



THE EFFECT OF INNOVATION ON COMPETITIVENESS

Ebru DOĞAN*

Abstract

Pioneering emergence of new markets and expanding competition areas make innovation the basis of development and dynamism in all economies. In this respect, innovation which creates significant impacts in a way that increasing and supporting competition can also create impacts that will change qualification of competition in goods and services markets.

In this study, the effect of the factors determining the innovation on competitiveness for member and candidate countries of the European Union was analyzed with panel data analysis. Empirical findings obtained have revealed that two determinants of innovation –knowledge&technology output and creative output- positively affect competitiveness.

Keywords: *Competitiveness, Innovation, European Union*

Jel Classification: *M19*

1.INTRODUCTION

With globalization, companies of developing countries are increasingly feeling the pressure of making innovation. All areas such as R&D, software, design, engineering, education, marketing and management are increasingly taking significant roles in the production of goods and services. In addition, developing international standards dominate international trade and global value chains. Therefore, competitiveness of companies and countries depend on their capabilities to make innovations and their orientation to technology and information. Innovation in developing countries is considered as the basic concept in addressing social problems such as environmental pollution, health, poverty and unemployment. Today, the role and importance of innovation have become more significant than economic achievement (GII, 2015: 81,82).

* Asst. Prof., Istanbul University, Faculty of Economics, Department of Business Administration, Istanbul, Phone: 0(212) 440 00 00 – 11613, ebruseng@istanbul.edu.tr

Thanks to its significant effects in a way that increasing and supporting competition, innovation has become an important field of activity in companies and the main factor that increases the dynamism of national economies.

In this study, the relationship of innovation and competitiveness was discussed and the effect of the factors determining the innovation for member and candidate countries of the European Union on competitiveness was analyzed.

2.COMPETITIVENESS

Today, globalization affects conditions of competition from various aspects in many sectors and while it completely changes these conditions in some sectors, it creates significant differences in some of them. Especially increasing differences in consumer preferences stemming from technological developments and globalization have necessitated establishments in global arena to apply highly different competition strategies when compared to the past.

While examining the concept of “world economy” as a new reality Drucker has specified mainly these features (Drucker, 1996: 117-120):

- World economy stopped being international and it became global towards the middle of 1970s. Economies largely entered under the domination of global economies.

- The primary phenomenon shaping global economy is cash flow rather than trade of goods and service. These cash flows have a distinctive dynamic. Monetary and fiscal policies of sovereign national states have been increasingly formed in a way that instead of shaping developments in global monetary and capital markets effectively, they prefer giving reaction to these developments.

- Labor and natural resources which are the traditional production factors in global economy have increasingly been in the secondary status. Money is also not a production factor anymore that will provide competition superiority for a country due to the fact that it has gained a global qualification and it has become reachable by everybody. Exchange rates



possess importance only for short terms. Management has gained the qualification of being determinant of production.

- The main purpose in global economy is not profit maximization, but market maximization. On the other hand, trade increasingly follows investment and it becomes a function of investment at the end.

- According to economic theory, the only unit, or at least the most dominant unit, which can create effective economic policies is nation state. On the contrary, there are four such units in the global economy. The first is national state, the second is regional integrations, the third is real market which is formed by money, credit and investment flows and lastly, the fourth is global enterprises which see the whole world as a single market.

- In forming economic policies, mutual relations among the regions have increasingly become prominent rather than free trade or protectionism.

- The concept of global ecology has become important. In this context, it is necessary to produce global policies for the environment.

According to Porter, companies should determine a distinctive strategic position in order to maintain their existence within the intensive competition environment. The strategy of a company should give the opportunity of suggesting a more different value than its rivals or presenting a wide range of benefits. A company should carry out more different activities than its competitors or perform similar activities in different forms in order to establish sustainable competitive advantage. The aim of establishing competition strategy is to relate a company with its environment. The structure of sector has a huge effect on both determining current strategies for the company and detecting competition rules. Competition strategies are defined as the whole decisions and behaviors providing competition superiority through value creating and possessed basic abilities for the customers in a certain market (Porter, 2004: 3,4).

World Economic Forum defines “competitiveness” as the sum of institutions, policies and production factors forming productivity level of a country. Thus, productivity level

determines sustainable welfare level within the economy. In other words, a more competitive economy tends to possess the ability to produce higher income levels for its citizens (WEF, 2008: 3).

