specializations that might be interesting for those seeking cooperation partners for an innovation project;

- The Living Labs provide settings for user-driven open innovation in the field of ICT;

- The Regions of Knowledge part of FP7, supports development across Europe of regional 'research-driven clusters';

- The European Institute of Innovation and Technology (EIT) aims to create Knowledge and Innovation Communities (KIC), which bring together enterprises with research and education;

- The European Cluster Alliance is an open platform for fostering trans-national cluster cooperation, and for improving cluster management capacities;

- The pan-European network of knowledge transfer offices "ProTon", provides access to the largest Europe-wide Network of knowledge transfer offices (European Commission, 2013).

Based on above discussion, this study defines external knowledge inflow as all the formal and informal knowledge the company intakes from external parties as a result of its operations or linkages with them.

Cooperation with External Parties

Cooperation activities with other firms or institutions are opportunities to access complementary technological resources, which is becoming more and more important. As the backbone of new technologies and innovation, the increased complexity of knowledge processes leads firms to search their own boundaries for valuable knowledge and skills, in order to complement their own capabilities (Becker and Dietz, 2004). Starting from the 1980s, competitive environment with shorter product and technological life cycles has forced firms to reconsider their innovation strategy in order to widen their technology base (Nijssen et al., 2001). In this manner, cooperation has gained an important role in the innovation process at the firm level, since innovation cooperation activities are considered as an efficient means for the industrial organization of complex R&D and innovation processes. Cooperation activities with other firms or institutions are opportunities to access complementary

technological resources (such as skill sharing), which can contribute to faster development of innovations, improved market access, economies of scale and scope, cost sharing and risk spreading (Ahuja, 2000; Cassiman andVeugelers, 2002; Hagedoorn, 2002; López, 2008). Intensive knowledge exchange and learning processes describe cooperation activities that lead to complementary assets and synergies (Becker and Dietz, 2004; Dachs et al., 2008). As transfer of knowledge is converted into new technological and organizational innovations, cooperations of firms widen the range of their technological options (Mowery et al., 1998; Caloghirou et al. 2003). Similarly, Gomes-Casseres et al. (2006) state that firms which are in cooperation activities or alliances have more knowledge flows than non-allied firms. In the resource based view, the purpose of firm is to maximize profits by using and improving its resources and capabilities (Penrose, 1959; Tsang, 2000). Cooperating and exchanging knowledge with external partners is one of the ways to do this. In this view, willingness of partners to acquire capabilities from an external source is vital motivation for the creation of alliances (Mowery et al., 1998). Rosenfeld (1996) and Hagedoornet (2000) state that not only multinational firms but also small and medium-sized firms are establishing more and tighter relationships with other companies in order to achieve economies of scale, market strength, or to exploit new opportunities. Firms have started to get engaged in joint activities like co-marketing, co-production, shared resources, or joint development (Bönte and Keilbach, 2005). The boundaries of innovation are shifting from a situation where firms perform R&D activities mainly internally (Mowery, 1983; Nelson, 1990) to a reality which involves corporate partnering, collaboration and external sourcing. In this new context, internal and external sourcing of innovation inputs, such as R&D, are seen not as substitutes, but as complements, since internal innovation activities

are not incompatible (and can be synergetic) with agreements with other firms, research agreements with universities, investments in the capital stock of new firms, and with the acquisition of small firms (Arora and Gambardella, 1990; Cassiman and Veugelers, 2002; Hagedoorn and van Kranenburg, 2003; Adams and Marcu, 2004). Cooperation decision is as equilibrium between achieving high knowledge flow and protecting internal knowledge from leaking out (Schmidt, 2005). Innovation cooperation activities can be regarded as a trade-off between spillovers: firms generate and receive spillovers to and from their cooperation partners. Hence, firms must manage the external information flows in order to maximize the incoming spillovers from partners and non-partners while they control spillovers to non-partners. Firms must try to increase the extent of incoming spillovers by investing in "absorptive capacity" in order to achieve this.

Another aspect is the importance of cooperation partners for the development of innovation activities. Firms that decide to cooperate based on similar motivations may attribute different levels of importance to it. Cooperation agreements can have different roles and values depending on the context and therefore it is unlikely that firms will benefit equally from their cooperation partnerships.

Some researches aim to measure the effects of cooperation on the overall performance of firms and on the innovation and R&D performance. Cooperative firms have, on average, higher overall performance levels than the non-cooperative firms (Abramovsky et al., 2008) They also pertain a higher R&D intensity (Becker and Dietz, 2004; Sampson, 2007) with the reason that they are able to share investment costs and may take advantage of partners' resources and capabilities. With the help of knowledge management, cooperation activities increase the profitability of R&D (Belderbos et al., 2003).

The nature of the cooperation partners affects the innovation success and overall performance. Vertical spillovers, associated with suppliers and customers, have a more important effect on R&D performance and welfare than horizontal spillovers, linked to universities, research institutes and competitors (Atallah, 2002). Moreover, cooperation with customers and public sector institutions is positively related to the success of product innovations, and cooperation with suppliers and universities has a more significant influence on the success of process innovations (Freeland and Harrison, 2006). While cooperation with universities, research institutes and competitors positively affects growth in sales per employee of products and services new to the market; supplier and competitor cooperation has a considerable impact on labor productivity growth (Belderboset, 2004). Most of the studies which emphasize the positive effect of cooperation in innovation activities on firms' performance identify the determinants behind the decision to cooperate in the specific areas of R&D and innovation. They can be summarized in three arguments; relating to kinds of partners, relating to firms' characteristics (including their ability to control and take advantage of spillovers) and relating to the different types of innovative activities.

While defining their innovation cooperation strategies, firms look for two kinds of external partners: (a) those that allow them to incrementally build on the firm's existing internal knowledge and (b) those that provide knowledge to aid defining paths that are new to the firm (Bercovitz and Feldman, 2007). Universities and government labs are the most common examples of the second group. Cooperation with these partners is more likely to occur with large firms and with firms that patent and/or receive public funding for innovation since these firms have more resources to invest in research (Mohnen and Hoareau, 2003; Fontana et al.,

2006). Firms which have exploratory, centralized and intellectual property protection strategies prefer university partners (Bercovitz and Feldman, 2007). That is the way of sharing cost to cooperate with the universities like own R&D, cooperation with other partners and the search for publicly available knowledge (Veugelers and Cassiman, 2005).

Firms that are more able to capture knowledge from external sources and that are better prepared to protect their own knowledge have a higher probability of cooperating in R&D or innovation (Cassiman and Veugelers, 2002; Abramovsky et al., 2008). Moreover, it is also stated that a firm that is better prepared to appropriate knowledge might be less keen to cooperate (López, 2008).

Fritschand Lukas (2001) emphasizes that firms involved in R&D cooperation tend to be relatively large and have a high share of R&D expenditures in addition to their ability to manage spillovers which differentiate them from non-cooperative firms. This coincides with Negassi's (Negassi, 2004) findings; namely, R&D cooperation increases with size and R&D intensity; firms with more resources may dedicate some of their resources to cooperation activities. Nonetheles, Cassiman and Veugelers (2005) state that large firms are also more prone to having the necessary technical and financial capabilities to perform innovation processes by themselves and, thus, are not willing to participate in cooperation agreements. It is also more common to cooperate with the firms which have introduced market level innovations.

The scope and complexity of the innovation activities are studied by several authors, such as Bayona et al. (2001) and Miotti and Sachwald (2003). These studies provide evidence that firms in more technology-intensive sectors have a greater

propensity to establish cooperative R&D and innovation agreements (Faria and Lima, 2010).

The idea that cooperation is an efficient way to improve the probability of success of innovation projects, effects the decision of firms to cooperate in innovation (Belderbos et al., 2003; Becker and Dietz, 2004; Sampson, 2007; Abramovsky et al., 2008). Research findings list that influence the decision to cooperate as engagement in R&D activities, qualification of human resources (as related to absorptive capacity and to the ability to optimize on spillovers), firm size, and competitiveness (Cassiman and Veugelers, 2002; Abramovsky et al., 2008; López, 2008). Concerning the success of the innovative activities themselves, the most important ones appear to be their complexity and how radical they are (Bayona et al. 2001; Miotti and Sachwald, 2003; Dachs et al., 2008).

Engagement in R&D Activities

R&D cooperations are an efficient strategy for adapting external resources only if the cost benefit-relationship ('trade-off') of joint R&D is positive or at least can be expected to be positive. The benefits of joint R&D (Becker and Peters, 1998; Camagni, 1993; Robertson and Langlois, 1995) can be stated as:

- Joint financing of R&D,

- Avoiding multiple and wasteful duplication of R&D,

- Reducing uncertainty,

- Realizing cost-savings,

- Realizing economies of scale and scope,

- Shortening development times.

The disadvantages of joint R&D are caused by transaction costs (Coase, 1937; Pisano, 1990;

Williamson, 1989) especially to coordinate, manages and controls the R&D activities of different actors. Transaction costs are mainly related to the following topics:

- Unification of heterogeneous structures, decision-making processes,

- Coordination of distinct organizational routines, styles,

- Combination of complementary assets, resources,

- Fixation of transfer prices of intangible goods, for example information or know-how,

- Regulation of the exploitation (appropriation) of the results (rates of return) of joint R&D.

The hidden and unexpected risks which R&D cooperation are faced with can be insufficient quality of assets, delays in development time, failure of research success, change in the relative contractual (market) power of the partners, etc. Moreover, since R&D efforts are not directly observable, partners tend to focus on their own profit when choosing their level of R&D investment. This can create moral hazard problems. When the adaptation of external resources is cheaper than in-house R&D, inter-organizational arrangements in R&D are an efficient way to expand and optimize firms' innovation activities with positive effects on research efficiency,

profitability and ability to compete. R&D cooperation can offer possibilities of efficient knowledge transfer, resource exchange and organizational learning.

Moreover, the number of partners effects the innovation of R&D cooperations related with the fact that networking effects of inter-organizational arrangements in R&D rise with the number of partners cooperating efficiently with each other. Hence, hereby, firms can establish inter industry agreements (Katz and Ordover, 1990; Mowery, 1989; Vonortas, 1997a) and/or collaborate with institutions outside the industrial sector, especially universities and public research institutes (Faulkner and Senker, 1994; Lee, 1996; Leyden and Link, 1999).

The effects of successful R&D cooperation on the innovation activities of firms can be summarized as follows: First, the adaptation of external resources within such collaborations results in an extension of firms' technological capabilities to develop new and improved products. This leads to an increase of technological knowhow and improved skills. Second, transfer of assets, resources and information in R&D cooperation improve the research efficiency of firms. Higher rates of return of R&D with positive impacts on firms' innovation input and output can be the indications of this observation. Third, the number of partners cooperating efficiently with each other has a positive effect on the efforts of firms to develop new products (Becker and Dietz, 2010).

Innovation literature highlights the importance of external linkages to improve the innovation potential of firms in recent empirical and theoretical contributions (Chesborough, 2003). These analyses highlight the positive effect of external linkages at firm level (Laursen and Salter, 2006). Empirical research on this issue either looks at the role of linkages such as technological agreements and R&D joint

ventures (Freeman, 1991; Hagedoorn, 2002) or at the role of specific actors on the innovation such as suppliers, customers (Hippel, 1988), and universities (Cohen et al., 2002; Laursen and Salter, 2004). Interaction with these actors may occur formally (i.e. through a collaboration agreement) or informally (i.e. external actors acts as sources of knowledge). The role of external linkages in the innovation process results from taking into account the fact that firms may simultaneously use several actors such as informal linkages (i.e. when actors are a source of information for innovation), formal linkages (i.e. when actors are formal partners in R&D projects) and knowledge sources as 'inputs' to the innovation process. This perspective concludes with the possibility that complementarity or substitution relationships exist among different knowledge inputs. Furthermore, a significant relationship seems to exist between reliance on external information flows and the decision to engage in formal cooperative R&D agreements (Cassiman and Veugelers, 2002). Therefore, the study of the role of external linkages on innovation development seems to require the overview of the several possible types of interactions, both formal and informal.

Research also highlights how firms' reliance upon external linkages depends on internal research capabilities as well as on innovative investments (Cabagnols and LeBas, 2002; Laursen and Salter, 2004). The literature on both national (Nelson, 1993) and sectorial (Malerba, 2004) systems of innovation conclude that the institutional context shapes innovation patterns of firms.

Innovation activities do not take place often in a business world where firms are isolated from each other and other organizations such as universities and suppliers. Institutional and technological contexts shape the organizational context in which innovation and technical change occur (Whitely, 2000). In fact, industrial innovation can be regarded as a process that involves search for information and

interaction with both market based actors (i.e. customers, suppliers, competitors) and research institutions (i.e. universities and government) (Etzkowitz, 1998; Salter and Martin,2001). These interactions may be the consequence of alliances and/or cooperation agreements or other types of external linkages. In these cases, they usually entail some form of knowledge and/or information exchange between the partners involved. Knowledge acquired from external linkages differs on the form of access as well as on the content being transferred (Swann, 2002; Monjon and Waelbroeck, 2003). The use of other types of sources of knowledge seems associated with the internal capabilities of firms to access and absorb the knowledge produced by other market or research actors more or less immediately, both formally and informally. On the other hand, the knowledge derived from collaborations seems associated with the use of ideas and developments that result from the access to infrastructures, human capital, and innovative capabilities of partners. Moreover, all these external linkages seem to be very closely connected. Especially, the intensive use of external sources of knowledge seems to enhance cooperation, especially with public research organizations (Cassiman and Veugelers, 2002; Van Beers et al., 2008) or with external actors that are already considered to be an important source of knowledge for innovation (Belderbos et al., 2004).

Another important aspect is the issue of the specific role of the external sources of knowledge for the specific type of innovation. In a traditional manner, the capability to translate external inputs of knowledge into successful innovations has been associated with the presence of high absorptive capacity at the firm level (Cohen and Levinthal, 1989; Cohen et al., 2002; Swann, 2002). The capabilities required to successfully innovate can vary depending on the type of innovation that firms want to develop. Many empirical analyses conclude that in order to pursue

specific innovations strategies, firms are required to interact with specific actors. As an example, user-producer interaction is widely acknowledged as crucial for product innovation (Hippel, 1988). In order to develop and market a novel product innovation, acquiring knowledge and collaborating with customers is as important as performing internal R&D investments, because customers are an important source of information that may boost product innovation (Levin and Reiss, 1988; Belderbos et al., 2004). Recent studies emphasize that product innovation often entails collaboration with universities (Beise and Sthal, 1999; Tether, 2002; Monjon and Waelbroeck, 2003).

Firms that mainly pursue an imitation strategy instead, seem to prefer technological information from competitors (Baldwin, 2002; Cabagnols and Le Bas, 2002). Firms pursuing process innovation, which entails investments in machinery and equipment, seem to require mainly interaction with suppliers (Pavitt, 1984; Malerba, 1992). Swann (2002) indicates that process innovators tend to use universities both as a knowledge source provider and as R&D partners when compared to product innovators. Additionally, Reichstein and Salter (2006) find, in addition, that knowledge from suppliers enhances process innovations in firms with a cost-focus strategy, while the probability of doing process innovation is negatively associated to the use of customers as a source of knowledge.

Developing specific external linkages may also depend on the type of industry and technology (Pavitt, 1984; Marsili, 2001). Firms active in science-based industries generally tend to benefit most from interactions with public research organizations and focus on (novel) product innovation (Cabagnols and Le Bas, 2002; Leiponen, 2002; Belderbos et al., 2004). Firms mainly rely on suppliers as a source of process-innovation in supplier-dominated industries (Leiponen, 2002). As sources of

information, specialized-suppliers rely mainly on customers to develop customized product-innovation and solve technological problems of their clients (Riggs, and Hippel, 1994). Firms tend to innovate more in product than in process, in scale intensive activities, which are also high-capital-intensive; firms achieve competitive advantage by exploiting economies of scale (Martínez-Ros and Labeaga, 2002). In short, engaging in a specific type of innovation strategy may require the integration of several specific types of knowledge and therefore firms need to interact with several actors simultaneously. The explanations for this evidence, interaction with several actors, might be the consequence of the presence of a relationship of complementarity or substitution between several knowledge sources. In other words, different knowledge sources reinforce each other (i.e. complementarity) or firms tap different sources to acquire knowledge that is difficult to access such as knowledge possessed by competitors (i.e. substitution). On the other hand, interaction with several actors might be the consequence of the fact that a firm may be involved in several types of innovation that differ in terms of novelty and integration of market and production (Freitas and Clause, 2008).

The supplier relationship plays a vital role in determining competitiveness and, ultimately, innovative capability. Sako (1994) states that to extent to which suppliers are asked to contribute to the design and development of products is a crucial dimension for innovation. Benefits are presumed to arise through greater cross-fertilization, reduced costs and improved efficiency. The firm is able to gain many of the advantages of vertical integration (and larger size) while reducing the transaction costs involved (MacPherson 1997). Moreover, the use of subcontracted services allows the small firm to supplement internal resource limitations. Rothwell and Dodgson (1991) suggest that subcontracting can enable firms to innovate products

requiring new production techniques, without having to invest initially heavily in expensive, sophisticated production equipment. Small firm capacity for innovation can be enhanced by the extended knowledge based on extensive supplier/subcontractor links.