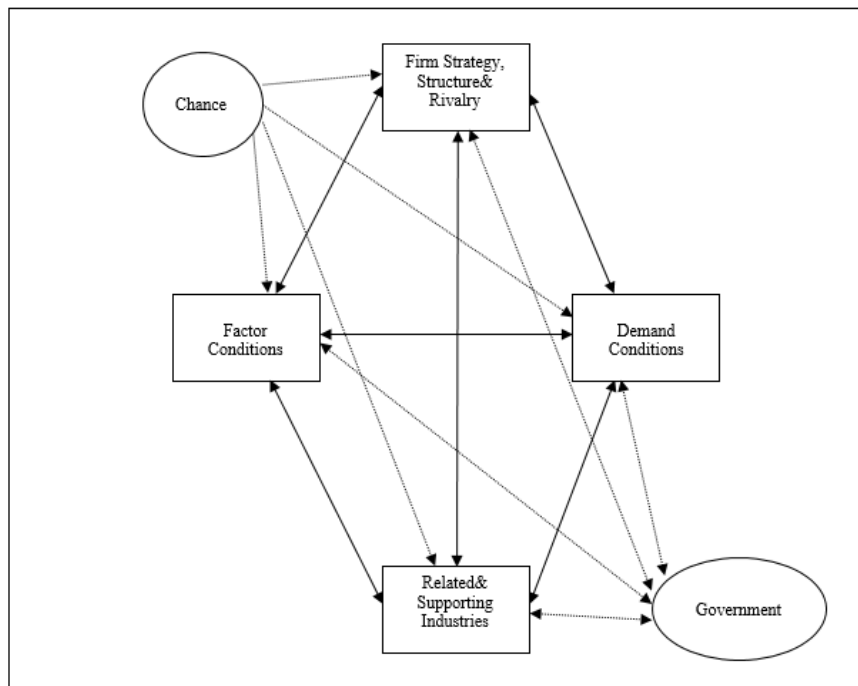
There is not any country in the world that gains sustainable achievement without protecting welfare levels of its citizens. Competitiveness explains the purpose of acquiring long-term growth, creating employment and determining how countries, regions and establishments will manage their abilities in order to increase welfare levels. When two countries compete with each other, both of them possess a better position; therefore competitiveness is defined as a way which provides development and in which there is neither loser nor winner. Competitiveness of nations is one the most remarkable developments in modern management (IMD, 2016).

In his study “Competitive Advantages of Nations” Porter, analyses the conditions which determine competitiveness and examines the reasons of why certain countries are more successful in certain industries (Porter, 1990a). He has discussed productivity as the most significant competitiveness concept in national level. The primary target of a country is providing a permanently increasing living standard for its citizens. The ability to achieve this is dependent on the use of productivity of workforce and capital within a country. Productivity is dependent on both qualities of the products and features of products as well as the activities to be able to produce these products. Productivity is the main determinant of long-term living standard of a country. Increase of sustainable productivity necessitates an economy to improve itself continuously. Companies of a nation should continuously increase the productivities within the current sectors by improving product quality, adding different features to the products, developing product technology or enhancing production activity (Porter 1990b: 76,77).

The four main attributes underlying the ability to make innovation of some nations’ companies are discussed in Diamond Model of Porter (Figure 1). These determinants are:

- Factor conditions
- Demand conditions
- Related and supporting industries
- Firm strategy, structure and rivalry

These determinants establish the national environment in which companies are born and learn how to compete. Every point in diamond model affects the accessibility of resources and talents needed for competitive advantage and the pressure of making investment and innovation on information and companies which are the basic elements for the achievement of international competition. Any industry can be successful if it possesses favorable conditions in the environment it is active (Porter, 1990b: 78).



Source: (Porter, 1990a: 127)

Figure 1: Competitiveness Diamond

Porter categorizes “factor conditions” as the human resources, physical resources, information resources, capital resources and infrastructure that a nation has. On the other hand, “demand conditions” imply the nature of internal market demand regarding product or service of the sector. The qualification of domestic purchaser gains importance at this point. If the domestic purchasers are the most satisfactory purchasers of a product or service all around the world, companies of that country will gain competitive advantage due to the fact that industries are becoming innovative for meeting these demands. The other determinant of competitive advantage is the presence of “related and supportive sectors” which are competitive in international scale within the country. Domestic suppliers which are

competitive in international scale can create superiority by providing cost-effective inputs early, rapidly and initially. The last factor is “firm strategy, structure and rivalry”. This factor includes the conditions affecting the nature of internal competition as well as establishment, organization and management of the companies. Domestic competition causes pressure of making innovation on the companies (Porter, 1990b: 78,79,83-85).