Customer or user relationship, which attracts much attention in the academic literature, is crucial for the success of innovations (Rothwell 1977) and it is mostly the collaboration and feedback loops that are of current interest. The innovation process is characterized as user-dominated (Hippel 1978) in which continuous user-manufacturer interaction identifies re-innovation opportunities, new uses and new users (Shaw, 1991). Rothwell and Gardiner (1985) argue that there is scope for considerable gain through involving the user in the product design and development processes. The gains are summarized in the following statements. Firms may be able to supplement their internal design and development activities by accessing the technical and managerial skills of their customers; user involvement is likely to be the ideal way to establish the optimum price/performance combination; involving the user in the product design and development stages is likely to reduce the post-delivery learning required on their part. User involment may result in accelerating the innovation acceptance process and in user feedback and associated product improvements that serve to lengthen the product life span. Indeed, it can be anticipated that the most innovative firms are more likely to also have non-exchange related links with customers and that these links, in turn, are likely to be stronger and more formal.

Improvements in local infrastructure and related trades and the flow and spillover of knowledge are all likely to improve the firm's position while requiring minimal direct action (Fujita and Thisse 1996). However, the gains that arise through

direct collaboration between firms and the impact it has upon their innovative capability arise as a major issue. In addition, the literature states that the principal benefits to be gained through collaboration involve complementing and supplementing internal product development efforts (Rothwell and Dodgson 1991), cost and risk sharing (Dodgson, 1994), accessing new markets (Confederation of British Industry, 1996) and the transfer of both technology and knowledge (Karlsson and Olsson 1998). Dodgson (1994) suggests that inter-firm collaboration can lead to positive sum gains and firms can obtain mutual benefits that cannot be achieved independently. The most innovative firms are significantly more likely to have engaged in some form of innovation-related collaborative activity with firms outside the vertical value chain. Collaborating with the competitors provides competitive advantages to firms. Research about the impact of collaboration with competitors is rather limited which might be due to the very limited links occurring in real life.

University links are likely to improve firm innovative potential and performance. University research is a source of significant innovation-generating knowledge. Evidence from the USA demonstrates that university research drives industry research and development (R&D) rather than vice versa (Jaffe, 1989). Silicon Valley in USA, as an example, is home to many of the world's largest technology corporations as well as thousands of small startups. Stanford University and graduates play a major role in the development of this area. On the other hand, it is suggested that small firms are able to diminish internal resource deficiencies by accessing university resource networks (Westhead and Storey, 1995). Therefore, as with other forms of external collaborative arrangements, firms are able to gain access to sophisticated technology and technical expertise. Moreover, there is extensive

literature emphasizing that links between small firms and Higher Education Institutes (HEIs) are likely to have a favorable effect on innovation (Johnson and Tilley, 1999).

The role that enterprise support agencies and indeed government play can be debatable if the principal benefits to collaboration relate to supplementing internal managerial and technical resources. Oughton (1997) suggests the encouragement of networking relationships between firms and states that they are likely to be well placed to promote inter-firm co-operation. The expectation is that government employs the requisite expertise or has easy access to such through its considerable resource networks. Additionally, government may play a network management role. In order to support competitiveness, there may be a role for government in brokering greater collaboration between firms or between firms and Universities (DTI 1998). It might be expected that innovative firms are more likely to have contact with public sector support agencies, government departments or trade associations (Freel, 2010).

International Trade Activities

European Council and other countries highlight knowledge and innovation in order to achieve sustainable competitiveness of the economy. Activities in this area are referred to as the driving forces of the economy. Therefore, a number of efforts are undertaken to support innovation and strive for continuous improvement of innovation in the EU and in the other developing and developed countries (Mazurkiewicz, 2010).

Whatever the form (product, process, organizational or marketing innovations), innovation and the diffusion of innovative products and processes result from "technology push" and "demand pull". The emergence of new technologies and knowledge results in the push to innovate, while corporate investments in response to demand pull innovation and diffusion along. According to the traditional view, in firms doing the innovating, innovation is a linear process that starts with research, design and development, followed by manufacturing, then marketing and distribution. In reality, there are numerous feedback loops and innovation is increasingly realized in networks involving internal R&D, new equipment, imitation, reverse engineering agreements with other companies and learning from other sources such as the factory floor (many companies have a "suggestions box" to gather ideas from employees). Firms, even the biggest market leader, do not possess all the internal skills, knowledge and capabilities needed to cope with global competition. However, innovation can come from outside and large multinationals are moving towards a double network structure. The company's use, generation and absorption of knowledge that are involved in the internal network are linked to numerous external networks with other firms and institutions. Firms look for strategic alliances in R&D and other areas such as setting standards, even with potential rivals.

The above discussed, framework which is basically related to the open innovation concept can be associated with international trade. There is a two-way link between trade and innovation. Innovation provides the innovator a technological advantage. This is the source of comparative advantage that drives trade with the differences in how much capital, natural resources and labor is available ("factor endowments"). One of the determinants of trade and innovation is technology gap.

Developed countries tend to export more high-technology goods compared to developing countries. In order to exploit the benefits of their innovations, innovative and more productive companies export, invest abroad or license their technologies. In that way, open markets benefit from innovative firms since the market in which the firm can make money from its innovation is larger. This becomes very important when the costs of developing and marketing a new product are high.

Trade and investment have impact on every stage of innovation in various ways. In the R&D phase, researchers with access to the latest equipment have an advantage, and no country is a world leader in all the various areas and applications of science. Even the United States, as one of the world's leading economies, imported a quarter of the analytic and scientific instruments its laboratories bought in 2006 (excluding optical equipment). Moreover, most companies make use of the research conducted in universities and other companies through licensing agreements, often with international partners. Trade has also motivational influence for greater R&D through competition new rivals often force companies to develop new products with new features. Exports also give opportunity to companies to cover R&D costs, but a benefit that might not be possible when these countries only produce for the smaller domestic market. In same manner, trade and investment play an integral role in providing innovative inputs for manufacturing by making new machinery and components available. Innovation can also be encouraged by efforts to gain an advantage over other firms. Process innovations are also affected by trade and investment. In developing countries, for instance, the main source of process innovation is often capital goods the machines, tools, equipment and so on needed to make other goods. The main driver of recent marketing and organizational

innovations is information and communication technology (ICT) and trade in ICT goods has been central to this innovation.

Integration into global production networks with foreign partners, sometimes called "trade in tasks", is an organizational innovation which has increased efficiency in the manufacturing process. One way of doing so is to allow the various partners to concentrate on what they do the best and to focus efforts on doing it even better. International trade and cross-border investment allow this specialization to be realized on a greater scale. They also provide firms of smaller economies access to bigger markets and greater investment opportunity than their own country could provide. This creates the possibility of "economies of scale" that allow them to become globally competitive.

Trade can induce and enhance innovation in three ways; namely, technology transfer, competition and economies of scale.

New technologies can be transmitted across countries through different channels, such as in the form of intermediate or capital goods or the result of people moving from one place to another. Imports of capital goods and inputs are an important channel for technology diffusion as foreign machinery may embody more technology than domestic machinery. Imports don't have to be high-tech but these imports may be insufficient to create a more dynamic process of innovation. It is necessary to invest in human resources and R&D to make the most of the new technology. Technology diffusion through lower prices is just as significant as technology embedded in imported goods. It is indicated that capital goods can cost over four times more in developing countries than in developed ones depending on domestic levels of technology and access to foreign capital goods through trade. In

such cases, cheaper foreign equipment can contribute to more efficient capital accumulation (Patrick and Ralph Lattimore, 2009).

In short, it is commonly observed that innovation and average productivity increase as firms become multinationals or affiliates of them. Moreover, when the share of multinationals and affiliates increases in the economy, this usually increases innovation and average productivity not only in the firms themselves, but also in the general economy. There can also be an indirect effect, when there are spillovers to other purely domestic companies, for example through enhanced competition, imitation and worker mobility. In order to satisfy an internationally competitive client, local suppliers have to upgrade their production processes, quality and delivery methods, a process known as research and development (R&D) , the very basis of innovation. The developed countries used to possess the majority of the world's R&D, but four trends are changing this: the increasing presence of non-OECD countries in global R&D; the increasing presence of non-OECD multinationals in global R&D; the increasing internationalization of multinationals' R&D; and the increase in international alliances (Patrick and Ralph Lattimore, 2009).

Firms that export are more productive than those that do not and innovation has significant role to play (Patrick and Ralph Lattimore, 2009). This is partly because of the fact that there are fixed costs of exporting and to pay these fixed costs, exporting firms, by definition, need to be more productive. "Learning by exporting" effect can be the second explanation. On the other hand, it can be argued that exporters become more productive, by getting more access to technology, getting new ideas from customers and by being subject to stronger competition. One reason for this is that firms often make deliberate decisions in terms of investment, training and technology to raise productivity before trying to conquer export markets, making it more difficult

to pick up differences before and after. Thirdly, trade, especially exports, extends the size of the market in which profits can be earned, providing greater incentives for increased investment in innovation. A company selling to both domestic and export markets may be able to recoup R&D investments over a larger quantity of sales since a large part of R&D costs are fixed. These scale economies are especially important for countries with smaller domestic markets.

Food and beverage sector has significant contribution on export of Turkey; in 2010 it realizes the 6% of the total export with volume of the 6.7 billion USD. In 2011, Turkey is the fifteenth largest exporter in the world in terms of food export (8.9 billion USD). While export is 9.5 billion USD in 2012, import is 5.1 billion USD. Thus, the ration of foreign trade is 186.2% (Food and Beverage Industry Report, 2013). 10% of the export is from food and beverage, agriculture, livestock and fisheries. Based on the developments in the last decade, Turkey is the seventeenth largest economy in the world, whereas fifteenth largest exporter with the food and beverage industry. Istanbul is the heart of manufacturing sector in Turkey, especially in the food sector. However, there is no statistical evidence about food and beverage industry of İstanbul.

CHAPTER V

METHODOLOGY AND DATA

Product innovation performance and the related external environment factors, which are both discussed in detail in previous chapters, are integrated in the relational framework of the study as presented in Figure 3.

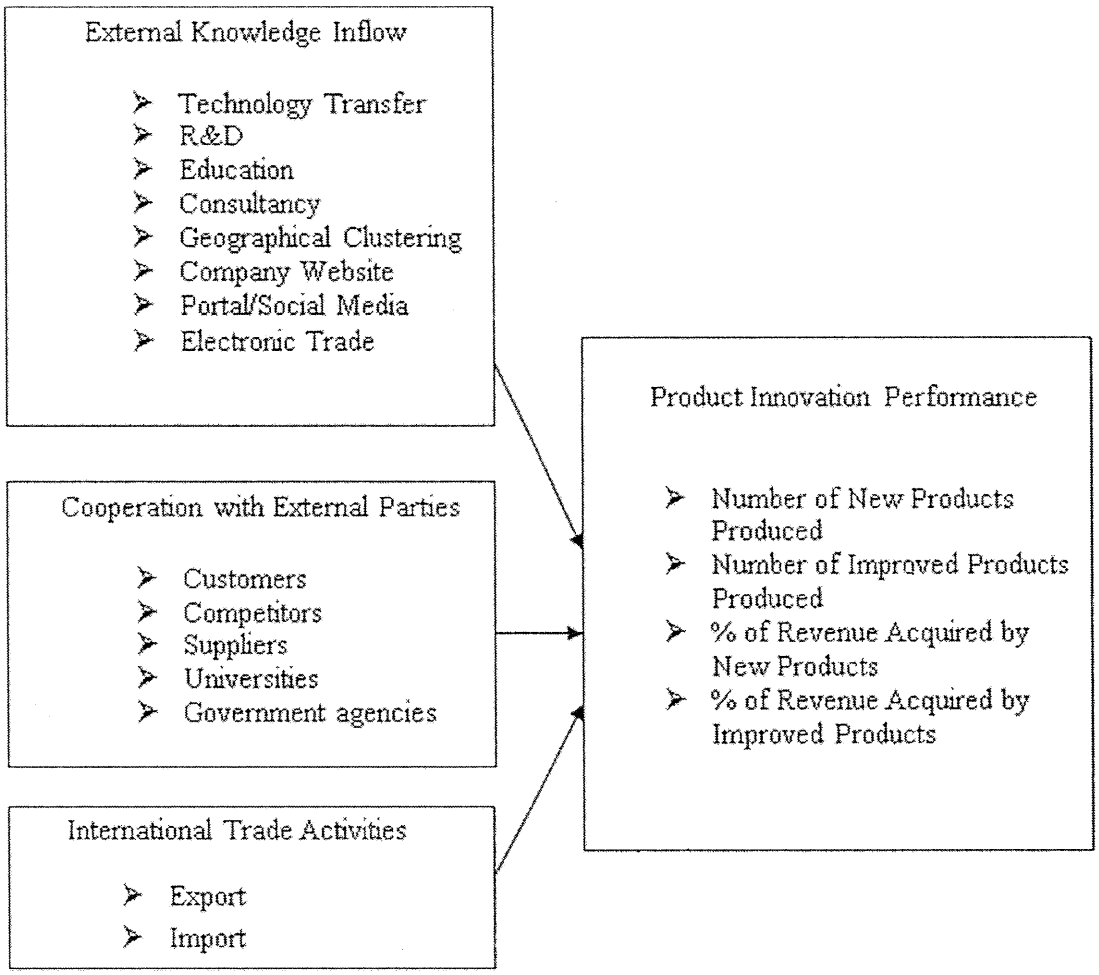


Figure 3. Relational framework of the study

The variables are grouped as independent and dependent as shown in left column and right column of Figure 3 respectively. Independent variables are further grouped into

three constructs. External knowledge inflow construct includes all the factors that facilitate the flow of knowledge from external environment to the company. The corresponding factors are technology transfer, R&D involvement, education, consultancy, geographic clustering, company website, portal or social media, electronic trade. Cooperation with external parties construct includes various types of cooperation with customers, competitors, suppliers, universities and government agencies. International trade activities construct covers export and import activities of the firm. On the other hand, dependent variables which are number of improved products produced, % of revenue acquired by improved products, number of new products produced and % of revenue acquired by new products make up the product innovation performance construct. Other possible performance indicator can be the number of patents or licenses. However, patenting process takes too long in Turkey because of the approval period from the ministry of health and the ministry of agriculture. That's why; this study does not include patenting among the product innovation performance measures.

Hypotheses

The main question of the study is whether the external environment related factors affect the product innovation performance. In order to measure this question three groups of hypotheses are developed. External knowledge inflow factors including technology transfer, R&D, geographical clustering, education, consultancy, company website, portal or social media and e-trade are hypothesized to have positive impact on each of the product innovation performance measures. Cooperation with external

parties including customers, competitors, suppliers, universities and government agencies are hypothesized to have positive impact on each of the product innovation performance measures and international trade activities including export and import are hypothesized to have positive impact on each of the product innovation performance measures. Product innovation performance measures include number of new products produced, number of improved products produced, % of revenue acquired by new products and % of revenue acquired by improved products.

Sample

In order to explore the impact of external knowledge inflow, cooperation with external parties and international trade activities on product innovation performance in the Food and Beverage industry in Istanbul, a questionnaire is developed and a survey is conducted in the years 2012/2013 within a period of 6 months.

Firms to be contacted include all the 561 enterprises operating in food and beverage sector industry that are registered in the Istanbul Chamber of industry. The survey is administered through electronic mailing of the questionnaires to the firms in the sample. After two rounds of mailings, follow-ups and periodic notifications, a total of 65 valid and complete questionnaires are returned by the firms.

Survey consists of five parts and 25 individual questions designed to assess the role of external knowledge inflow, cooperation with external parties and international trade activities on product innovation performance. In the first part, six questions are asked about firm information in order to analyze the demographics of the firms.

Eight questions in the second part aim to analyze external knowledge inflow effects. Three question in the third part aim to analyze cooperation with external parties. Two of these questions are about sharing and other one is about the various cooperation types with different external parties and the level of importance of the cooperation. Four questions are asked in the fourth part to analyze international trade activities. One of the questions is about % of revenue acquired by import and export activities, two of them are about the import and export destinations and one of them is about the reasons of not being involved in the import and export activities. Four questions in the last part aim to analyze product innovation performance. Two of the questions are about the number of products produced in the last five years and two of them are about % of revenue acquired by products.

The Food and Beverage Industry

Selection of the food and beverage industry for analysis is based on a number of factors. The food and beverages industry experiences a high level of competition. Furthermore, it is among the first industries established in Turkey and has a significant role in Turkish economy due to the competitive advantage of the country in agriculture.

The global food and beverage market is expected to expand, due to the increasing demand for healthy products and rising disposable incomes in emerging economies such as China, India and Brazil. Consumers decrease their spending on non-essentials such as home furnishings in response to the global economic

downturn, whereas spending on essentials such as food and beverage remain fairly constant.

Although the economic downturn has an impact on spending habits and priorities, concerns for quality, health and sustainability still play a significant role in consumption and accordingly such food safety concerns are expected to grow in future.

The food and beverage industry is highly fragmented, with the top ten companies in 2011 accounting for only 12.9 percent of the global market. As being the world's largest exporter and importer of food and beverage products worldwide, the EU is the key player in the global trade. Because of increased shares of Brazil and China in recent years, the share of the EU declined from 24.6% in 1998 to 19.8 % in 2011. The US ranks second in the world trade, followed by Brazil and China.