Every point in diamond model is related with each other and weakness in any of the factors will restrict growing and development potential of the sectors. Besides, there are two external factors which are role of the government and chance factors included to diamond model. The government has an important but indirect role in developing international competitiveness of a sector. The government does not create competitive sectors; this can only be achieved by companies. The thing to be done by the state is not trying to create competitive advantage, but affecting main elements of the diamond model. In other words, it means all government policies are made for providing an environment which creates competitive advantage for companies without directly interfering with competition environment. At the same time, this factor strengthens the powers forming the diamond even more. However, chance factor is seen as the situations which are uncontrollable and affect positions in the competition environment (input costs and large changes in exchange rates, wars, oil shocks, etc.) (Porter, 1990a: 123-126; Porter, 1990b: 87).

Companies should accept central role of innovation because of the fact that they will gain competitive advantage due to the innovation activities. They approach innovation with its broadest sense including both new technologies and new business forms. A company can maintain competitive advantage acquired with the help of innovation with only continuous development. Competitiveness of a nation is dependent on its industry's the capacity of making innovation and increasing its quality (Porter, 1990b: 73,75,89). In addition, competitiveness is not only dependent on economic area, but also the works in social areas and contributions to the society made by companies. While it was thought that economic and social targets contradicted with each other, today, establishments cannot isolate themselves from the society in which they are active. Therefore, there is a parallelism between interests of the society and interests of the company (Porter, 2002: 59).



3. THE RELATIONSHIP OF INNOVATION AND COMPETITIVENESS

There are many different definitions of innovation in the literature. In business dictionary, innovation is the process of translating an idea or invention into a good or service (Business Dictionary, 2016).

European Innovation Management Academy defines innovation as “the successful exploitation of a new product, service, process, organization or new business model which is new to a company, new to a market or new to the world” (European Innovation Management Academy, 2016).

According to Drucker, innovation is an action providing source with a new capacity in order to create welfare and it creates source (Drucker, 1993: 30).

The most comprehensive and widely-accepted definition of the innovation concept is available on the Oslo Manual co-published by the OECD and the European Commission. According to Oslo Manual, innovation is the application of a newly or specifically developed product (good or service) or of a process, a new marketing method or a new institutional method (OECD-Eurostat, 2005: 45). Based on this definition, the innovation concept may be classified under four categories (OECD-Eurostat, 2005: 47-51):

- Product Innovation: It is a good or service which is newly or substantially developed in terms of its intended use. This includes significant improvements/developments in technical specifications, mechanisms and materials, firmware, ease of use or other functional features.

- Process Innovation: A newly or substantially developed production or distribution method. This includes significant changes in techniques, equipment and/or software.

- Marketing Innovation: It is a new marketing method including significant changes in product design or packet, product placement, product promotion or pricing.

- Organizational Innovation: It is application of an organizational method in business practices, organization or foreign relations of the firm.

Today, innovation-based growing is not the ability and privilege of only high-income countries. Developing countries also tend to establish appropriate policies in order to increase their innovation capacities. Innovation policies are developed in different forms depending on the needs of countries and their impacts show differences even though they are in the same development level. Some of the developing countries have achieved to improve their innovation inputs and outputs continuously (GII, 2015: V).

OECD relates the increase of a country's welfare and employment rate with the capacity of that country to make innovation and adapt it; similarly, the European Union also considers innovation as an urgent and common issue for Europe. Innovation which forms the basis of competitiveness is the key of development, sustainable economic growth and social welfare (MÜSİAD, 2012: 34). Although the relationship between competitiveness and unemployment is complex, both of them depend largely on efficiency of education system and labor market. A country enables its citizens possess the necessary talents for providing efficient employment by training, improving and awarding people appropriately. This is valid for both developed and developing countries, because talent creates ideas which turn into powerful innovation and powerful occupational abilities are considered as an important element for comparative advantage (WEF, 2015: 17,18).

There should be some basic principles for innovation to create competitiveness. In this context, national innovation achievement principles are as follows (Atkinson and Ezell, 2015: 89-94):

- Innovation policy should focus on maximizing innovation in all sectors.
- Innovation policy should support each kind and phase of innovation.
- Providing creative destruction
- Keeping import prices of capital goods and especially information and communication technologies low



- Supporting creation of basic innovation inputs

- Developing national innovation and productivity strategy as well as the institutions that will support these innovations and strategies.

According to Green Paper on Innovation, “the competitiveness of a country, region or firm now depends predominantly on its capacity to invest in research, know-how, technology and the skills which allow maximum benefit to be derived from these in terms of new products or services” (European Commission, 1995: 6).

Innovation shows up as a result of development of background knowledge and experience of an enterprise. R&D is a significant activity due to the fact that it provides the required information and experience for innovation. OECD defines R&D as “creative study conducted by basing on a systematical background in order to increase amount of information and develop new practices dependent on this information”. R&D is the precondition of innovation (OECD, 2016).

Economic progress is an important determinant of a country’s innovation level and there is a positive correlation between them. As the economies of states gain strength, they will make more investment on researches. The intensity of R&D (such as percentage of funds allocated for R&D activities within gross domestic product) has a significant and positive relation with innovation. Therefore, allocating more funds in this way will cause an increase in the innovations of Middle and Eastern European countries (Petrariu, Bumbac and Ciobanu, 2013: 23).

Information is one of the most important driving powers in the development of R&D activities which play a major role in economic growth. Countries which produce information and transform it into added value have taken their places as the most successful countries within the global competition environment. While the most important driving power in economic growth is information, human resources is also an indispensable element as the most significant tool in the production, transfer and use of information. For this reason, improvement of human resource dependent on information possesses a great importance in

the transformation of fiscal resources invested in R&D activities into added value and providing a sustainable economic growth. The allocated resources, sub-structures, technology transfers for R&D activities will remain inactive unless the human resource that will assess these investments efficiently is found and they will not serve for improving competitiveness (MÜSIAD, 2012: 124).

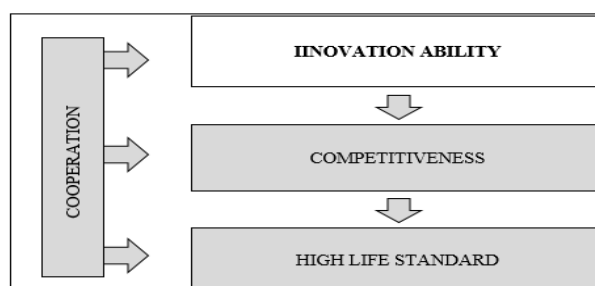
Innovation is the basis for development and dynamism in all economies. Enterprises in many OECD countries make investment in the knowledge-based assets (software, database, R&D, abilities peculiar to the enterprise and institutional capital) that will lead innovation. In addition, billions of people's using internet and being in interaction with each other all around the world, including developing economies, enable the dissemination of information and creation of more advanced innovations. The said and other technological developments in biotechnology and nanotechnology areas and in the related areas with improved materials will cause a continuous transformation in the structures of production, occupations, economic activity locations as well as the structures of roles in different sectors within the economy. Governments have important roles in improving innovation environment such as making investment in innovation institutions, helping remove the obstacles of innovation and establishing basic public policies that will contribute to innovation. 2015 OECD Innovation Strategy set forth concrete agendas that would strengthen innovation performance and the strategy put these into practice for stronger, greener and more comprehensive growing. The strategy set forth 5 priorities that would provide a comprehensive and action-based approach regarding innovation for politicians. Most of them are the priorities that can be applied in the economies which are in difficult situations fiscally and they can be listed as follows (OECD, 2015: 3,4):

- Strengthening innovation investments and encouraging business dynamism.
- Making and regulating an efficient system investment in creating and disseminating information.
- Understanding benefits of digital economy.
- Encouraging talents and abilities and optimizing use of these talents and abilities.

- Improving inspection and application of innovation policies.

In addition to the abovementioned matters, innovation as the main determinant of improvement in productivity leads to value creation for human capital, physical and information-based capital. This value creation increases the total income and has a positive effect on general living standard. Education system is the basis of innovation and productivity including recognizing benefits of the future production revolution. Along with this, OECD assessments show that in total only one third of all adults possess the abilities needed for technologically rich environments. Many disciplines are related with subjects dealing with more comprehensive abilities such as creativeness and critical thinking. The basic principle is creating an environment that will provide individuals with the opportunity of choosing and gaining suitable abilities and even support optimal use of these abilities (OECD, 2015: 6,13).