Turkey is an attractive market for potential investors: it is ranked the fifth in a rating analysis by Business Monitor International (BMI) regarding the Food and Drink industry, Q3 2010 CEE Business Environment Ratings. This is basically due to its large size of population (nearly 73 million), lack of market maturity or saturation, its favorable long term economic structure and GDP per capita, by taking into consideration the market size, current consumption levels, future potential growth and the legislative and political environment.

In addition to this, as a major agricultural producer with an increasingly positive food and beverage trade balance, Turkey offers easy access to raw materials. The food and beverage sector, which is largely dependent on the agricultural sector in Turkey, has an important share in the country's production i.e. a share ranging between 18-20 % (Turkish Food and Beverage Industry Report, 2010).

Production in the Turkish food and beverage sector registered an increase of 4.1% from 2007 to 2008; followed by a decline of 1.3% from 2008 to 2009 due to the global economic downturn and an increase of 10% from 2010 to 2012. Since retailers require higher standards from food manufacturers and investments accompanied by improvements in the sector take place, the Turkish food sector is developing. Due to the presence of modern mass grocery retail outlets and rising disposable incomes, the consumption patterns of Turkish consumers have shifted to packaged and processed foods, such as ready-to-eat meals and frozen foods. Moreover, increases in the number of females in full-time employment support the trend towards packaged, frozen and ready food.

Reforms are being performed in organic agriculture to keep pace with the growing international interest in this sub-sector since 2000. Currently, Turkey exports almost all of its certified organic food produce, with the vast majority (approximately 85%) of this going to Europe. Additionally, the production of "halal food" gives opportunities to Turkey as a predominant Muslim country (Turkish Food and Beverage Industry Report, 2010).

Turkey mostly exports food stuffs to large European and Middle Eastern markets. Its agricultural diversity and climate allow it to produce a sustainable supply chain of raw inputs for its processing industry. Turkey's manufactured food and beverage export industry tripled in size over the last decade and is now valued at over USD 6.7 billion.

In order to improve the efficiency of the agriculture sector, R&D, which fosters innovation, is an opportunity. In February 2011, the government approved the country's first agriculture "techno park" which aims to become one of the most

competitive regions in global agriculture by pursuing high-technology R&D, greenhouse systems and seed and soil improvement. Such ambition has already attracted high profile companies, for instance Monsanto, a multinational agricultural corporation, has several well-established facilities in Turkey where it is searching for the possibilities to improve seed efficiency (Turkish Food and Beverage Industry Report, 2010).

Based on the above discussion on food and beverage industry in Turkey, an analysis of the sector regarding expected opportunities and threats is presented in the following section. The analysis is based on the work of Turkish food and beverage industry report (2010):

Opportunities;

- Increase in the consumption and production of food and beverage in Turkey due to the young and growing population

- Important export opportunities for the Turkish food industry due to the diverse agricultural products available in the country

- Expected increase in the GDP per capita because of being a developing country

- Young population interested in testing new brands and products

- Growth in the tourism sector which foster consumption and export

- Various opportunities for new products to enter Turkey due to the immaturity of the market

Threats:

- The economically volatile environment affected by the global economic crisis

- Lower level of alcoholic drink consumption compared to the European countries mainly due to Islamic traditions

- The high Special Consumption Tax on alcoholic drinks

- The unstable regulatory environment in agriculture

- High energy and raw material costs

- Competition in the wine industry due to increasing number of wine producers globally producing high quality and low priced wines

This analysis indicates that the food industry in Turkey has a high potential to increase its export volume which will in turn increase the international trade volume and create growth opportunities for the Turkish economy.

CHAPTER VI

RESULTS

Research findings include statistical analyses to interpret the data gathered from the responses to the questionnaires used in the survey.

Data Analysis

Each question in the questionnaire is defined as one or more variables and coded in an appropriate format. Data obtained from the responses are formatted and analyzed using Statistical Package for the Social Sciences (SPSS). After the completed questionnaires are gathered, statistical methods are used to measure the impact of external knowledge transfer, cooperation with partners and international trade on product innovation performance. First part of the analysis includes descriptive statistics, mainly frequency analyses and their cross tabulations. Thus, demographic characteristics are explained in detail. Consequently, correlation and regression analyses are conducted to investigate the relationship among the variables and to understand the role of various independent variables on the product innovation performance.

The variables are grouped as independent and dependent as shown in Figure 3. Independent variables are further grouped into the three constructs. External

knowledge inflow construct includes technology transfer, R&D, education, consultancy, geographic clustering, company website, portal or social media, electronic trade. Cooperation with external parties construct includes cooperation with customers, competitors, suppliers, universities and government agencies. International trade activities construct covers export and import activities. On the other hand, dependent variables are number of improved products produced, % of revenue acquired by improved products, number of new products produced and % of revenue acquired by new products make up the product innovation performance construct.

While frequency analysis provides distribution of only one variable, Cross tabulation (crosstab) analysis is involved in the distribution of two or more variables. In other words, crosstab displays the multivariate frequency distribution of the variables (Sekoran and Bougie, 2010). Crosstab summarizes categorical data and creates a contingency table. Each variable is compared to other variables in terms of their respective frequency distributions across the categories of another variable.

Correlation analysis examines the direction, strength and significance of the bivariate relationship among all the variables that are measured at an interval or ratio level. Regression analysis is used to describe a relationship precisely by means of an equation that has predictive value. Multiple regression analysis includes more than one independent variable to explain the variance in the dependent variable. It is a multivariate technique and it assesses the degree and the character of the relationship between the independent variables and the dependent variables. The regression coefficients indicate the relative importance of each of the independent variables in the prediction of the dependent variables (Sekoran and Bougie, 2010).

The initial analysis conducted is reliability analysis. The related Cronbach's alpha coefficient is a coefficient of internal consistency. It is widely believed to indicate the degree to which a set of items measures a single unidimensional latent construct. For the internal consistency level to be acceptable the generally agreed upon limit for Cronbach's alpha is 0.70, although values over 0.60 are also acceptable (Hair, Black, Babin, Anderson and Tatham, 2006). The Table 1 below provides the scores for Cronbach's alpha value of the questionnaire developed for this study.

Table 1. Reliability Analysis

Cronbach's Alpha	N of Items
.934	44

Cronbach's alpha value is 0,934 which is higher than 0.70. It is being very close to one, which is the best value possible, indicates that the construct is highly reliable.

Descriptive Analysis

The descriptive statistics include univariate as well as bivariate analyses. This section summarizes demographic profile of the firms in the sample, which include information such as geographic location, level of capital, firm structure, number of employees.

Geographical location of a firm might affect its innovation potential since firms which are physically close to each other can learn through formal and informal communication channels or simply by observing the innovation behavior of others.

Among the firms which participated in the study; 17% are located in Üsküdar, 11% in Kadıkoy, 10% in Şişli, 8% in Beşiktaş, 12% in İkitelli, 9% in Bayrampaşa, 13% in Gaziosmanpaşa and 20% in Esenyurt. The distribution indicates that location of the firms is dispersed rather than clustering in a specific area.

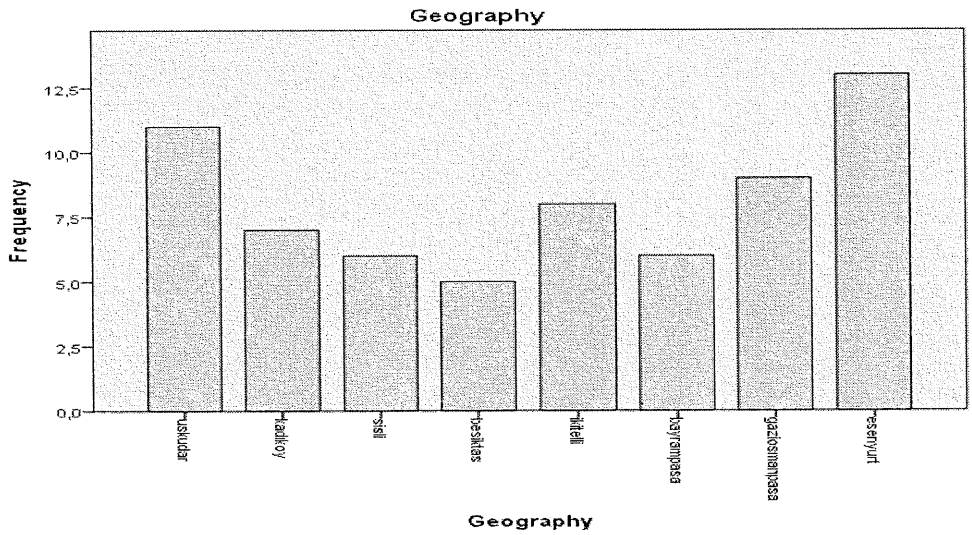


Figure 4. Frequency analysis for geographical location

The size of the firms and its role on innovation is debatable since some of the researches argue for their importance of large size and monopoly power, while some others argue for small size firms. In this research, 22% of the firms are large size, 34% are middle size and 44% are small size according the Istanbul Industry Chamber which data are gathered.

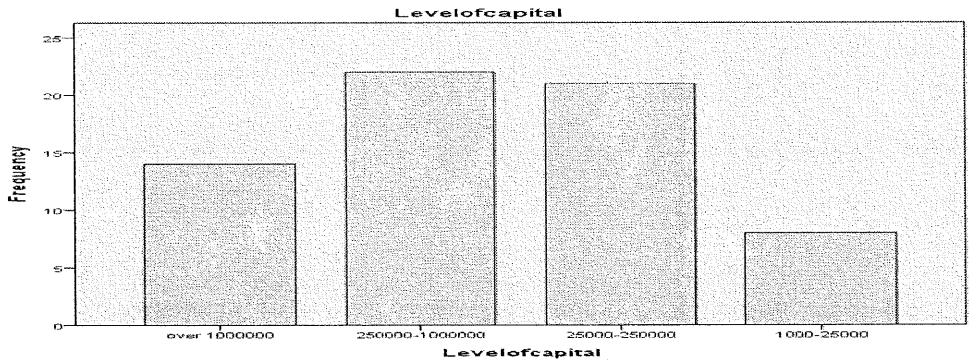


Figure 5. Frequency analysis for level of capital

The question related to firm structure demonstrates a composition of 48% of individual/ family firms, 22% of domestic partners, 16% of foreign partners and 14% of foreign origin.

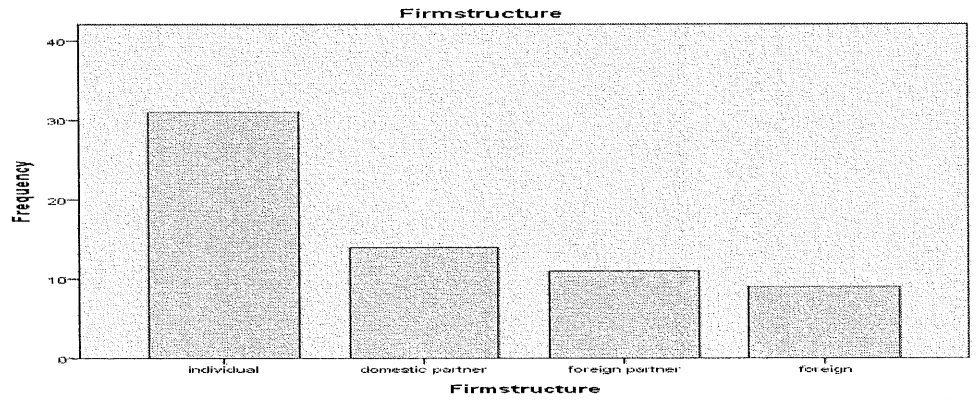


Figure 6. Frequency analysis for structure of the firms

6% of the firms have employees in the range of 0-50, 11% in 51-100, 21% in 101-250, 18% in 251-500, 17% in 501-1000, 14% in 1001-5000 and 12% have over than 5000 employees.

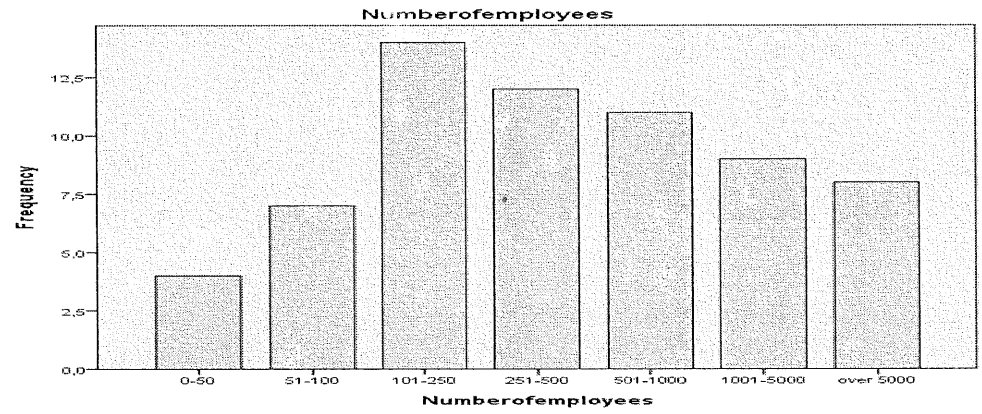


Figure 7. Frequency analysis for number of employees

Firm involvement in R&D is an indispensable factor for product innovation performance. This is necessary due to rapid and continuous changes and developments in technology. Furthermore, globalizing level of competition, increasing number of competitors as well as changing preferences and increasing expectations of customers emerge as other important issues. A firm which lacks an R&D strategy must rely only on strategic alliances, acquisitions, and networks to tap into the innovations of others. 40% of the firms don't have R&D department and accordingly they don't have R&D budget. On the other hand, 60% of the firms have R&D department and R&D budget. This implies that 60% of the firms are involved in R&D operations such as developing their internal and external R&D strategy such as deciding on which R&D to acquire for which type of sources.

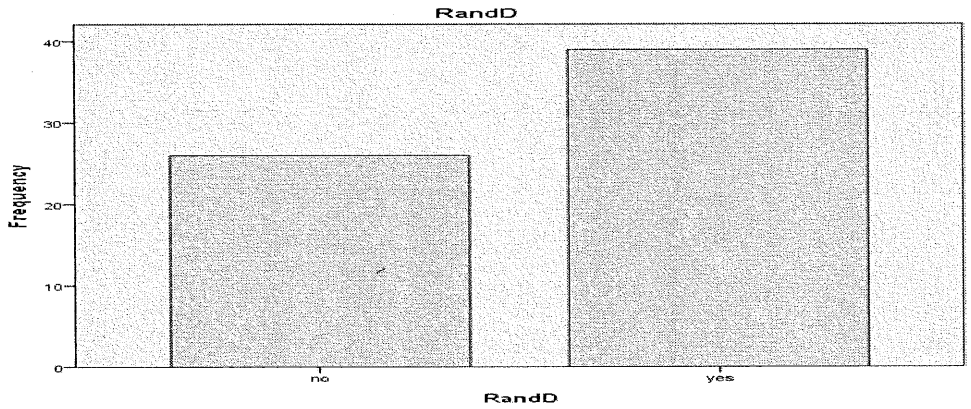


Figure 8. Frequency analysis for R&D involvement

Technology transfer is the process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments, universities and other institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services. It can be also considered as knowledge transfer which fosters innovation (Hargadon, 2003). Results of the technology transfer

question show that 5% of the firms transfer no technology, 29% transfer one, 25% transfer two, 15% transfer three and 26% transfer more than three. There is quite evidence that firms get more innovative with increasing number of technology transfers.

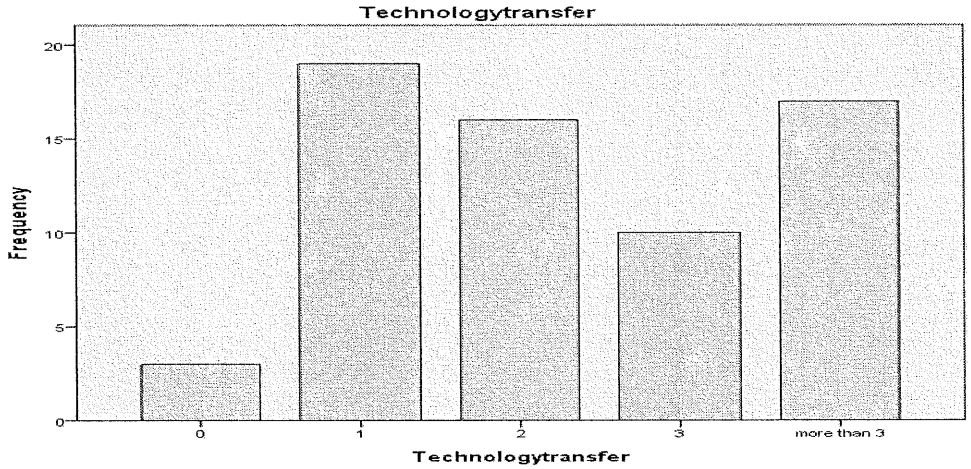


Figure 9. Frequency analysis for technology transfers

The business environment of the firm is a significant aspect. Organized industrial zones (OIZ), techno parks, industrial sites (IS) etc. increase the competitiveness of its region or territory of influence by stimulating a culture of quality and innovation among its business and knowledge based institutions. Based on the responses, 15% of the firms are located in OIZ, 8% in Techno park, 6% in IS, 62% isn't involved in any type of cluster and 9% is other. Results indicate that a majority of firms are located separate from others and cannot benefit from the collaboration opportunities of geographical clustering.