The concept of innovation is associated with unique inventions, processes and systems which will enable development in a modern society and change lives of individuals. Besides, innovation for states should incorporate more than individual inventions or steps. It should be seen as a process which incorporates new ideas into the economy and changes the product to be manufactured and the way how it will be manufactured and organizes the way of manufacturing the product. Innovation is the indicator of a successful economy and it leads economic development and creates new business areas. Moreover, innovation is a tool which enables a successful competition with high-quality low-wage economies for a high-quality high-wage economy without decrease in living standards (Figure 2). Low-wage countries have been investing in education, researches and business innovations; thus, for example the uphill task for the USA should be making innovation more rapidly and efficiently than its competitors (National Governors Association, 2014: 1).



Source: (Dulupçu v.d., 2007: 9)

Figure 2: Innovation and Competitiveness

As a result of the fact that technology and innovation processes have gradually become determinants in competition, use of new technologies and capacity to make innovation have become prominent as the most crucial component of competitiveness and they have become one of the basic conditions of companies' sustaining their existence within the global economy (Akis, 2015: 1312).

In a study conducted by Iosif on member states of the European Union, the impact of variables affecting the innovation which took place within the scope of Innovation Union Scoreboard on competitiveness was examined and it was concluded that human resource and intellectual capital factors had impact on competition (Iosif, 2014: 670).

4.ASSESSMENT OF GLOBAL INNOVATION AND COMPETITIVENESS INDICES

There are certain indices which define the place of a country in the world in terms of innovation and competitiveness. This study involves two key indices which are most widely-accepted and distinguished with a huge number of countries it encompasses as the Global Competitiveness Index and the Global Innovation Index.

Global Competitiveness Report is published by the World Economic Forum on annual basis. This Report uses Global Competitiveness Index. Global competitiveness index is composed for the quantitative measurement and ranking the countries by their competitiveness. This index is widely comprehensive, enables the analysis of micro and macroeconomic situations in terms of national competitiveness; and consists of 12 pillars influencing competitiveness.

These pillars:

- *Basic Requirements Subindex*: Institutions, infrastructure, macroeconomic environment, health and primary education.

- *Efficiency Enhancers Subindex*: Higher education and training, goods market efficiency, labor and market efficiency, financial market development, technological readiness, market size



- *Innovation and Sophistication Factors Subindex*: Business Sophistication and innovation

The 2015-2016 report covers 140 countries. This report groups and analyzes the countries by per capita income (Table 1).

Table 1: Member and Candidate Countries/Economies of European Union at Each Stage of Development (2015)

Stage 1 Factor-driven	Transition from stage 1 to stage 2	Stage2 Efficiency-driven (5 Economies)	Transition from stage 2 to stage 3 (7 Economies)	Stage 3 Innovation-driven (21 Economies)
		Albenia - Bulgaria, Makedonia - Montenegro - Serbia	Croatia - Hungary - Latvia, Lithuania - Poland, Romania - Turkey	Austria - Belgium - Cyrpus - Czech Republic - Denmark - Estonia - Finland - France -Germany - Greece - Ireland - Italy - Luxembourg - Malta - Netherlands - Portugal - Slovakia - Slovenia - Spain - Sweden - United Kingdom

Source: (WEF, 2015: 38)

Global Innovation Index provides a rich dataset for the release and analysis of the global innovation trends. GII measures the innovation capacities of the countries across the world. It provides comparative analyses which facilitate the understanding of the differences in innovation capacities.

The 2015 Global Innovation Index, of which main theme has been determined as Effective Innovation Policies for Development, examines the innovation capacities of 141 countries under various components. This Index relies on two sub-indices as Innovation Input Sub-Index and Innovation Output Sub-Index, and 79 indicators. (The Global Innovation Index, 2015: 9): In calculating Innovation Index score, input and output sub-indices have equal weight. The sub-indices:

- *Input Sub-Index* relies on 5 key pillars consisting of 3 indicators.

- Institutions: political environment, regulatory environment, business environment
- Human Capital and Research: Education, tertiary education, research development
- Infrastructure: ICTs, general infrastructure, ecological sustainability
- Market sophistication: Credit, investment, trade&competition
- Business sophistication: Knowledge workers, innovation linkages, knowledge absorption

- *Output Sub-Index* relies on 2 key pillars consisting of 3 indicators.