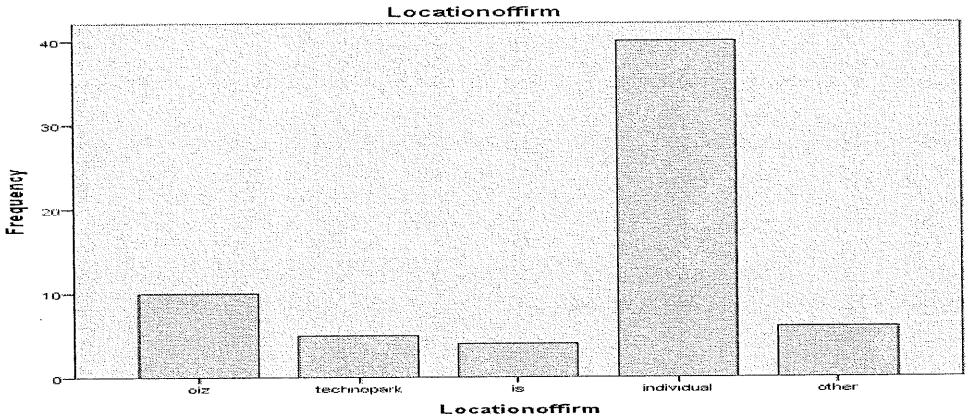


Figure 10. Frequency analysis for geographic clustering

Acquiring training and consulting services are included among the factors that strengthen the innovation potential and performance. This investment made for new information and knowledge provides business the opportunity to renew itself, to keep updated, to overcome weaknesses and thus enables innovative process strategies. Results of the related question indicate that 16% of the firms are not involved in any training and consulting services in the last five years. Among the others, only 3% have received education from universities, 8% from KOSGEB, 6% from sectorial, 60% from consultancy companies and 7% from others. The results for consultancy services are exactly the same with the results of training services. These results show that there is an urgent need to improve the policies and incentives for university-industry cooperation. Universities are major the major bodies of science and new knowledge. They should also lead in the diffusion of this knowledge. It is promising that an increasing number of universities are establishing their techno parks as well as technology transfer offices.

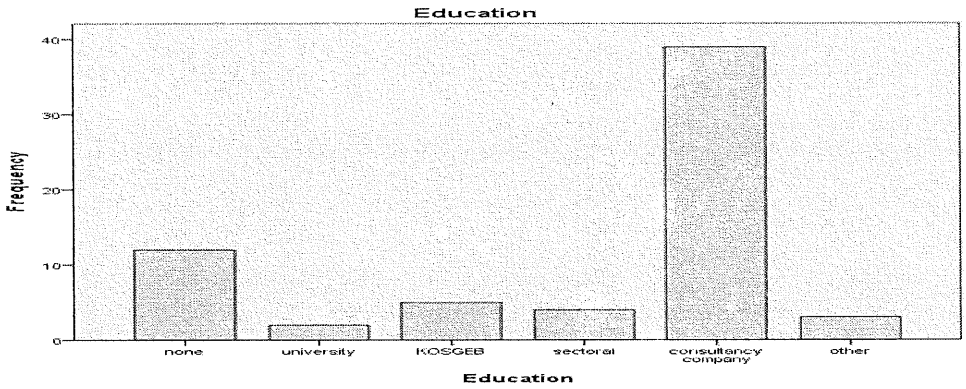


Figure 11. Frequency analysis for education

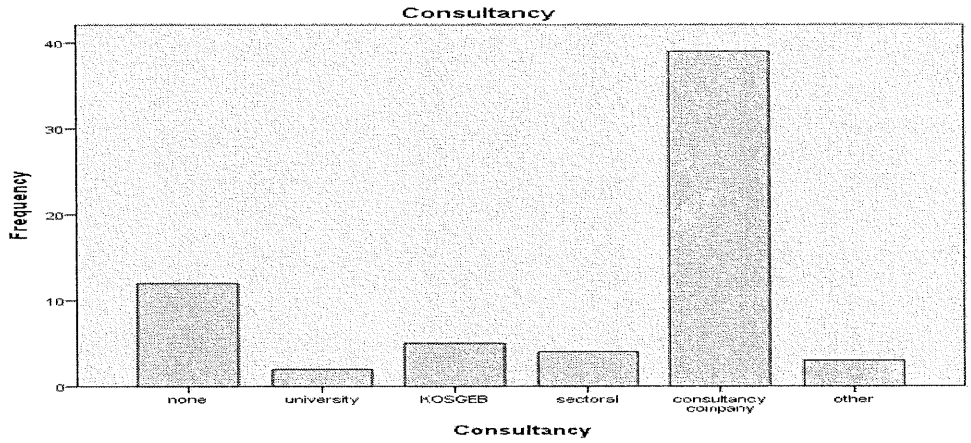


Figure 12. Frequency analysis for consultancy

Information and Communication Technology (ICT) has proven to be a major transformative force, driving socioeconomic progress and productivity around the world and fostering innovation. When fully deployed, ICT has a positive impact on society as a whole, including individuals, businesses, and governments. Therefore, having an active company website and using portals and social media are regarded as indicators of product innovation performance. Survey results indicate that all the firms have active website. Moreover, all the firms are members of portals and social media devices with 23% for one membership, 50% for two memberships and 27% for three memberships.

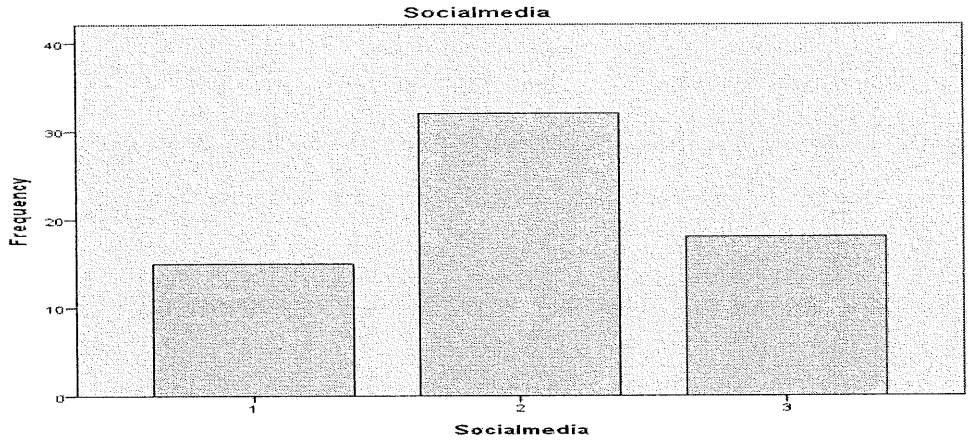


Figure 13. Frequency analysis for social media/ portal

E-trade is another indicator of ICT which also fosters innovation. The benefits of e-trade can be listed as increase in the number of customers in both domestic and international markets, an increase in the sales, the development of customer services, an increase in the productivity of the firm, an increase on the coordination with the supplier and a reduction on inventory and cost. Results of the related survey question show that 34% of the firms are not involved in e-trade, whereas the remaining 66% include electronic trading in their operations. Additionally, results of the revenue question indicate that e-trade activities constitute 1-5% of revenue for 25% of the firms, 6-10% for 31% and 11-15% for 10% of the firms.

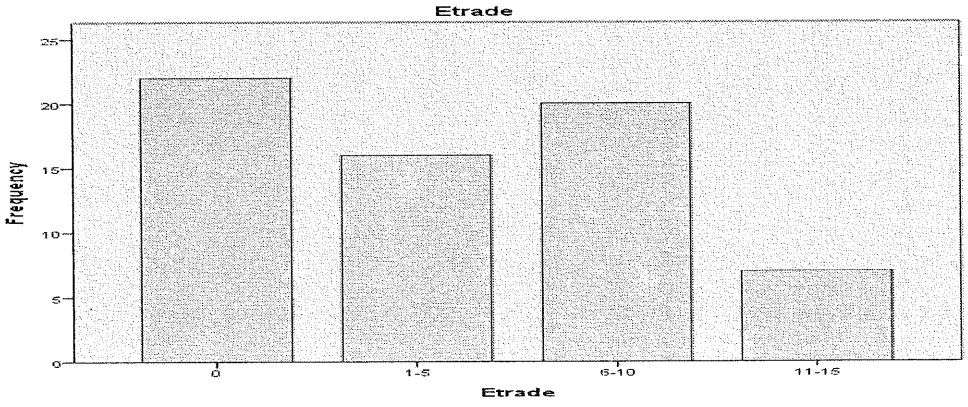


Figure 14. Frequency analysis for e-trade

Cooperation types with external parties are classified as sharing skills and knowledge, developing and accessing new technology, design, finding new domestic customers, finding new foreign customers, product innovation. The questionnaire includes questions about the firms' relationships with customers, competitors, suppliers, universities and governments. Moreover, the importance attributed to each type of cooperation with each party is also included. This is measured on a scale ranging between zero and three where zero stands for no importance and three stands for highly significant importance.

Table 2. Mean Values for Cooperation Level

Types of Cooperation	Customer	Competitor	Supplier	University	Government
Sharing Knowledge/ Skill	1.91	0.8	0.9	1.1	0.9
Access to New Technology	1.97	0.9	1.8	1	0.5
Design	1.12	1.1	1.6	0.6	0.5
Finding Domestic Customer	1.14	0.8	1.7	0.5	0.5
Finding Foreign Customer	1.9	1.1	1.6	0	0.5
Product Innovation	1.9	1	1.4	1.4	1.2

Table 2 presents the importance of the cooperation with external parties in various types of cooperation including sharing knowledge/ skills, new technology access, design, finding domestic customers, finding foreign customers and product innovation. The values in the table are the means of all the responses given ie. 1.97 shows the average level of importance out of three which can be interpreted as highly important. Results show that the highest importance is attributed to cooperation with the customers. This makes customer relation management a vital issue for firms

which helps to analyze the needs and demands of the consumers. Second important cooperation type is cooperation with the suppliers which can also be trendsetters in industries lie food and beverage. Results show that, firms should give importance to their supply chain strategies. They should form the appropriate supply chain strategies match with their company objectives and stronger supplier- customer linkages. The importance given to the cooperation with competitors, universities and government agencies are low. Turkish government supports production of raw material, but, there is not enough support for the processed products. As common feature of the innovation leaders, it is important to strengthen the science- business linkage. Therefore, they should focus on improving university- private sector cooperation.

Mean values that are given in Table 2 are presented in more detail in the following paragraphs.

18 % of the firms has no cooperation with customers for sharing skill/ and knowledge. 9% of firms that cooperate find it less important, 36% medium important and 37% very important. 18 % of the firms has no cooperation with customers for finding new foreign customer. 2% of firms that cooperate find it less important, 45% medium important and 35% very important. 55 % of the firms has no cooperation with customer for design. 6% of firms that cooperate find it less important, 10% medium important and 29% very important. 46 % of the firms has no cooperation with customer for finding new domestic customer. 10% of firms that cooperate find it less important, 29% medium important and 15% very important. 31 % of the firms has no cooperation with customer for new technology development/ access. 1% of firms that cooperate find it less important, 11% medium important and 57% very important. 25 % of the firms has no cooperation with customer for product

innovation. 1% of firms that cooperate find it less important, 34% medium important and 40% very important. Firms cooperate with the customers mostly for sharing skill/ knowledge and for finding new foreign customer whereas they cooperate at least for design. However, in general, cooperation with customer provides technology development and design improvement to firms.

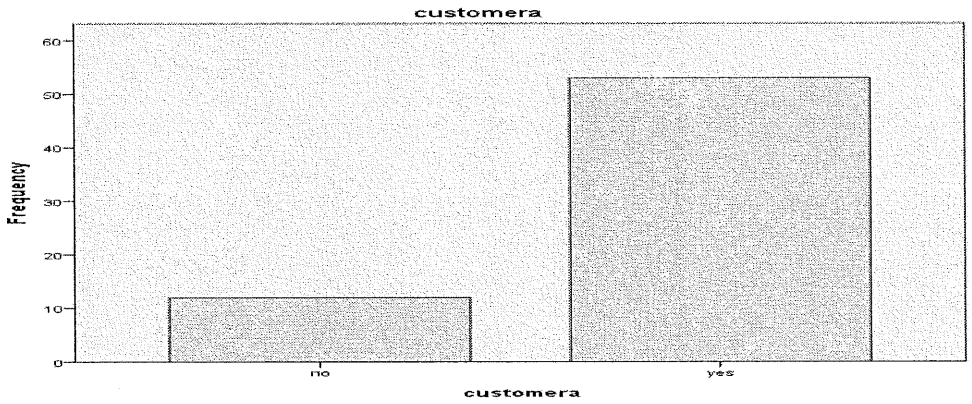


Figure 15. Cooperation level for sharing knowledge and skill

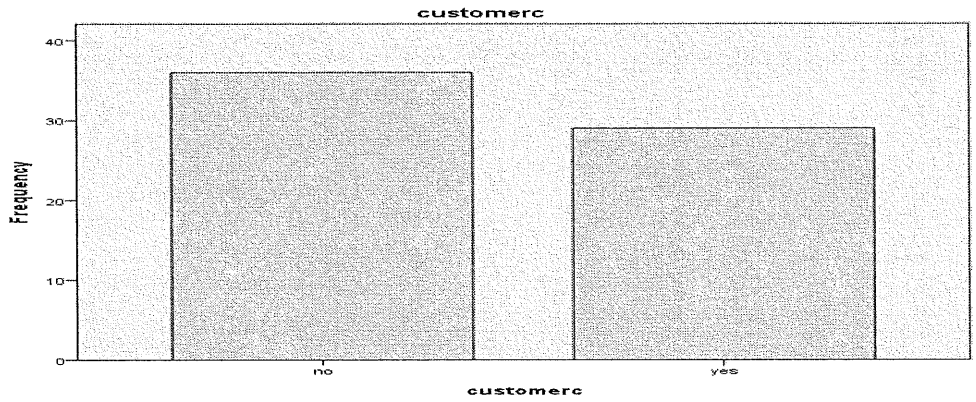


Figure 16. Cooperation level for design

63 % of the firms has no cooperation with competitor for sharing skill/ knowledge. None of the firms that cooperate find it less important, 34% medium important and 3% very important. 60 % of the firms has no cooperation with customer for finding new foreign customer. None of firms that cooperate find it less important, 30% medium important and 10% very important. 60 % of the firms has no cooperation with customer for design. None of firms that cooperate find it less important, 2%

medium important and 38% very important. 55 % of the firms has no cooperation with customer for finding new domestic customer. 7% of firms that cooperate find it less important, and 38% very important. 32% of the firms has no cooperation with customer for new technology development/ access. 28% of firms that cooperate find it less important, 3% medium important and 37% very important. 45 % of the firms has no cooperation with customer for product innovation. 17% of firms that cooperate find it less important, 1% medium important and 37% very important. Firms cooperate with the competitor at most for new technology development/ access whereas they cooperate at least for sharing skill/ knowledge. In general, cooperation with the competitor is the least frequent cooperation type and it is only based on sharing new technology.

48 % of the firms has no cooperation with supplier for sharing skill/ knowledge. 8% of firms that cooperate find it less important, 3% medium important and 41% very important. 28 % of the firms has no cooperation with customer for finding new foreign customer. None of the firms that cooperate find it less important, 33% medium important and 39% very important. 35 % of the firms has no cooperation with customer for design. None of the firms that cooperate find it less important, 37% medium important and 28% very important. 29 % of the firms has no cooperation with customer for finding new domestic customer. 2% of firms that cooperate find it less important, 41% medium important and 28% very important. 35% of the firms has no cooperation with customer for new technology development/ access. 2% of firms that cooperate find it less important, 28% medium important and 35% very important. 46 % of the firms has no cooperation with customer for product innovation. 9% of firms that cooperate find it less important, 6% medium important and 39% very important. Firms cooperate with the supplier at most for finding new

foreign costemer whereas they cooperate at least for sharing skill/ knowledge. But, in general, cooperation with the supplier adds to the level of expertise and comprehensive knowledge and contributes to product revenue.

45 % of the firms has no cooperation with university for sharing skill/ knowledge. None of firms that cooperate finds it less important and 55% medium important. None of the firms cooperate with customer for finding new foreign customers. 54 % of the firms has no cooperation with customer for design. 32% of firms that cooperate find it less important and 14% medium important. 54 % of the firms has no cooperation with customer for finding new domestic customer. 46% of firms that cooperate find it less important. 39% of the firms has no cooperation with customer for new technology development/ access. 37% of firms that cooperate find it less important, 15% medium important and 9% very important. 54 % of the firms has no cooperation with customer for product innovation. None of firms that cooperate find it less important, 2% medium important and 44% very important. Firms cooperate with the university at most for new technology development/ access whereas they have no cooperation for finding new foreign customer.

54 % of the firms has no cooperation with supplier for sharing skill/ knowledge, finding new foreign customer, design, finding new domestic customer and new technology development/ access. None of the firms that cooperate find it less important and 46% medium important. 62% of the firms has no cooperation with customer for product innovation. 32% of firms that cooperate find it very important. Firms cooperate with the government at least for product innovation which should be increased for improving product innovation performance.

The utilization of machinery and laboratory is among vital factors for innovation. These preferences are decisive for the firm's innovation strategy and

innovative potential. Results indicate that although firms use machinery and lab, they own them and not at all cooperate for sharing or common use of these research tools. Technical infrastructure investment entity may be an indicator in terms of innovation capacity. The joint use of infrastructure facilities such as lab and machine park should be developed. Common use provides firms cost savings, knowledge sharing and cooperation culture.

Export and import provide firms access to new international markets, new technology, new ideas from international customers along with new and stronger level of competition. 43% of the firms don't import and 45% of them don't export. Import rates in terms of contribution to the revenue, is in the scale of 1-10% for 43% of the firms, in the scale of 11-25% for 14%. For export, these rates are 1-10% for 40% of the firms and 11-25% for 15% of the firms. These rates indicate that firms are to a degree exposed to the international markets which should be increased further.

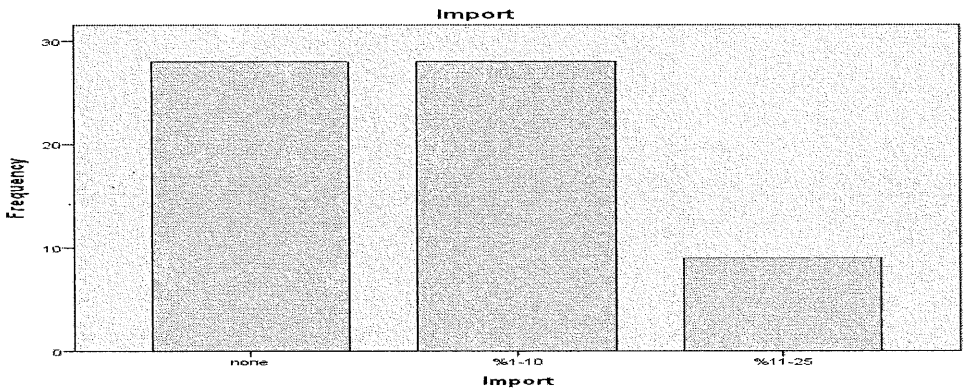


Figure 17. Frequency test for import

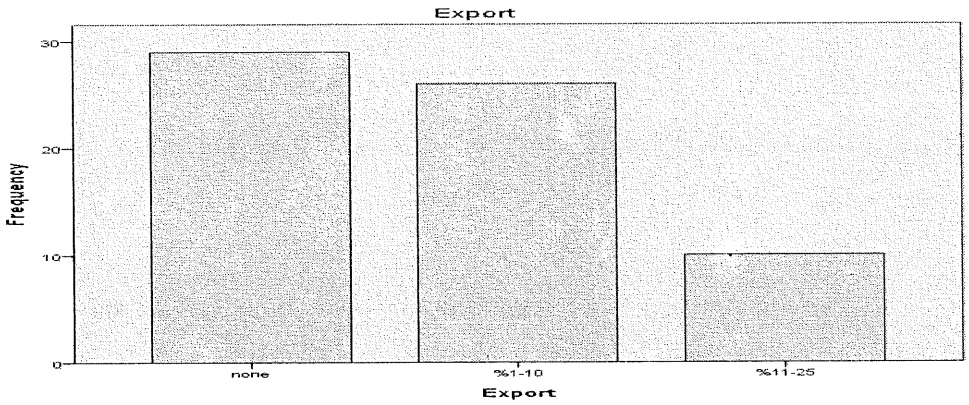


Figure 18. Frequency test for export

For the respondents of the questionnaire, import destinations are EU countries (more than 50%), China, Far East, Russia, USA and South America; whereas, export destinations are EU countries, African Countries, India, Russia, China, Far East, Russia, USA and South America. These results of the sample are actually similar to training activities realized with all the trade partners of the Turkey.

For the firms that neither import nor export, the reason is mostly the high manufacturing costs and lack of support and encouragement. Other reasons are stated as the lack of foreign trade department, lack of market research, lack of information communication technology infrastructure, foreign language problems and regulatory challenges.

Product innovation is classified in the literature as new product innovation, greatly modified/ improved products or slightly improved products. New product development describes the complete process of bringing a new product or service to market. Major processes that are involved in the path of new product innovation are the idea generation, product design, detail engineering and market research and marketing analysis. Improvement of existing product includes improvements in functional characteristics, technical abilities, or ease of use. The questionnaire includes four questions related to the measurement of about product innovation

performance. The questions are about the number of products improved in the last five years, number of new products produced in the last five years and contribution of both types of products to the revenue in 2012. Results indicate that 14% of the firms improved one existing product, 32% of the firms improved two existing products, 29% of the firms improved three existing products, 8% of the firms improved four existing products, 12% of the firms improved five existing products, 5% of the firms improved more than 5 existing products.

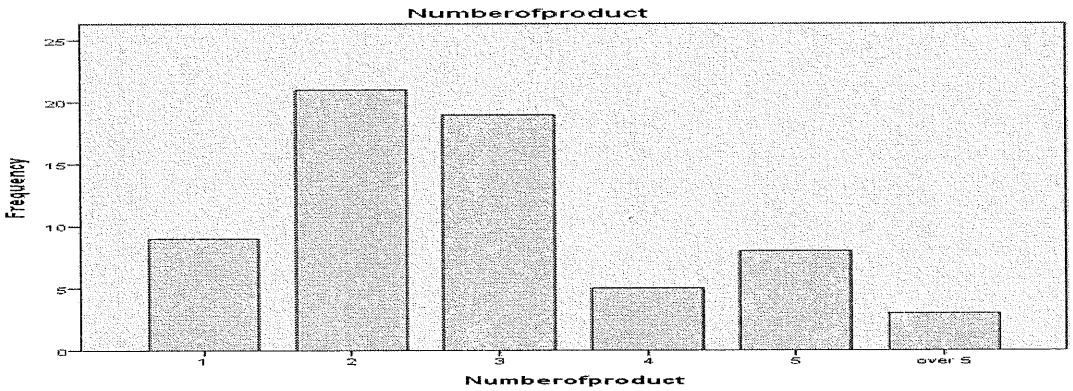


Figure 19. Frequency test for number of improved products produced

The contribution of improved products produced to revenue is as follows. For 5% of the firms no effect on revenue, for 21% in the range of 1-5%, for 34% in the range of 6-10%, for 28% in the range of 11-15%, for 5% in the range of 16-20%, and for 7% it is more than 20%.

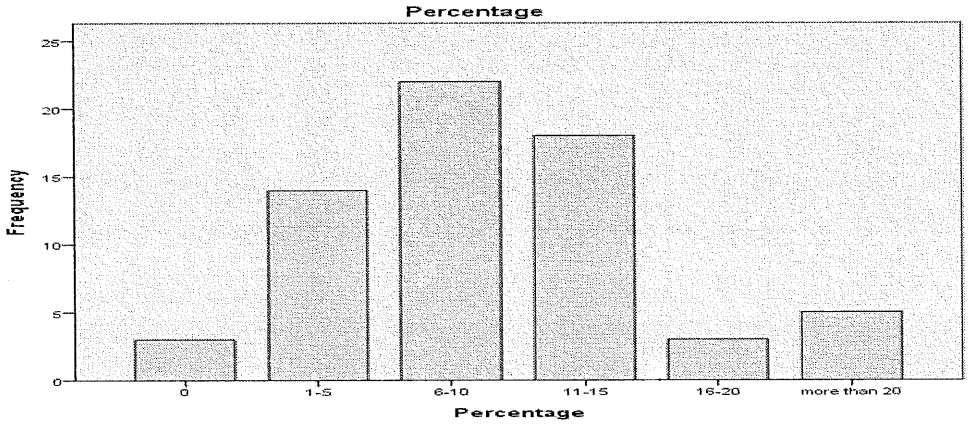


Figure 20. Frequency test for number of improved products produced

In terms of new product innovation, questionnaire results show that 9% of the firms improved no new product, 35% of the firms improved one to three new products, 43% of the firms improved four to six new products, 8% of the firms improved seven to nine new products and 6% of the firms improved more than nine new products.

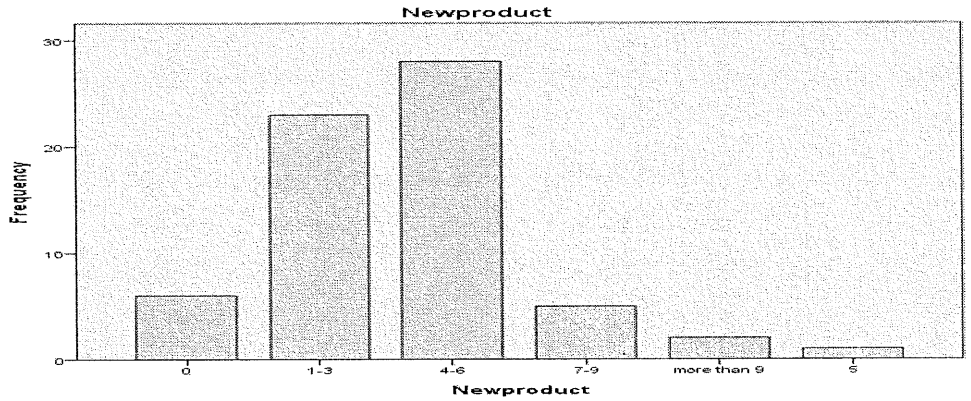


Figure 21. Frequency test for number of new products produced

The contribution of new products to the revenue is as follows. For 11% of the firms no effect on revenue, for 35% in the range of 1-5%, for 32% in the range of 6-10%, for 12% in the range of 11-15%, for 2% in the range of 16-20%, and for 8% it is more than 20%.

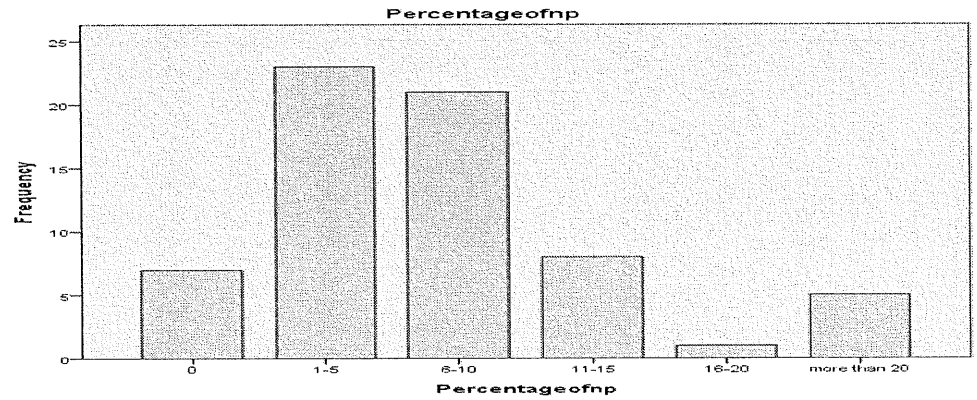


Figure 22. Frequency test for % of revenue acquired by new products produced

The results may imply that the contribution of the firms and their innovation potential are higher when they innovate new products or make improvements in major existing products compared to minor improvements made in existing products.

Cross tabulation of Frequencies

A cross tabulation (crosstab) allows bivariate comparisons. These variables are compared in terms of their respective frequency distributions across the categories of another variable. By comparing differences in these frequency distributions it can be assessed whether a relationship exists between the two variables. Chi-square test is used to assess whether a relationship displayed by sample data in a crosstab comes about by chance when sampling from populations where the two variables are actually independent. Asymp. Sig. value (significance level) that is less than 0.05 is attributed to the existence of a significant relationship (Sekoran and Bougie, 2010). In this section, the four dependent variables of the research are cross tabulated with all the independent variables considered for analysis.

Crosstabs for Number of Improved Products Produced

Table 3. Crosstab for R&D and Number of Improved Products Produced

Crosstab

			RandD		
			no	yes	Total
Numberofproduct	1	Count	7	2	9
		Expected Count	3,6	5,4	9,0
		% within Numberofproduct	77,8%	22,2%	100,0%
		% within RandD	26,9%	5,1%	13,8%
	2	Count	12	9	21
		Expected Count	8,4	12,6	21,0
		% within Numberofproduct	57,1%	42,9%	100,0%
		% within RandD	46,2%	23,1%	32,3%
	3	Count	2	17	19
		Expected Count	7,6	11,4	19,0
		% within Numberofproduct	10,5%	89,5%	100,0%
		% within RandD	7,7%	43,6%	29,2%
	4	Count	3	2	5
		Expected Count	2,0	3,0	5,0
		% within Numberofproduct	60,0%	40,0%	100,0%
		% within RandD	11,5%	5,1%	7,7%
	5	Count	2	6	8
		Expected Count	3,2	4,8	8,0
		% within Numberofproduct	25,0%	75,0%	100,0%
		% within RandD	7,7%	15,4%	12,3%
	over 5	Count	0	3	3
		Expected Count	1,2	1,8	3,0
		% within Numberofproduct	0,0%	100,0%	100,0%
		% within RandD	0,0%	7,7%	4,6%
Total		Count	26	39	65
		Expected Count	26,0	39,0	65,0
		% within Numberofproduct	40,0%	60,0%	100,0%
		% within RandD	100,0%	100,0%	100,0%

Table 4. Chi-Square Test for R&D and Number of Improved Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18,384[a]	5	,003
Likelihood Ratio	20,760	5	,001
Linear-by-Linear Association	8,125	1	,004
N of Valid Cases	65		

a. 7 cells (58,3%) have expected count less than 5. The minimum expected count is 1,20.

Table 3 and Table 4 are related to the crosstab analysis for number of improved products produced and R&D involvement of the firms. The increase in the number of improved products is accompanied by the increase in the percentage of firms involved in R&D. 22% of firms which innovate one product are involved in R&D.

43% of firms which innovate two products and 90% of firms which innovate three products are involved in R&D. It is evident from these results that firms which are innovating a higher number of products are involved in R&D operations with higher percentages. Among all those who are involved in R&D, 28% innovate one or two products, whereas, the remaining majority innovate more than two products. Pearson Chi-Square value (p-value= 0.003< 0.05) designates that the relationship between number of improved products and R&D is significant. Moreover, crosstab analyses for R&D and R&D budget give the same result. In other words, number of improved products is significantly related to both R&D and R&D budget.

Table 5. Crosstab Analysis for Technology Transfer and Number of Improved Products Produced

Crosstab

			Technologytransfer					Total
			0	1	2	3	more than 3	
Numberofproduct	1	Count	3	5	1	0	0	9
		Expected Count	,4	2,6	2,2	1,4	2,4	9,0
		% within Numberofproduct	33,3%	55,6%	11,1%	0,0%	0,0%	100,0%
		% within Technologytransfer	100,0%	26,3%	6,3%	0,0%	0,0%	13,8%
	2	Count	0	13	4	3	1	21
		Expected Count	1,0	6,1	5,2	3,2	5,5	21,0
		% within Numberofproduct	0,0%	61,9%	19,0%	14,3%	4,8%	100,0%
		% within Technologytransfer	0,0%	68,4%	25,0%	30,0%	5,9%	32,3%
	3	Count	0	1	7	1	10	19
		Expected Count	,9	5,6	4,7	2,9	5,0	19,0
		% within Numberofproduct	0,0%	5,3%	36,8%	5,3%	52,6%	100,0%
		% within Technologytransfer	0,0%	5,3%	43,8%	10,0%	58,8%	29,2%
	4	Count	0	0	2	2	1	5
		Expected Count	,2	1,5	1,2	,8	1,3	5,0
		% within Numberofproduct	0,0%	0,0%	40,0%	40,0%	20,0%	100,0%
		% within Technologytransfer	0,0%	0,0%	12,5%	20,0%	5,9%	7,7%
	5	Count	0	0	1	3	4	8
		Expected Count	,4	2,3	2,0	1,2	2,1	8,0
		% within Numberofproduct	0,0%	0,0%	12,5%	37,5%	50,0%	100,0%
		% within Technologytransfer	0,0%	0,0%	6,3%	30,0%	23,5%	12,3%
	over 5	Count	0	0	1	1	1	3
		Expected Count	,1	,9	,7	,5	,8	3,0
		% within Numberofproduct	0,0%	0,0%	33,3%	33,3%	33,3%	100,0%
		% within Technologytransfer	0,0%	0,0%	6,3%	10,0%	5,9%	4,6%
Total		Count	3	19	16	10	17	65
		Expected Count	3,0	19,0	16,0	10,0	17,0	65,0
		% within Numberofproduct	4,6%	29,2%	24,6%	15,4%	26,2%	100,0%
		% within Technologytransfer	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Table 6. Chi-Square Test for Technology Transfer and Number of Improved Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	60,816[a]	20	,000
Likelihood Ratio	61,399	20	,000
Linear-by-Linear Association	23,630	1	,000
N of Valid Cases	65		

a. 26 cells (86,7%) have expected count less than 5. The minimum expected count is ,14.