- Knowledge and technology outputs: Knowledge creation, knowledge impact, knowledge diffusion.
- Creative outputs: Intangible assets, creative goods and services, online creativity.

In general, R&D (R&D expenses and R&D personnel) and patents are taken into consideration as innovation indicators. In innovation process, while R&D activities are regarded as input indicators, patents which are outputs of R&D activities are regarded as output indicators. Innovation is no longer just developed in R&D laboratories is not limited with patent or scientific publications. From the point of view, GII takes into account of both traditional and new emerging perspectives and several indicators without ignoring the previous approaches (Karaata, 2012: 11).

When the 2015 indices are examined, as is seen on Table 2, 7 out of the countries ranking first 10 in innovation index also rank in first 10 countries in competitiveness power index. In both indices, the dominance of the EU countries in first 10 draws attention.



**Table 2: Global Innovation Index and Global Competitiveness Index Rankings
(Top 10 Country/2015)**

Global Innovation Index Rank Innovation Top 10		The Global Competitiveness Index Rank Competitiveness Top 10	
1	Switzerland	1	Switzerland
2	United Kingdom	2	Singapore
3	Sweden	3	United States of America
4	Netherlands	4	Germany
5	United States of America	5	Netherlands
6	Finland	6	Japan
7	Singapore	7	Hong Kong
8	Ireland	8	Finland
9	Luxembourg	9	Sweden
10	Denmark	10	United Kingdom

Source: (WEF, 2015: 7; GII, 2015: xxx)

When innovation output sub index examined due to the fact that innovation outputs are a result of innovation activities within the economy, the top 10 countries in the Innovation Output Sub-Index this year are Switzerland, Luxembourg, the Netherlands, Sweden, the UK, Iceland, Ireland, Germany, the USA, and Finland. Eight of these countries are already in the GII top 10. These countries translate their robust innovation capabilities into high level innovation outputs (GII, 2015: 15,22,24,43).

Table 3 indicates the ranking of indices of 28 EU countries and 5 candidate countries. Accordingly,

- 9 European Union countries (Germany, Netherlands, Finland, Sweden, United Kingdom, Denmark, Luxembourg, Ireland, Austria) are in the Top 20 countries of GII and

-8 European Union countries (Germany, Germany, Netherlands, Finland, Sweden, United Kingdom, Denmark, Belgium, Luxembourg) are in the Top 20 countries of GCI. Candidate countries (Turkey, Macedonia, Montenegro, Albania, Serbia) can not take place in the Top 50 of both indexes.

**Table 3: Global Innovation Index and Global Competitiveness Index Rankings
(Member and Candidate Countries of European Union /2015)**

Countries	Global Innovation Index-Rank	Global Competitiveness-Rank	Countries	Global Innovation Index-Rank	Global Competitiveness-Rank
Germany	12	4	Italy	31	43
Netherlands	4	5	Latvia	33	44
Finland	6	8	Malta	26	48
Sweden	3	9	Turkey *	58	51
United Kingdom	2	10	Romania	54	53
Denmark	10	12	Bulgaria	39	54
Belgium	25	19	Slovenia	28	59
Luxembourg	9	20	Macedonia*	56	60
France	21	22	Hungary	35	63
Austria	18	23	Cyprus	34	65
Ireland	8	24	Slovak Republic	36	67
Estonia	23	30	Montenegro*	41	70
Czech Republic	24	31	Croatia	40	77
Spain	27	33	Greece	45	81
Lithuania	38	36	Albania *	87	93
Portugal	30	38	Serbia *	63	94
Poland	46	41			

* Candidate Countries

Source: (WEF, 2015: 7; GII, 2015: xxx)

Turkey holds its place among “Countries of Transition from productivity to innovation” in the 2015-2016 Report. The countries in this group should further focus on innovation due to their transition to innovation-based development phase. While Turkey ranks 58 in Innovation Index, it ranks 51 in Competitiveness Index. Turkey is the most advantageous country among the other candidate countries in terms of competitiveness. The European Union, of which we intend to be a part, has evolved our vision as becoming a country with the highest competitiveness power and the most dynamic knowledge-based economy. A National Innovation System is the backbone of a knowledge-based economy. This system would produce new information, and the science and technology which is the source of the information, and serve as a tool facilitating the creation of high value-added based on qualified labor force, and hence, gaining global competitiveness power (TÜBİTAK, 2004: 31). According to the European Innovation Management Academy Survey, the key innovation priority of Turkey is to develop its innovation and entrepreneurship skills as well as its education system (WEF, 2015: 102). The rapid changes across the world in science and technology pose both an opportunity and a risk for Turkey as for the other developing countries. Turkey will be able to increase its competitiveness provided that it increases its labor capacity and innovation capacity using its young population and the increasing training and research facilities, and that it achieves the transformation to knowledge-based production (Ulengin, Ekici and Tamer, 2014: 45).