Table 5 and Table 6 present the crosstab analysis for number of improved products and number of technology transfers. Based on the results, it is obvious that the number of improved products increase with increasing number of technology transfers. Among the firms that innovate one product, 33% makes no, 56% makes one technology transfer. Among those they innovate two products 62% make one, 38% make more than one transfers. This trend repeats itself for higher number of product innovations. 95% of firms which innovate three products make more than two technology transfers and all of the firms which innovate four or more products make more than two technology transfers. On the other hand, 73% of firms that make one technology transfer produce two or more products, 94% of firms that make two technology transfers produce more than two products and all of the firms that make three and more technology transfers produce more than two products. And also Table 6 shows that the relationship between number of improved product and technology transfer is significant ($p=0.000< 0.05$). Both way relationships very clearly prove that technology transfer is an extremely important factor for the number of products produced.

Table 7. Crosstab Analysis for Receiving Training and Number of Improved Products Produced

Crosstab

			Education						
			0	university	KOSGEB	sectoral	consultancy company	other	Total
Numberofproduct	1	Count	5	0	1	1	1	1	9
		Expected Count	1,7	,3	,7	,6	5,4	,4	9,0
		% within Numberofproduct	55,6%	0,0%	11,1%	11,1%	11,1%	11,1%	100,0%
		% within Education	41,7%	0,0%	20,0%	25,0%	2,6%	33,3%	13,8%
	2	Count	4	0	0	2	14	1	21
		Expected Count	3,9	,6	1,6	1,3	12,6	1,0	21,0
		% within Numberofproduct	19,0%	0,0%	0,0%	9,5%	66,7%	4,8%	100,0%
		% within Education	33,3%	0,0%	0,0%	50,0%	35,9%	33,3%	32,3%
	3	Count	2	0	3	0	13	1	19
		Expected Count	3,5	,6	1,5	1,2	11,4	,9	19,0
		% within Numberofproduct	10,5%	0,0%	15,8%	0,0%	68,4%	5,3%	100,0%
		% within Education	16,7%	0,0%	60,0%	0,0%	33,3%	33,3%	29,2%
	4	Count	0	0	0	0	5	0	5
		Expected Count	,9	,2	,4	,3	3,0	,2	5,0
		% within Numberofproduct	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	100,0%
		% within Education	0,0%	0,0%	0,0%	0,0%	12,8%	0,0%	7,7%
	5	Count	0	1	1	1	5	0	8
		Expected Count	1,5	,2	,6	,5	4,8	,4	8,0
		% within Numberofproduct	0,0%	12,5%	12,5%	12,5%	62,5%	0,0%	100,0%
		% within Education	0,0%	50,0%	20,0%	25,0%	12,8%	0,0%	12,3%
	over 5	Count	1	1	0	0	1	0	3
		Expected Count	,6	,1	,2	,2	1,8	,1	3,0
		% within Numberofproduct	33,3%	33,3%	0,0%	0,0%	33,3%	0,0%	100,0%
		% within Education	8,3%	50,0%	0,0%	0,0%	2,6%	0,0%	4,6%
Total		Count	12	2	5	4	39	3	65
		Expected Count	12,0	2,0	5,0	4,0	39,0	3,0	65,0
		% within Numberofproduct	18,5%	3,1%	7,7%	6,2%	60,0%	4,6%	100,0%
		% within Education	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Table 8. Chi-Square Test for Taking Education and Number of Improved Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37,416[a]	25	,053
Likelihood Ratio	37,553	25	,051
Linear-by-Linear Association	1,081	1	,299
N of Valid Cases	65		

a. 33 cells (91,7%) have expected count less than 5. The minimum expected count is ,09.

Tables 7 and 8, present the crosstab analysis for number of improved products and receiving training from external bodies. There is a positive relationship among the two with the significance coefficient being at the limiting value (p=0.053). This will be discussed further in regression analysis. The results of receiving consultancy are also parallel with these results; therefore, it is not discussed in further detail.

Crosstab analyses for social portal membership, e-trade and contribution of import on revenue do not reveal significant relationship with number of improved products produced. Respective p-values are 0.084, 0.165 and 0.137. These are discussed further in regression analyses.

Moreover, number of improved products has positive relationship with increasing number of social media/ portal membership and export. Respective p-values are 0.008 and 0.038. These results are in parallel with the results of previous crosstab analyses. Therefore, it is not discussed in detail.

All the cooperation types including the customer for sharing skill/ knowledge, new technology development/ access, design, finding new domestic customer, finding new foreign customer, product innovation have positive relationship with the number of improved products. Respective p-values are 0.00,0.00, 0.039, 0.049, 0.04 and 0.01. All the p-values of cooperation with the universities for sharing skill/ knowledge, new technology development/ access, design, finding new domestic customer, finding new foreign customer, product innovation are smaller than 0.05, which indicates positive relationship between number of improved products and cooperation with the university. Similarly, all the p-values of cooperation with the government for sharing skill/ knowledge, new technology development/ access, design, finding new domestic customer, finding new foreign customer, product innovation are smaller than 0.05, which indicates relationship between number of improved products and cooperation with the government is significantly positive. These results are in parallel with the results of previous crosstab analyses. Therefore, it is not discussed in detail.

Crosstabs for Number of New Products Produced

Table 9. Crosstab Analysis for Cooperation with universities and Number of New Products

Crosstab

			universitya		Total
			no	yes	
Newproduct	0	Count	3	3	6
		Expected Count	2,7	3,3	6,0
		% within Newproduct	50,0%	50,0%	100,0%
		% within universitya	10,3%	8,3%	9,2%
	1-3	Count	16	7	23
		Expected Count	10,3	12,7	23,0
		% within Newproduct	69,6%	30,4%	100,0%
		% within universitya	55,2%	19,4%	35,4%
	4-6	Count	8	20	28
		Expected Count	12,5	15,5	28,0
		% within Newproduct	28,6%	71,4%	100,0%
		% within universitya	27,6%	55,6%	43,1%
	7-9	Count	2	3	5
		Expected Count	2,2	2,8	5,0
		% within Newproduct	40,0%	60,0%	100,0%
		% within universitya	6,9%	8,3%	7,7%
	more than 9	Count	0	2	2
		Expected Count	,9	1,1	2,0
		% within Newproduct	0,0%	100,0%	100,0%
		% within universitya	0,0%	5,6%	3,1%
	5	Count	0	1	1
		Expected Count	,4	,6	1,0
		% within Newproduct	0,0%	100,0%	100,0%
		% within universitya	0,0%	2,8%	1,5%
Total		Count	29	36	65
		Expected Count	29,0	36,0	65,0
		% within Newproduct	44,6%	55,4%	100,0%
		% within universitya	100,0%	100,0%	100,0%

Table 10. Chi-Squire Test for Cooperation with Universities and Number of New Products

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11,241[a]	5	,047
Likelihood Ratio	12,536	5	,028
Linear-by-Linear Association	6,209	1	,013
N of Valid Cases	65		

a. 8 cells (66,7%) have expected count less than 5. The minimum expected count is ,45.

Tables 9 and 10 are related to the crosstab analysis for number of new products and cooperation with universities for sharing knowledge. When cooperation with universities for sharing knowledge increases from 30% to 71%, the related number of

new products produced increase from 1-3 to 4-6 range. Firms which are innovating a higher number of products cooperate with the universities with higher percentages. Among all those who cooperate with universities 27% innovate zero or one-three products, the remaining majority innovate more than three products. Pearson Chi-Square value (p-value= 0.047< 0.05) designates that the relationship between number of new products and cooperation with universities for sharing knowledge is significant.

Table 11. Crosstab Analysis for Export and Number of New Products Produced

Crosstab

			Export			
			none	%1-10	%11-25	Total
Newproduct	0	Count	5	1	0	6
		Expected Count	2,7	2,4	,9	6,0
		% within Newproduct	83,3%	16,7%	0,0%	100,0%
		% within Export	17,2%	3,8%	0,0%	9,2%
	1-3	Count	16	7	0	23
		Expected Count	10,3	9,2	3,5	23,0
		% within Newproduct	69,6%	30,4%	0,0%	100,0%
		% within Export	55,2%	26,9%	0,0%	35,4%
	4-6	Count	8	14	6	28
		Expected Count	12,5	11,2	4,3	28,0
		% within Newproduct	28,6%	50,0%	21,4%	100,0%
		% within Export	27,6%	53,8%	60,0%	43,1%
	7-9	Count	0	2	3	5
		Expected Count	2,2	2,0	,8	5,0
		% within Newproduct	0,0%	40,0%	60,0%	100,0%
		% within Export	0,0%	7,7%	30,0%	7,7%
	more than 9	Count	0	1	1	2
		Expected Count	,9	,8	,3	2,0
		% within Newproduct	0,0%	50,0%	50,0%	100,0%
		% within Export	0,0%	3,8%	10,0%	3,1%
	5	Count	0	1	0	1
		Expected Count	,4	,4	,2	1,0
		% within Newproduct	0,0%	100,0%	0,0%	100,0%
		% within Export	0,0%	3,8%	0,0%	1,5%
Total		Count	29	26	10	65
		Expected Count	29,0	26,0	10,0	65,0
		% within Newproduct	44,6%	40,0%	15,4%	100,0%
		% within Export	100,0%	100,0%	100,0%	100,0%

Table 12. Chi-Squire Test for Export and Number of New Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26,710[a]	10	,003
Likelihood Ratio	30,780	10	,001
Linear-by-Linear Association	18,530	1	,000
N of Valid Cases	65		

a. 14 cells (77,8%) have expected count less than 5. The minimum expected count is ,15.

Tables 11 and 12 present crosstab analysis for number of new products produced and export activities contributing in revenue. Based on the results, it is obvious that the number of new products increase with export activities. Those firms, which innovate higher number of products, acquire a higher percentage of their revenue through export. 96% of firms for which export is 1-10% of revenue, innovate one or more products. 100% of firms for which export is 11-25% of revenue, produce more than four products. And also Table 12 shows that the relationship between number of new products and export activities is significant ($p=0.003< 0.05$).

Significant p-value is obtained for technology transfer, cooperation with the customer in terms of design and new technology development/ access, cooperation with the supplier in terms of new technology development/ access, design, finding new domestic customer and finding new foreign customer. These results are in parallel with the results of previous crosstab analyses.

Crosstabs for % of Revenue Acquired by Number of Improved Products Produced

Table 13. Crosstab Analysis for E-trade and % Revenue Acquired by Number of Improved Products Produced

Crosstab

			Etrade				
			0	1-5	6-10	11-15	Total
Percentage	0	Count	2	1	0	0	3
		Expected Count	1,0	,7	,9	,3	3,0
		% within Percentage	66,7%	33,3%	0,0%	0,0%	100,0%
		% within Etrade	9,1%	6,3%	0,0%	0,0%	4,6%
	1-5	Count	5	6	3	0	14
		Expected Count	4,7	3,4	4,3	1,5	14,0
		% within Percentage	35,7%	42,9%	21,4%	0,0%	100,0%
		% within Etrade	22,7%	37,5%	15,0%	0,0%	21,5%
	6-10	Count	8	6	5	3	22
		Expected Count	7,4	5,4	6,8	2,4	22,0
		% within Percentage	36,4%	27,3%	22,7%	13,6%	100,0%
		% within Etrade	36,4%	37,5%	25,0%	42,9%	33,8%
	11-15	Count	1	3	10	4	18
		Expected Count	6,1	4,4	5,5	1,9	18,0
		% within Percentage	5,6%	16,7%	55,6%	22,2%	100,0%
		% within Etrade	4,5%	18,8%	50,0%	57,1%	27,7%
	16-20	Count	3	0	0	0	3
		Expected Count	1,0	,7	,9	,3	3,0
		% within Percentage	100,0%	0,0%	0,0%	0,0%	100,0%
		% within Etrade	13,6%	0,0%	0,0%	0,0%	4,6%
	more than 20	Count	3	0	2	0	5
		Expected Count	1,7	1,2	1,5	,5	5,0
		% within Percentage	60,0%	0,0%	40,0%	0,0%	100,0%
		% within Etrade	13,6%	0,0%	10,0%	0,0%	7,7%
Total		Count	22	16	20	7	65
		Expected Count	22,0	16,0	20,0	7,0	65,0
		% within Percentage	33,8%	24,6%	30,8%	10,8%	100,0%
		% within Etrade	100,0%	100,0%	100,0%	100,0%	100,0%

Table 14. Chi-Square Test for E-trade and % Revenue Acquired by Number of Improved Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26,127[a]	15	,037
Likelihood Ratio	31,747	15	,007
Linear-by-Linear Association	1,089	1	,297
N of Valid Cases	65		

a. 19 cells (79,2%) have expected count less than 5. The minimum expected count is ,32.

Tables 13 and 14 present crosstab analysis for % of revenue acquired by improved products and % of e-trade in revenue. Based on the results it is obvious that % of revenue acquired by improved products increases with e-trade. And also Table 14 shows that the relationship between number of new product and export activities is significant ($p=0.037< 0.05$).

Figure 15: Crosstab Analysis for Cooperation with Customers and % Revenue Acquired by Number of Improved Products Produced

Crosstab

			customera		Total
			no	yes	
Percentage	0	Count	3	0	3
		Expected Count	,6	2,4	3,0
		% within Percentage	100,0%	0,0%	100,0%
		% within customera	25,0%	0,0%	4,6%
	1-5	Count	5	9	14
		Expected Count	2,6	11,4	14,0
		% within Percentage	35,7%	64,3%	100,0%
		% within customera	41,7%	17,0%	21,5%
	6-10	Count	1	21	22
		Expected Count	4,1	17,9	22,0
		% within Percentage	4,5%	95,5%	100,0%
		% within customera	8,3%	39,6%	33,8%
	11-15	Count	1	17	18
		Expected Count	3,3	14,7	18,0
		% within Percentage	5,6%	94,4%	100,0%
		% within customera	8,3%	32,1%	27,7%
	16-20	Count	2	1	3
		Expected Count	,6	2,4	3,0
		% within Percentage	66,7%	33,3%	100,0%
		% within customera	16,7%	1,9%	4,6%
	more than 20	Count	0	5	5
		Expected Count	,9	4,1	5,0
		% within Percentage	0,0%	100,0%	100,0%
		% within customera	0,0%	9,4%	7,7%
Total		Count	12	53	65
		Expected Count	12,0	53,0	65,0
		% within Percentage	18,5%	81,5%	100,0%
		% within customera	100,0%	100,0%	100,0%

Figure 16: Chi-Square Test for Cooperation with Customers and % Revenue Acquired by Number of Improved Products Produced

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26,603[a]	5	,000
Likelihood Ratio	24,253	5	,000
Linear-by-Linear Association	6,195	1	,013
N of Valid Cases	65		

a. 9 cells (75,0%) have expected count less than 5. The minimum expected count is ,55.

Tables 15 and 16 are related to the crosstab analysis for % of revenue acquired by improved products and cooperation with customers for sharing knowledge. When cooperation with customers for sharing knowledge increases from 0% to 64% and to 96%, % of revenue acquired by improved products increases from 0 to 1-5 to 6-10. Among all those who cooperate with customers, for 17% of them improved products

contribute to 1-5% of revenue, for the remaining majority contribution to revenue is more than 5%. Pearson Chi-Square value (p-value= 0.00< 0.05) designates that the relationship between % of revenue acquired by improved products and cooperation with customers for sharing knowledge is extremely significant.

There is a significant positive relationship with the R&D, technology transfer, import and export. Respective p-values are 0.003, 0.000, 0.027 and 0.037. These results are in parallel with the results of previous crosstab analyses. Therefore, it is not discussed in detail.

Crosstabs of % of Revenue Acquired by Number of New Products Produced

None of the p-values are smaller than 0.05; no significant relationship exists between any of the independent variables and % of new products in total revenue. In other words, number of new products produced has no effect in the total revenue. However, some factors are positively related with % of revenue acquired by improved products. One of the reasons can be that commercialization and launching of new products take too long. Therefore, number of new products does not have effect on the revenue in the short run. Another reason can be the effects of brands which are not well-known since these brands have small market share and take long to contribute to revenue.

Correlation Analysis

Correlation analysis examines the direction, strength and significance of the bivariate relationship among all the variables that are measured at an interval or ratio level.

This analysis makes no priori assumptions instead it gives an estimate as to the degree of associations between the variables. Pearson correlation coefficient, which is calculated for interval and ratio scale variables, indicates the strength and the direction of the relationship. The generally accepted conventional p-value in social sciences is p= 0.05 for accepting the significance of the relationship. Pearson correlation value between 0-1 means positive correlation whereas between -1- 0 means negative correlation. And also correlation gets stronger when the value gets closer to one (Sekoran and Bougie, 2010). Correlation analysis is conducted for the variables related to external knowledge inflow and international trade activities.

Table 17. Correlation Analysis

Correlations

		Technologytransfer	Socialmedia	Etrade	Import	Export	Numberofproduct	Percentage	Newproduct	Percentageofnp
Technologytransfer	Pearson Correlation	1	,414**	,687**	,553**	,740**	,608**	,135	,614**	,053
	Sig. (2-tailed)		,001	,000	,000	,000	,000	,282	,000	,677
	N	65	65	65	65	65	65	65	65	65
Socialmedia	Pearson Correlation	,414**	1	,539**	,494**	,479**	,373**	,199	,225	-,008
	Sig. (2-tailed)	,001		,000	,000	,000	,002	,113	,072	,952
	N	65	65	65	65	65	65	65	65	65
Etrade	Pearson Correlation	,687**	,539**	1	,812**	,746**	,429**	,130	,424**	-,068
	Sig. (2-tailed)	,000	,000		,000	,000	,000	,300	,000	,589
	N	65	65	65	65	65	65	65	65	65
Import	Pearson Correlation	,553**	,494**	,812**	1	,785**	,283*	,138	,418**	,078
	Sig. (2-tailed)	,000	,000	,000		,000	,022	,273	,001	,537
	N	65	65	65	65	65	65	65	65	65
Export	Pearson Correlation	,740**	,479**	,746**	,785**	1	,369**	,151	,538**	,109
	Sig. (2-tailed)	,000	,000	,000	,000		,002	,229	,000	,387
	N	65	65	65	65	65	65	65	65	65
Numberofproduct	Pearson Correlation	,608**	,373**	,429**	,283*	,369**	1	,184	,630**	,101
	Sig. (2-tailed)	,000	,002	,000	,022	,002		,143	,000	,425
	N	65	65	65	65	65	65	65	65	65
Percentage	Pearson Correlation	,135	,199	,130	,138	,151	,184	1	-,017	,134
	Sig. (2-tailed)	,282	,113	,300	,273	,229	,143		,895	,286
	N	65	65	65	65	65	65	65	65	65
Newproduct	Pearson Correlation	,614**	,225	,424**	,418**	,538**	,630**	-,017	1	,321**
	Sig. (2-tailed)	,000	,072	,000	,001	,000	,000	,895		,009
	N	65	65	65	65	65	65	65	65	65
Percentageofnp	Pearson Correlation	,053	-,008	-,068	,078	,109	,101	,134	,321**	1
	Sig. (2-tailed)	,677	,952	,589	,537	,387	,425	,286	,009	
	N	65	65	65	65	65	65	65	65	65

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 17 presents the correlation between product innovation performance variables and the variables related to external knowledge inflow and international trade. For technology transfer, p-value is 0.00 and Pearson correlation value is 0.608 which means perfect correlation with the number of improved products produced. In other words, as the number of technology transfers increase, the number of improved

products increases as well. The results of new products improved are also in parallel with these results. As it is discussed in the crosstab analyses, technology transfer extremely affects the number of product innovations.

The correlation of technology transfer with both e-trade and export are also significant. Respective p-values are 0.00 and 0.00; and respective Pearson correlation values are 0.69 and 0.74 which are so close to one. Moreover, e-trade is highly correlated with import and export. Respective p-values are 0.00 and 0.00; and respective Pearson correlation values are 0.81 and 0.75 which are so close to one. Results imply that firms make technology transfer through e-trade and export, Results also imply that firms realize some of their import and export activities through e-trade, especially import activities. Social media/ portal, e-trade, import and export with respective p-values of 0.02, 0.00, 0.022 and 0.02, are also positively correlated to number of improved products produced. It can be said that knowledge inflow through ICT including social media/ portal and e-trade is important for the product innovation performance. Export and import are also important for the product innovation performance since both of them play a significant role in technology diffusion and in accessing global market.

As can be seen in Table 17, all p-values for the independent variables are greater than 0.05 for both % of revenue acquired by improved products and % of revenue acquired by new products. Therefore, none of the variables related to knowledge inflow and international trade are significantly correlated to the % of revenue acquired by product innovation. One of the reasons can be that; since bureaucratic process takes too long for the approval of the improved or new product in the food and beverage sector in Turkey, it takes time to go to market and have a significant market share. This consequently results in low contribution to revenue

within the period of analysis. Another reason can be that integrating into the distribution channel may be hard for the SMEs in this sector. So, they cannot widespread their product in the market which results in unrecognization of product. Moreover, radical innovations usually make the innovator firms market leaders by providing higher market shares accordingly. Considering the fact that many new products in the food sector emerge from minor improvement of existing products, it might be the case that consumers do not recognize it as an innovation and the effect on the revenue becomes minor. The correlation analysis for both types of product innovations provides exactly the same results.

Regression Analyses

The regression analysis is used to describe the relationship precisely by means of an equation that has predictive value. In addition to correlation analysis, it also includes causality in the relationship (Sekoran and Bougie, 2010). Regression analyses conducted for this study analyze the effects of external environment related variables on the product innovation performance variable one by one.

First regression analysis is conducted to analyze the impact of external knowledge inflow variables on the number of improved products produced. Independent variables are external knowledge inflow variables which include R&D, technology transfer, geographical clustering, social media and e-trade.

Table 18. Model Summary of External Knowledge Inflow and Number of Improved Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,631[a]	,398	,347	1,105

a. Predictors: (Constant), Etrade, Locationoffirm, RandD, Socialmedia, Technologytransfer

Table 19. Anova of External Knowledge Inflow and Number of Improved Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47,689	5	9,538	7,809	,000[b]
	Residual	72,064	59	1,221		
	Total	119,754	64			

a. Dependent Variable: Numberofproduct

b. Predictors: (Constant), Etrade, Locationoffirm, RandD, Socialmedia, Technologytransfer

Table 20. Coefficients of External Knowledge Inflow and Number of Improved Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,288	,618		2,083	,042
	RandD	-,061	,352	-,022	-,173	,863
	Technologytransfer	,621	,170	,578	3,651	,001
	Locationoffirm	-,112	,115	-,101	-,972	,335
	Socialmedia	,304	,230	,159	1,325	,190
	Etrade	-,046	,202	-,035	-,229	,820

a. Dependent Variable: Numberofproduct

As shown in Table 18, Table 19, and Table 20, p-value= 0.00< 0.05 which imply a significant linear relationship between the dependent and independent variables. In other words, at least one of the independent variables used in the model affects the number of improved products significantly. Along with this, nearly 34% of the

product innovation performance for number of improved product can be explained by the external knowledge inflow variables (Table 18). Moreover, significance level for the technology transfer variable ($p=0.01< 0.05$) designates a significant linear relationship. Therefore, the number of technology transfers impacts the product innovation performance based on the number of improved products produced. On the other hand, the independent variables R&D, geographical clustering, social media and e-trade do not significantly impact the number of improved products produced, based on the p values (Table 20).

Second regression analysis is conducted to see the impact of knowledge transfer variables on the number of new products produced. The independent variable set is the same as in the previous analysis. The regression analysis results for the number of new products are the same as the results of improved products. It can be concluded that number of technology transfers made from the external environment significantly impact the number of improved products and number of new products produced by the firm. It is obvious that technology transfer is indispensable for the product innovation performance.

Third regression analysis is conducted to analyze the impact of international trade variables on the number of new products produced. Independent variables are the international trade variables which include import and export operations of the firm.

Table 21. Model Summary of International Trade and Number of New Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,538[a]	,290	,267	,835

a. Predictors: (Constant), Export, Import

Table 22. Anova Summary of International Trade and Number of New Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17,625	2	8,812	12,636	,000[b]
	Residual	43,237	62	,697		
	Total	60,862	64			

a. Dependent Variable: Newproduct

b. Predictors: (Constant), Export, Import

Table 23. Coefficients Summary of International Trade and Number of New Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,135	,151		7,514	,000
	Import	-,016	,240	-,011	-,067	,947
	Export	,738	,233	,547	3,169	,002

a. Dependent Variable: Newproduct

Tables 21, 22 and 23 show the regression analysis for the number of new products and international trade variables. The significance of the overall model is 0.00, which implies the existence of a significant linear relationship between the dependent and independent variables. In other words, at least one of the independent variables impacts the number of new products produced. Table 21 shows that nearly 27% of the product innovation performance as designated by the number of new products produced can be explained by the international trade variables. In addition, significance level for the contribution of export on revenue ($p=0.002< 0.05$), results in a significant linear relationship. Therefore, the contribution of the export on revenue has impact on the product innovation performance, namely the number of new products produced. Results shows that as the % of exports in total revenue increases, number of new products produced also increase. This might be due to the

knowledge transfer or knowledge diffusion effect of entering new international trade markets for exporting the goods.

Fourth regression analysis is conducted to see the impact of international trade variables on the number of improved products produced. The independent variable set is the same as in the previous analysis. The regression analysis results for the number of new products are the same as the results of improved products.

Fifth regression analysis is conducted to analyze the impact of various cooperation types with customers on the number of new products produced. Independent variables are the cooperation with customers in sharing knowledge, new technology access, design, finding domestic customers, finding foreign customers and product innovation.

Table 24. Model Summary of Cooperation with Customer and Number of New Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,484[a]	,234	,155	,896

a. Predictors: (Constant), customerf, customerd, customere, customerc, customera, customerb

Table 25. Anova Summary of Cooperation with Customer and Number of New Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14,267	6	2,378	2,960	,014[b]
	Residual	46,594	58	,803		
	Total	60,862	64			

a. Dependent Variable: Newproduct

b. Predictors: (Constant), customerf, customerd, customere, customerc, customera, customerb

Table 26. Coefficients Summary of Cooperation with Customer and Number of New Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,077	,272		3,966	,000
	customera	-,360	,728	-,144	-,494	,623
	customerb	-,102	,754	-,041	-,136	,892
	customerc	,589	,329	,303	1,790	,079
	customerd	,007	,341	,004	,020	,984
	customere	,749	,357	,357	2,097	,040
	customerf	,213	,410	,095	,519	,606

a. Dependent Variable: Newproduct

Tables 24, 25 and 26 show the regression analysis for the number of new products and cooperation with customers. The significance of the overall model is 0.14, which implies a significant linear relationship between the dependent and independent variables. Table 24 shows that nearly 16% of the product innovation performance for number of new products produced can be explained by the cooperation with customers. Significance level for new technology development/ access ($p=0.04<0.05$) implies a significant linear relationship. Thus, the cooperation with the customer for new technology development/ access has impact on the product innovation performance in terms of number of new products produced. Results show that, cooperation with customers provides benefits in identifying market opportunities for technology and product development and also reduces the likelihood of poor design in the early stages of development.

Sixth regression analysis is conducted to analyze the impact of various cooperation types with customers on the % of number of improved products in revenue. The independent variable set is the same as in the previous analysis. Anova results show that the significance of the overall model is 0.015, which implies a significant linear relationship between the dependent and independent variables.

Nearly 15% of the product innovation performance in terms of the percentage of improved products in revenue can be explained by the cooperation with customers. In addition, significance level for product innovation ($p=0.011< 0.05$), results in a significant linear relationship. Therefore; cooperating with the customer for product innovation has a significant impact on the product innovation performance in terms of contribution of improved products to total revenue. Results imply that as the firms cooperate with customers through their product improvement process, they are more likely to satisfy the customer needs and wishes. So customer relation management fosters the revenue collected through marketing and sales of these products. Furthermore, customer cooperation becomes significant since customer feedback supports post-delivery learning process of the firm.

Seventh regression analysis is conducted to analyze the impact of various cooperation types with suppliers on the number of improved products produced. Independent variables are the cooperation with suppliers in sharing knowledge, new technology access, design, finding domestic customers, finding foreign customers and product innovation.

Table 27. Model Summary of Cooperation with Supplier and Number of Improved Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,590[a]	,348	,293	1,150

a. Predictors: (Constant), vendorf, vendore, vendora, vendorb, vendord

Table 28. Anova Summary of Cooperation with Supplier and Number of Improved Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41,703	5	8,341	6,305	,000[b]
	Residual	78,051	59	1,323		
	Total	119,754	64			

a. Dependent Variable: Numberofproduct

b. Predictors: (Constant), vendorf, vendore, vendora, vendorb, vendord

Table 29. Coefficients Summary of Cooperation with Supplier and Number of Improved Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,614	,291		5,556	,000
	vendora	,629	,378	,231	1,663	,102
	vendorb	-,243	1,215	-,080	-,200	,842
	vendord	-,084	1,358	-,028	-,062	,951
	vendore	1,715	,618	,604	2,775	,007
	vendorf	,084	,438	,031	,193	,848

a. Dependent Variable: Numberofproduct

Tables 27, 28 and 29 above show the regression analysis results for cooperation with suppliers on number of improved products produced. As Anova results show the significance of the overall model is 0.00, which implies a significant linear relationship between the dependent and independent variables. Nearly 29% of the product innovation performance in terms of number of improved products produced can be explained by various types of cooperation with the suppliers. In addition, significance level for new technology development/ access ($p=0.007< 0.05$), results in a significant linear relationship with the number of improved product. Results imply that firms which cooperate with suppliers might acquire technology and trends easily since suppliers are usually trendsetters in various sectors including the food and beverage sector.

Eighth regression analysis is conducted to analyze the impact of various cooperation types with suppliers on the number of new products produced. Independent variables are the cooperation with suppliers in sharing knowledge, new technology access, design, finding domestic customers, finding foreign customers and product innovation. The significance of the overall model is 0.02, which implies a significant linear relationship between the dependent and independent variables. Significance level for new technology development/ access ($p=0.003< 0.05$), and significance level for sharing skill/ knowledge ($p=0.015< 0.05$); results in a significant linear relationship with the number of new products produced. Results imply that cooperation with suppliers usually provides relatively more expertise and more comprehensive knowledge. Moreover, supplier involvement helps firms identify potential technical problems; thereby speeding up new product development and responses to market demands. Collaboration with suppliers is very likely to improve the supply chain performance and thus the efficiency of the supply chain members including the producer firm.

Ninth regression analysis is conducted to analyze the impact of various cooperation types with universities on the number of improved products produced. Independent variables are the cooperation with universities in sharing knowledge, new technology access, design, finding domestic customers, finding foreign customers and product innovation.

Table 30. Model Summary of Cooperation with University and Number of Improved Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,497[a]	,247	,210	1,216

a. Predictors: (Constant), universityf, universityb, universitya

Table 31. Anova Summary of Cooperation with University and Number of Improved Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29,564	3	9,855	6,665	,001[b]
	Residual	90,189	61	1,479		
	Total	119,754	64			

a. Dependent Variable: Numberofproduct

b. Predictors: (Constant), universityf, universityb, universitya

Table 32. Coefficients Summary of Cooperation with University and Number of Improved Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,895	,279		6,792	,000
	universitya	1,772	,569	,649	3,112	,003
	universityb	,805	,475	,289	1,695	,095
	universityf	-1,105	,722	-,406	-1,531	,131

a. Dependent Variable: Numberofproduct

Tables 30, 31 and 32 above show the regression analysis results for cooperation with universities on number of improved products produced. Anova table shows that the significance of the overall model is 0.01, which implies a significant linear relationship between the dependent and independent variables. Nearly 21% of the product innovation performance in terms of the number of improved products produced can be explained by the cooperation with the universities. Moreover, significant level for sharing skill/ knowledge ($p=0.003< 0.05$), results in a significant linear relationship with the product innovation performance. Results clearly result from the fact that universities are source of knowledge which contributes to knowledge inflow of the firms. Furthermore, cooperation with universities decreases the cost and risk of the firms.

Tenth regression analysis is conducted to analyze the impact of cooperation with government agencies on the number of improved products produced. Independent variables are the cooperation with government agencies in sharing knowledge, new technology access, design, finding domestic customers, finding foreign customers and product innovation.

Table 33. Model Summary of Cooperation with Government and Number of Improved Products

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,358[a]	,128	,100	1,298

a. Predictors: (Constant), governmentf, governmente

Table 34. Anova of Cooperation with Government and Number of Improved Products

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15,342	2	7,671	4,555	,014[b]
	Residual	104,411	62	1,684		
	Total	119,754	64			

a. Dependent Variable: Numberofproduct

b. Predictors: (Constant), governmentf, governmente

Table 35. Coefficients of Cooperation with Government and Number of Improved Products

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,429	,219		11,072	,000
	governmente	1,371	,620	,504	2,210	,031
	governmentf	-,520	,636	-,186	-,818	,417

a. Dependent Variable: Numberofproduct

Tables 33, 34 and 35 show the regression analysis results for cooperation with suppliers on number of improved products produced. Anova table shows that the significance of the overall model is 0.014, which implies a significant linear

relationship between the dependent and independent variables. Nearly 10% of the product innovation performance in terms of number of improved products produced can be explained by cooperation with the government agencies. Additionally, significant level for new technology development ($p= 0.031< 0.05$), results in a significant linear relationship with the product innovation performance. Results imply that cooperation with governments is significant for the number of products produced. The reason might be financial funds which government supply for the firms, in order to acquire new technology. Moreover, governments provide a wide range of network for the firms in order to access new technology.

CHAPTER VII

CONCLUSION

The emergence of global markets has forced the companies to focus on innovations in order to sustain and strengthen their competitiveness. Innovation can be defined as all the scientific, technological, organizational, financial and commercial activities which lead to, or are intended to lead to, the implementation of technologically new or improved products or services. Innovation contains new ideas which influence the economic activity. With the introduction of new technology, human capital and the improvements in production processes, there is strong evidence that firm efficiency increases. Higher efficiency enables the organizations to produce at lower costs and/ or higher quality than its rivals, leading to the expansion of firms in new segments of the market. Innovations enable firms to differentiate themselves from their rivals in terms of new products, processes, costs or organizational improvements. Innovation is regarded as one of the main drivers for a sustainable and internationally competitive business environment. Extensive research depicts a strong linkage between innovation activities and GDP growth which further increases market volume.