5. EMPIRICAL ANALYSIS

This study is aimed at analyzing the effect of the factors determining innovation on competitiveness. Data obtained within the scope of member and candidate countries of the European Union were annually acquired from Global Competitiveness Index 2011, 2012, 2013, 2014, 2015 and The Global Innovation Index 2011, 2012, 2013, 2014, 2015. These years were considered as dataset due to the lack of some data previously. A member state of the EU, Malta was excluded from the analysis because of missing data of the year 2011. The effects of the factors determining the innovation on the competitiveness of the above-mentioned countries were researched with Panel Data Analysis.

Choosing between Fixed Effects and Random Effects, the Hausman Test is used in deciding which one to be used (Greene, 2003: 301). According to the Hausman test results, Fixed Effects Model is valid rather than Random Effects Model (Table 4).

Table 4: Hausman Test Results

	Statistical Value
Hausman Test	31.06***

Note: *** indicates that it is significant at 1% confidence level.

As can be seen in Table 5, the coefficients belonging to the variables of knowledge-technology output and creative output were found to be statistically significant. According to the F statistics of the model, it was considered to be significant as a whole. The model was calculated by using all of the input and output variables. However, input variables were excluded from the model due to being insignificant.

Table 5: Results of Fixed Effects Model

Variable	Coefficient	Standard error	T statistics
knowledge and technology output	0.004586	0.001199	3.83***
creative output	0.004638	0.001235	3.76***
_cons	4.262736	0.076005	56.08***
R-sq: within = 0.1742			
between = 0.7986			
overall = 0.7441			
F statistics	12.87		
(Probability value)	(0.0000)		

Note: *** indicates that it is significant at 1% confidence level.

Regarding the coefficient values, the variables of knowledge-technology output and creative output positively affect the competitiveness due to the positive values of their coefficients. Accordingly, 1-unit of increase in knowledge-technology output causes 0.0045-unit of increase in competitiveness; 1-unit of increase in creative output causes 0.0046-unit of increase in competitiveness.

6. CONCLUSION

Innovation being the basis of development and dynamism in all economies is also a determinant of competitiveness defined as the sum of institutions, policies and production factors forming the productivity level of a country. Due to this important role of innovation, companies approach innovation with its broadest sense including both new technologies and new business forms. The fact that companies will obtain the competitive advantage acquired with the help of innovation activities and maintain this advantage with continuous development will also increase the national competitiveness. Nevertheless, national competition creates the innovation pressure on companies.

Because of this relation between innovation and competitiveness, the effect of the factors determining the innovation for member and candidate countries of the EU on competitiveness was analyzed and it has been concluded that knowledge-technology output and creative output positively affect competitiveness. Accordingly, 1-unit of increase in knowledge-technology output causes 0.0045-unit of increase in competitiveness; 1-unit of increase in creative output causes 0.0046-unit of increase in competitiveness.



REFERENCES

Akis, Elife (2015), “Innovation and Competitive Power”, World Conference on Technology, Innovation and Entrepreneurship, *Procedia - Social and Behavioral Sciences*, 195, pp.1311-1320.

Atkinson Robert D. and Stephen Ezell (2015), “Principles for National Innovation Success”, *The Global Innovation Index 2015*, pp.89-94.

Business Dictionary (2016), <http://www.businessdictionary.com/definition/innovation.html>.

Drucker, Peter (1996), *Yeni Gerçekler*, 5.Baskı, çev. Birtane Karanakçı, Türkiye İş Bankası Yayınları, Ankara.

Drucker, Peter (1993), *Innovation and Entrepreneurship*, HarperCollins Publishers, New York.