Among the four major types of innovation which are product, process, marketing and organizational, this thesis focuses on product innovation. The primary objective of this thesis is to analyze the effects of some major factors related to the external environment of the firm on the product innovation performance. To the best knowledge, literature lacks a study which involves the analysis of all these specific factors in a single study. The factors are grouped as external knowledge inflow,

cooperation with external parties and international trade activities namely import and export. On the other hand, product innovation performance is defined as the number of new or improved products and their contribution to total revenue. The main contribution of this study is the comprehensive analysis of each of these factors and their impacts on product innovation performance. Product innovations can basically be defined as the utilization of new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. (Product innovation can advance technologies; change customer needs, shorten product life cycles, and increase global competition). Product innovation is classified in the literature as new product innovation, greatly modified / improved products, and slightly improved products. Improvement of existing product includes improvements in functional characteristics, technical abilities, or ease of use; whereas new product development describes the complete process of bringing a new product or service to market. Because of rapid changes, firms depend on external technological knowledge and skills in addition to internal technological resources. Using strategies such as technology licensing and collaborative agreements, many firms today are relying more extensively on external linkages to acquire new technological knowledge. In order to reduce the costs and risk of technology development and to introduce higher-quality products faster than competitors, firms may count heavily on the effectiveness with which they can gain access to external sources of technological knowledge and skills. Consequently, there is a movement from internal (closed) innovation to forming external linkages and cooperation (open innovation).

Collaborating with different parties primarily suppliers, competitors and customers are regarded as an effective way to improve product innovation. In general, cooperation with suppliers usually provides relatively more expertise and

more comprehensive knowledge. Moreover, supplier involvement helps firms identify potential technical problems; thereby speeding up new product development and responses to market demands. There can be a positive association between suppliers and the proportion of revenue attributed to improved or new products produced. Collaboration with suppliers is very likely to improve the supply chain performance and thus the efficiency of the supply chain members mainly the producer firm. On the other hand, cooperation with customer provides benefits in identifying market opportunities for technology and product development and also reduces the likelihood of poor design in the early stages of development. Customer cooperation becomes significant since customer feedback supports post-delivery learning process of the firm. Due to cooperation with the competitor, firms may share technological knowledge and skills with each other, producing a synergistic effect on solving common problems outside the competitor's area of influence. In addition they can decrease the cost and risk, verify their competitors' technology strategies in order to differentiate themselves. Cooperation with university provides firms to acquire the created and disseminated scientific knowledge, whereas cooperation with government provides easy access to resource networks and new technology.

Product innovation is one of the major drivers of growth and profits since new products generally mean new consumers, the ability to enhance or add new marketing claims or make a splash with a new line extension, and the possibility of reducing costs by modifying ingredients, manufacturing processes, packaging or suppliers.

The concept of acquiring external knowledge is discussed under the open innovation concept. Open innovation assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms

look to advance their technology. The main idea of open innovation is that, in a world of vast and widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (i.e. patents) from other companies; or involved in joint venture. Knowledge transfer can be defined as the means by which expertise, knowledge, skills and capabilities are transferred from the knowledge-base to those in need of that knowledge. Interaction with these actors may occur formally (i.e. through a collaboration agreement) or informally (i.e. external actors acts as sources of knowledge). R&D activities are critical sources of knowledge and technology transfer as well as the special sources to identify and manage knowledge resources with business potential. Concepts related to knowledge transfer from external sources to the firm are discussed under external knowledge inflow in this study. Knowledge and technology transfer can also take place between consultancy institutions and business by receiving training or consultancy from these institutions for the value creation. On the other hand, as an informal knowledge transfer the information communication technology (ICT) seeks to create competitive advantage by promoting collaboration and knowledge sharing between the users and providers of information and communications technologies, and helping to drive innovation in the sector.

Involvement in international trade increases efficiency in the manufacturing process and creates the possibility of "economies of scale" that allows them to become globally competitive. Trade can induce and enhance innovation in three ways; namely, technology transfer, competition and economies of scale. Exporters become more productive by getting more access to technology, getting new ideas from customers and by being subject to stronger competition. Additionally, exports

extend the size of the market in which profits can be earned, provide greater incentives for increased investment in innovation and also recover R&D investment. The import market entry, then, discloses to firms the opportunity to purchase cheaper and/or higher quality input and new intermediate varieties unavailable in the domestic market. Imports and exports are important channels for technology diffusion.

In order to empirically explore the impact of knowledge inflow, cooperation with external parties and international trade activities on product innovation performance in the food and beverage industry in Istanbul, a questionnaire is designed. The sample includes the food and beverage firms that are in the database of the Istanbul Chamber of industry. Total of 65 valid and complete questionnaires are returned by the firms. The food and beverage industry is selected for analysis in this study since this sector is highly competitive and is one of the important sectors for the Turkish economy. Moreover, other reason to select this sector is the important role that manufacturing plays in terms of product innovation.

Based on the concept of open innovation, relational framework of the study proposes that various linkages with the firm's external environment impacts the product innovation performance of the firm. The external environment related constructs that make up the independent variables are grouped into three as external knowledge inflow, cooperation with external parties and international trade activities. Each group is further decomposed into various variables as presented in detail in Figure 3. On the other hand, product innovation performance, the dependent variable of the study, is operationalized as four different measures. Measures are the number of new products produced, their % in total revenue, number of improved products produced and their % in total revenue.

To this purpose, data gathered from 65 companies operating in food and beverage sector are analyzed statistically. Statistical analyses include reliability, frequency, cross tabulation and regression analyses.

Analysis results demonstrate that although a number of factors significantly affect the number of new or improved products produced, there is no single factor that significantly impacts the% of new or improved products in firm's total revenue. This finding implies that within the period of analysis (last five years), product innovations do take place and are fostered by a number of factors; however, these innovations cannot significantly contribute to total revenue within the analysis period. This fact might be based on a number of reasons. Bureaucratic process for the approval of improved or new products in the food and beverage sector in Turkey takes too long. This fact delays the marketing and commercialization stages of the innovated product. Another reason can be that to integrate into the distribution channel may be hard for the SMEs in this sector. So, their being unable to enter supermarket chains or other retail outlets will lead to unrecognization of the product as well as lowering their sales potential. Moreover, radical innovations make the firms market leader and they may have higher market share accordingly. Firms conducted in the sector may not make radical innovation; instead they may make similar kind of innovations on the similar products at the same time. Sector is directly related to health issues, therefore, brand loyalty and trust may be more important compared to other sectors. Therefore, if the innovated product is not a commonly known brand, it may not create too much demand. Furthermore, firms are more likely to consider the market need when they launch products to market without considering innovation properties. So, this consideration results in low revenue. Sample regression analysis indicates that cooperation with the customers for product

innovation significantly impacts the % of innovated products in total revenue. It can be related the fact that new brands through ICT such as social media and ICT channels reinforce the feedback and commercialization mechanism with the customers.

Another result is the high significant impact of technology transfer on the number of improved and new products produced. Technology transfer enables the firm to acquire more competent production technologies along with production know-how which would result in improved production processes. It is very likely that these factors decrease the cost and required time to produce and market the product as well as increase the product value. R&D, geographical clustering, e-trade and social media/ portal positively correlate with the number of improved products produced and the number of new products produced. Results also designate that although the relationship is not significant. Firms mostly receive knowledge by these factors and implement them in order to improve their production processes. These factors coming through knowledge inflow may be in the process of application, so it may be concluded that the relationship between factors of knowledge inflow and product innovation performance will be significant after a certain time period. Additionally, receiving training and consultancy do not significantly impact on product innovation performance. Results may stem from the fact that received training and consultancy don't affect the production line especially in a short time period. However, they are important innovation guides for both companies and technical staff of the companies.

Regression analyses are also conducted for analyzing the effect of cooperation with external parties on the product innovation performance. Results show that accessing or developing new technologies in cooperation with customers, suppliers

and government agencies significantly impact the number of product innovations. Government can support them with financial funding while customers and suppliers support them with feedback mechanisms. Another regression analysis result is that cooperation with suppliers and universities for sharing knowledge and skill significantly affect the number of product innovations. Universities can give various certificates regarding the reliability and hygiene of the products to firms which cooperate with universities. Receiving certificate from the universities can lower the bureaucracy process and decrease cost and risk. In addition to this, firms can use these certificates received from the universities for their marketing purposes. However, when the global innovation index of the Turkey is considered, innovation index for cooperation with the university is low, which should be increased. It is becoming more and more important to strengthen bonds between private-public sectors in Europe and also in the world. Not surprisingly, cooperation with the competitor has no impact on the performance since it is not common not only in Turkey but also in the world. Since firms may not be aware of the benefit of the cooperation with the competitors such as sharing knowledge and experience.

Results indicate that although firms use machinery and lab, they own them and not at all cooperate for sharing or common use of these research tools. The joint use of infrastructure facilities should be developed such as lab, machine park. Common use provides firms cost savings, knowledge sharing and cooperation culture.

Analysis results regarding international trade activities indicate that firms' export activities have significant effect on the product innovation performance in terms of number of improved and new products produced. It totally fits with the idea that exporters become more productive by getting more access to technology, getting new ideas from customers and by being subject to stronger competition. On the other

hand, although there is a positive correlation between import and the number of improved and new products produced, regression analyses do not depict a significant relationship.

The consciousness for the food and beverage sector in the world and in Europe increases and they consider the public health and develop policies accordingly. To this purpose, food diversification is getting important. New opportunities for product innovation expand and especially healthy food products can be developed further. Innovators should also include launching innovative products to market which would in turn result in higher economic returns.

This study can shed light on similar studies with the suggestion that external environment related various factors of the firm are worth analyzing in studying the product innovation performance of firms. The study further implemented this framework to number of food and beverage companies in Istanbul and came up with some comments and policy suggestions. These results can be generalized with higher confidence level by applying the study to a larger number of food and beverage companies operating in Turkey. The framework can also be implemented on companies from various sectors which would make it possible to benchmark sectors in terms of product innovation performance.

APPENDICES

APPENDIX A.

Anket

I. Firma Bilgileri

1. Firma adı:

_____

2. Firma yeri (İl/ilçe) _____

3. Firmanın konumu □ OSB □ Teknokent/teknopark □ Sanayi sitesi □ Bireysel □ Diğer

4. Firmanızın yapısını belirtiniz.

□ Şahıs/Aile firması □Yerli ortaklı □Yabancı ortaklı □Yabancı uyruklu ülkesi _____

5. Toplam çalışan sayısı

□ 0-50 □50-100 □100-250 □ 250-500 □ 500-1000 □ 1000-5000 □5000 üzeri

6. Sermaye seviyesi _____

II. Dış Bilgi Akışı

7. Son beş yılda firma dışından kaç önemli teknoloji transferi yaptınız?

8. Firmanızda Ar-Ge ve/veya tasarım birimi var mı?

□Evet □Hayır

9. Firmanızda Ar-Ge için ayrılmış bütçe var mı?

□Evet□Hayır

10. Firmanız son beş yılda faaliyet alanına yönelik eğitim aldı mı? □ Evet □ Hayır
Aldıysa;

□ Üniversite □ TÜBİTAK □ KOSGEB □ Sektörel STK □ Eğitim danışmanlık firması □Diğer

11. Firmanız son beş yılda faaliyet alanına yönelik danışmanlık aldı mı? □ Evet □ Hayır
Aldıysa;

□ Üniversite □ TÜBİTAK □KOSGEB □ Sektörel STK□Danışmanlık firması □ Diğer

12. Devamlı faaliyette olan internet siteniz (web siteniz) var mı? □ Evet □ Hayır

13. İşinizle ilgili üye olduğunuz portaller ve sosyal medya araçları nelerdir?

_____

14. Toplam cironuzun yüzde kaçını e-ticaret yoluyla gerçekleştiriyorsunuz? %__

III. İŞBİRLİKLERİ

15. Makina parkı kullanımı: □Kullanmıyorum □Kendimize ait
□_____ ile ortak kullanıyorum

16. Laboratuar kullanımı: □Kullanmıyorum □Kendimize ait
□_____ ile ortak kullanıyorum

17. Son beş yılda faaliyetlerinizle ilgili aşağıda verilen konularda işbirliği yaptınız mı?

İşbirliği düzeyini önem derecelerine göre aşağıdaki tabloda işaretleyiniz.

0-hayır 1-az 2-orta 3-çok

İşbirliği çeşitleri	Müşteriler	Rakipler	Tedarikçiler	Üniversiteler	Devlet
Bilgi/beceri paylaşımı	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3
Yeni teknoloji geliştirme/erişim	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3
Tasarım	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3
Yurt içi yeni müşteri bulma	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3
Yurt dışı yeni müşteri bulma	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3
Ürün yeniliği	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3	□0 □1 □2 □3

IV. Uluslararası Ticaret Aktiviteleri

18. İthalat ve ihracatınızın ciro içindeki payını aşağıdaki tabloda belirtiniz.

	Hiç	%1-10	%11-25	%26-50	%51-75	%75' den fazla
İthalatın cirodaki payı	□	□	□	□	□	□
İhracatın cirodaki payı	□	□	□	□	□	□

19. İthalat yapılan ülkeler:

□ AB ülkeleri □ ABD □ Afrika ülkeleri □ Çin □ Diğer Uzakdoğu Ülkeleri □ Güney Amerika ülkeleri □ Hindistan □Rusya □ Hiçbiri □Diğer

20. İhracat yapılan ülkeler:

□ AB ülkeleri □ ABD □ Afrika ülkeleri □ Çin □ Diğer Uzakdoğu Ülkeleri □ Güney Amerika ülkeleri □Rusya□ Hindistan □Hiçbiri □Diğer

21. Dış ticaret yapmıyorsanız nedenlerini belirtiniz:

□ Yüksek üretim maliyetleri □ Ürünün standartlara uymaması □Yabancı dil bilmeme

□ Satış sonrası hizmette yetersizlik □ Dış pazarlara ulaşım zorluğu □ Mevzuat zorlukları □Teşvik ve destek yetersizliği□Dış ticaret departmanı eksikliği □Pazar araştırma eksiklikleri □ Bilgi iletişim teknoloji altyapısı yetersizliği

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V. Ürün Yeniliği Performansı

22. Son beş yıl içinde kaç tane mevcut ürününüzü geliştirdiniz? _____

23. 2012 yılı cironuzda bu ürünlerin yüzdesi nedir? % _____

24. Son beş yılda kaç tane yeni ürün geliştirdiniz? _____

25.2012 yılı cironuzda bu ürünlerin yüzdesi nedir? % _____

APPENDIX B.

Questionnaire

I. Firm Information

1. Name of the firm:

_____

2. Geography of firm _____

3. Location of the Firm □ OIZ □ Techno park □ IZ□ Individual □ Other

4. Structure of the firm

□ Family firm □Domestic partner □Foreign partner □Foreign country

5. Number of employee

□ 0-50 □50-100 □100-250 □ 250-500 □ 500-1000 □ 1000-5000 □over 5000

6. Level of capital _____

II. External Knowledge Inflow

7. How many technology transfer did you make in the last five years?

8. Do you have R&D department?

□Yes □No

9. Do you have R&D budget?

□Yes □No

10. Did you receive any training in the last five years? □ Yes □ No
If so;

□ University □ TÜBİTAK □ KOSGEB □ Sectorial □ Education service
□Other

11. Did you receive any consultancy in the last five years? □ Yes □ No
If so;

□ University □ TÜBİTAK □ KOSGEB□ Sectorial □ Consultancy service
□Other

12. Do you have active website? □ Yes □ No

13. How many social media or portal membership do you have? _____

14. What percentage of the total revenue through e-trade are acquiring? %__

III. İŞBİRLİKLERİ

15. Usage of machinery: □Do not use □ own □_____ sharing with

16. Usage of lab: □Do not use □ own □_____ sharing with

17. Did you cooperate for the cooperation types below in the last five years? Select the level of cooperation attributed.

0-No 1-less significant 2-medium significant 3-very important

Cooperation Types	Customer	Competitor	Supplier	University	Government
Sharing Knowledge	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3
New Technology Access	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3
Design	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3
Finding Domestic Customers	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3
Finding Foreign Customers	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3
Product Innovation	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3	□ 0 □1 □ 2 □3

IV. International Trade Activities

18.Select the % of revenue acquired by import and export.

	none	1-10%	11-25%	26-50%	51-75%	Over than 75%
Import	□	□	□	□	□	□
Export	□	□	□	□	□	□

19. Import destinations:

□ EU □ USD □ Africa □ China □ Far East □ South America □ India □Russia □ None □Other

20. Export destinations:

□ EU □ USD □ Africa □ China □ Far East □ South America □ India □Russia □ None □Other

21.What are the reasons if you are not involved in import and export activities :
□ High production costs □ Product Standards □Foreign Language

□ Inability to after-sales service □ The difficulty of access to foreign markets

□ Regulatory challenges □ Lack of support and encouragement □ Lack of foreign trade

department □ Lack of market research □ Lack of information and communication

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V. Product Innovation Performance

22.How many existing product is improved in the last five year? _____

23.How much % of the contribution of these products on revenue? % _____

24. How many new products is produced in the last five year? _____

25.How much % of the contribution of these products on revenue? % _____

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