Dulupçu, Murat A. v.d. (2007), *Yenilik, İşbirliği ve Girişimcilik*, http://www.tepav.org.tr/tur/admin/dosyabul/upload/yenilik_isbirligi_ve_girisimcilik.pdf.

European Commission, (1995), *Green Paper on Innovation*, http://europa.eu/documents/comm/green_papers/pdf/com95_688_en.pdf.

European Innovation Management Academy (2016), <https://www.improve-innovation.eu>.

Greene, William H. (2003), *Econometric Analysis*, 5th Ed., Prentice-Hall, New York.

IMD World Competitiveness Center (2016), <http://www.imd.org/wcc>.

Iosif, Alina E. (2014), "Innovation as A Generator of National Competitiveness in The European Union", *Proceedings of The 8th International Management Conference: Management Challenges For Sustainable Development*, November 6th-7th, Romania ,pp. 670-679.

Karaata, E. S. (2012), "İnovasyon Ölçümünde Yeni Arayışlar", *TÜSİAD-Sabancı Üniversitesi-Rekabet Forumu*, No: 2012-1, İstanbul.

MÜSİAD (2012), *Küresel Rekabet İçin Ar-Ge ve İnovasyon*, MÜSİAD Araştırma Raporları: 76, İstanbul.

National Governors Association (2016), *Innovation America: The Final Report 2014*, <http://www6.sura.org/wp-content/uploads/2014/09/NGAIInnovation07071.pdf>.

OECD (2016), "Research and Development", <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>.

OECD (2015), *OECD Innovation Strategy: An Agenda for Policy Action 2015*, <https://www.oecd.org/innovation/OECD-Innovation-Strategy-2015-CMIN2015-7.pdf>.

OECD (2010), *Ministerial Report on The OECD Innovation Strategy: Innovation to Strengthen Growth and Address Global and Social Challenges*, <https://www.oecd.org/sti/45326349.pdf>.

OECD and Eurostat (2005), *Guidelines For Collecting and Interpreting Innovation Data*, Third Ed., OECD Publishing.

Petrariu, Ioan R., Robert Bumbac and Radu Ciobanu (2013), "Innovation: A Path to Competitiveness and Economic Growth: The Case of CEE Countries", *Theoretical and Applied Economics*, Vol.XX, No.5(582), pp. 15-26.

Porter, Micheal E. (2004), *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, Free Press, New York.



Porter, Micheal (2002), “The Competitive Advantage of Corporate Philanthropy”, *Harward Business Review*, December; 57-68.

Porter, Micheal, (1990a), *Competitive Advantage of Nations: With A New Introduction*, The Free Press, New York.

Porter, Micheal (1990b), “Competitive Advantage of Nations”, *Harward Business Review*, March-April, pp.73-93.

The Global Innovation Index (GII) (2015), “Effective Innovation Policies for Development” <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf>.

The Global Innovation Index (GII) (2014), “The Human Factor in Innovation”, <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2014-v5.pdf>.

The Global Innovation Index (GII) (2013), “The Local Dynamics of Innovation” http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2013.pdf.

The Global Innovation Index (GII) (2012), “Stronger Innovation Linkages for Global Growth”, http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2012.pdf.

The Global Innovation Index (GII) (2011), “Accelerating Growth and Development”, https://www.globalinnovationindex.org/userfiles/file/GII-2011_Report.pdf.

TÜBİTAK (2004), *Ulusal Bilim ve Teknoloji Politikaları 2003-2023 Strateji Belgesi*, http://www.tubitak.gov.tr/tubitak_content_files/vizyon2023/Vizyon2023_Strateji_Belgesi.pdf

Ulengin, Fusun Ş., Önsel Ekici ve Emre Tamer (2014), *Türkiye'nin Küresel Rekabet Düzeyi: Küresel Endekslerde Türkiye'nin Rekabet Gücüne İlişkin Bir Değerlendirme*, TÜSİAD-Sabancı Üniversitesi Rekabet Forumu REF.

World Economic Forum (WEF) (2015), *The Global Competitiveness Report 2015-2016*, http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf.

World Economic Forum (WEF) (2014), *The Global Competitiveness Report 2014-2015*, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf.

World Economic Forum (WEF) (2013), *The Global Competitiveness Report 2013-2014*, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf.

World Economic Forum (WEF) (2012), *The Global Competitiveness Report 2012-2013*, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf.

World Economic Forum (WEF) (2011), *The Global Competitiveness Report 2011-2012*, http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf.