ISTANBUL BILGI UNIVERSITY
INSTITUTE OF SOCIAL SCIENCES
FINANCIAL ECONOMICS MASTER'S DEGREE PROGRAM

IMPACT OF GEOPOLITICAL RISK ON INNOVATIVE ACTIVITIES

ÖZGE TARIYAN

116620020

Associate Professor Ender DEMİR

ISTANBUL
2019

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JEOPOLİTİK RİSKİN İNOVASYONA ETKİSİ

ÖZGE TARIYAN

116620020

Tez Danışmanı: Doç. Dr. Ender Demir

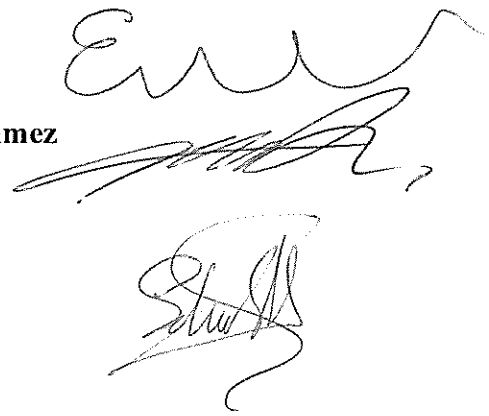
İstanbul Medeniyet Üniversitesi

Jüri Üyesi: Dr. Öğretim Üyesi Fatma Didin Sönmez

İstanbul Bilgi Üniversitesi

Jüri Üyesi: Doç. Dr. Serda Selin Öztürk

İstanbul Bilgi Üniversitesi



Tezin Onaylandığı Tarih: 16.01.2019

Toplam Sayfa Sayısı: 64

Anahtar Kelimeler (Türkçe)

1) Inovasyon
2) Jeopolitik Risk
3) Patent
4) Gelişmekte Olan Ekonomiler
5) Araştırma ve Geliştirme Harcamaları

Anahtar Kelimeler (İngilizce)

1) Innovation
2) Geopolitical Risk
3) Patent
4) Emerging Economies
5) Research and Development Expenditures

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ABSTRACT

Impact of geopolitical risk on innovative activities

Innovation has always been a popular concept. Everybody says innovation is important. But the problem lies in the fact that a few people or company actually know how to turn innovation into profit or create value from it. Therefore we will discuss the fundamental concepts of innovation and factors that affect the innovation activities in our research. Additionally we will discuss the relationships between innovation, entrepreneurship, and the barriers for change. These relationships are critical for understanding the economic studies about research and development and the economic growth.

A number of studies in the literature have examined patent statistics as an economic measure and examined patent rights and innovations at national and firm level. We will extend the existing literature by incorporating the geopolitical risk index in the estimation procedure. In this study, we examined the impact of Geopolitical Risks (GPR) on innovative activities in eighteen countries for 1995-2015. We observed that as the R&D expenditures increase in the country, patent applications increase and also trade has a positive effect on innovation activities. Additionally, GPR has a negative effect on the patent application of non-residents. However the interesting finding is that for the case of residents GPR has no effect.

ÖZET

Jeopolitik Riskin İnovasyona Etkisi

İnovasyon her zaman popüler bir kavram olmuştur. Herkes inovasyonun önemli olduğunu söylüyor. Ancak sorun, az kişinin veya şirketin, inovasyonun nasıl kar haline dönüştürüleceğini veya ondan değer yaratılacağını bilmesi gerçeğinde yatmaktadır. Bu nedenle araştırmamızda inovasyon konseptini ve inovasyon faaliyetlerini etkileyen faktörleri tartışacağız. Ek olarak, girişimciliğin ve değişimin önündeki engeller ile arasındaki ilişkileri tartışacağız. Bu ilişkiler, araştırma ve geliştirme ile ilgili ekonomik çalışmaları ve ekonomik büyümeyi anlamak için kritik öneme sahiptir.

Literatürdeki bir dizi çalışma, patent istatistiklerini ekonomik bir ölçü olarak incelemiş, patent haklarını ve yenilikçi aktiviteleri ulusal ve firma seviyesinde veriler ile incelemiştir. Jeopolitik risk endeksini tahmin prosedürüne dahil ederek mevcut literatürü genişleteceğiz. Bu çalışmada, 1995 – 2015 yılları için on sekiz ülkede Jeopolitik Risklerin (GPR) yenilikçi aktiviteler üzerindeki etkisini inceledik. Ülkedeki araştırma ve geliştirme harcamaları arttıkça patent başvurularının da arttığını ve ticaret faaliyetlerinin inovasyon üzerinde pozitif etki yarattığını gözlemlemiş bulunmaktayız. Jeopolitik Risklerin, yerleşik olmayan yabancıların patent başvuruları üzerinde negatif etkisi bulunurken, ülkede ikamet edenlerin patent başvuruları üzerinde bir etkisi olmadığı gözlemlenmiştir.

INTRODUCTION

Changes in science and technology have impact on our standard of living and these changes can be improved by innovation. Innovation is an important component for the success of companies and economic growth of countries. Innovation as a definition is the process of translating an idea or invention into a good or service that creates value which customers will pay for.

Inventor's main driver is profiting from the rights of the invention. In relation to this, a patent is a right granted to the inventor of a process, machine, article of manufacture or compound of a substance, which is new and useful. It is the right to prevent others from using a new technology and it gives the inventor the right to stop others, for a period of time, from making, using or selling the invention without obtaining their permission.

The patent system is one of the most effective tools for knowledge sharing and transfer of the technology, and it is the evidence that patents boost innovation which is not confined to the U.S., nor is it limited only to the developed countries (Phelps, 2015).

Stronger levels of patent protection are positively and significantly associated with inflows of high-tech product and R&D expenditures (Park and Lippoldt, 2008). Whenever intellectual property lies at the focus of the modern company's economic success or failure, patent protection will keep its significance as innovation.

To our knowledge this is the first study in terms of examining the impact of geopolitical risks on innovation. The first four parts represent the literature review, fifth section gives the data methodology and sixth section gives the findings and the conclusion section concludes the paper.

1. GEOPOLITICS AND GEOPOLITICAL THEORY

1.1 Introduction to Geopolitics and Geopolitical Theory

It is crucial to comprehend the concept of geopolitics, before approaching geopolitical risk term. According to Wolff (2010), in the most basic sense, geopolitics is the coaction between geographical location and politics. The Oxford English dictionary defines geopolitics as "politics, especially international relations, as influenced by geographical factors". Similarly, Grygiel (2006) tends to refer to geopolitics as, the environment that the state is within and in reaction to which, it should act. In short, geopolitics studies the effect of geography on states' policy regulations and arranging international relations (Suder, 2006). Once, geopolitics term is used to identify only countries' practices, struggle and control for territory. However now, we are facing new players such as, companies, non-governmental organizations (NGOs) and pressure groups, who acknowledged the importance of geopolitics on individuals' life and now have incremental effect as a part of these practices (Caldara and Iacoviello, 2018). According to Wolff (2010), a country's general geographical characteristics, such as proximity to strategic resources, rivers, mountains, deserts or oceans, determine a country's natural resources capacity on international political attitude. Likewise, Spykman (1938) emphasizes the particular and adequate usage of geographic factors to help formulate politics to gain and preserve power.

Geopolitical theory is said to arise in two perspectives; early naturalism and global geopolitics (Deudney, 2000). The first wave criticizes security-political implications of countries geography following Aristotle, Montesquieu and Machiavelli's political science approaches (Deudney, 2000).

Traditional geopolitical theory suggests that a country's location offers advantages as well as disadvantages. Kelly and Jalilov (2016) count these advantages as, area leadership, security, communication transit, central planning; whereas disadvantages include illegal immigration, conflicting borders and foreign interruption.

The second wave tends to focus on global security and power relationships between nations and recognize the role of technology and industrial revolution on geographic structure of nations. The second wave is represented by studies or theories proposed by Mahan, Ratzel, Mackinder and Wells (Deudney, 2000). It is beneficial to name some significant ideas on geopolitical theory. MacKinder (1904) first attempted to conceptualize geopolitical theory. During MacKinder's (1904) comprehension of the new dynamics of imperialistic world, he is sure that boundaries of countries are no longer definite but subject to change (Chowdhurry and Hel Kafi, 2015). Also, he introduced the term "heartland" as the core of Eurasia and suggested that the Eastern Europe is the strategically advantageous location to control the world (Akter, 2016). Unlike MacKinder's extreme concern for land dominance, Mahan recognized the significant role of sea power (Ullman, 2006). Mahan (2013) believed that nations acquired power due to their master on seas and commercial activities on seas. Lastly, as for Friedrich Ratzel (1940), nations are acting as living organisms and just like living organisms' nations had to grow, expand and to establish boundaries that are subject to change. His ideas continued as "Lebensraum" and inspired German Geopolitical School.

1.2 Understanding Geopolitical Risk

Geopolitical risk has been there for long ago, but staying unexplored, just like the hidden part of an iceberg. Now, thanks to improvements in communication technologies, the world is now easier in terms of access to information. We are able to monitor and detect either positive or negative events that are taking place at distinct territories. Yet, it is not just operational distinct in international arena, but butterfly effect of a sunk investment on a region may devastate firm' overall

financial performance on that volatile economy. The more information, business world acquires, the more chance companies have to lower risks in terms of ensuring sustainable businesses. Not only accurate, but timely and detailed information is needed for a country or region, to invest in, but extensive what-if scenario planning, alternative plans and assessment of diverse risks need to be studied deeply. In the global business view, geopolitical risk can be perceived as direct or indirect effect of governments, non-governmental organizations and corporations on operations of international firms or partners of these firms (Suder, 2004). In that sense, not only terrorist attempts need to be taken seriously, but also its indirect effect on regular global economy in terms of commercial infrastructure (Suder, 2006). That's why, not only governments are interested in identifying and measuring geopolitical risks for territories, but corporations, non-governmental organizations and academics heightened their attention, too.

Caldara and Iacoviello (2018) define geopolitical risk as the risk related to tensions between states that disturb the regular sequence of overseas diplomacy, generally stemming from terrorism and war issues. In that sense, geopolitical risk encompasses the risks that these negative events materialize or new risks emerging from the same reasons. Similarly, Flynn (2008) refers to geopolitical risk as any kind of threat arising from geographic, historic or societal variables associated with international policies. As Blomberg, Hess and Orphanides (2004) claim, both terrorism and war related negativities have significant adverse effect on nation's growth. Moreover, Stevens (1998) studied particularly how governments' regulations directly affect foreign direct investment of multinational companies in host countries, in terms of tax, tariff and other changes.

Geopolitical risk is usually associated with threats stemming from the regions that the multinational companies are doing business in. However, urban terrorism and supply chain disorders are affecting all transportation industry in terms of rising insurance costs and increased security need. Behrendt and Khanna (2003) exemplify this, by how Al Qaeda attacked to oil tankers as economic implication of its acts.

As a supporting example to the importance of geopolitical risk, we can give World Economic Forum's Global Risks 2015 and 2016 reports. According to the Global Risks 2015 report, there has been a radical change according to the previous years and economic risks have found the smallest place within the top 5, and the geopolitical risks such as the collapse of countries and conflicts have come to the fore (Kucuk, 2015). According to the Global Risk Report of 2016, technological, geopolitical, social issues and destructive changes of economic inequality will directly affect the way governments and companies work by creating a new fragility in our world (World Economic Forum, 2016).

1.3 Measuring Geopolitical Risk

Companies are interested in measuring and publishing general business risk through a set of indicators, yet geopolitical risk is taken as one of them. Either publicly transparent either classified, firms tend to outweigh geopolitical risk and hence use their own risk-taking mechanism in their strategic decision-making processes. The main issue for these measurement indexes can be counted as broadly defining geopolitical risks ranging from wars, major financial crises and to global warming to be more coherent (Caldara and Iacoviello, 2018). In addition to that, Caldara and Iacoviello (2018) criticize companies' formation or usage of geopolitical risks as being loosely defined, not suitable for empirical analysis and unclear implications.

Scholars tend to approach geopolitical risk in a more comprehensive and systematic manner. Several studies studied wars or terror related events to construct quantitative measures of geopolitical risk. Likewise, Berkman, Jacobsen, and Lee (2011), by analyzing the International Crisis Behavior database, formed up a crisis index. A more recent study by Caldara and Iacoviello (2018) proposed a geopolitical risk index (GRI) grounded on newspaper articles about progress of geopolitical tensions since 1985. They established search categories as of geopolitical threats, war threats, war acts, nuclear threats, terrorist threats and terrorist acts and scanned 6125 articles concerning these terms.

According to that index, high geopolitical risk score yields to decreasing economic activity, lower market stock returns, and investment bestowed to advanced markets rather than emerging markets.

1.4 Contemporary Approaches to Geopolitical Risks

Since beginning of the 2000's, the world is experiencing a paradigm change, redefining conventional geopolitical principles. Carney (2016) refers to geopolitical risk as having negative economic impacts, just like economic and political uncertainty. According to geopolitical analysts like Nye, Brzezinski and Nye geopolitical power inclined towards Asian and Asia-Pacific (especially BRIC) from Euro Atlantic (Riegl, 2013). Particularly, China gained more power in terms of economic and geopolitical condition, mainly capturing the dominance of American market. In that flux global arena, Nye (2011) identified five major challenges. First one is the intersection of terrorism and nuclear materials, which resulted focus on Middle East, whereby terroristic acts are going on for capturing a larger share of oil reserves. Stratfor Worlwide (2014), also recognized oil, as the most important geopolitical commodity as it ceases to offer significant cash for its exporters and have strategic role in economic growth. Second one is identified as rise of Political Islam, hence increased international trade and economic growth of countries adopting this view. Third one is rise of Asian markets, such as China, India and Russia, in response mature American market. Fourth one is economic depression mainly based on oil dependence. Last one is counted as ecological and environmental concerns related to sustainability of natural resources.

In that sense, how companies approach to lower geopolitical risk is an interesting topic. A consultation firm report offers diverse tools to indicate geopolitical risk (Wildman, 2015). The first one is application of PESTEL (political, economic, social, technological, environmental and legal) or SWOT (Strengths, weaknesses, opportunities and threats) Analysis. Through one of this environmental scanning techniques, Porter's Five Forces is model can be implemented as of the threat of new entrants; the threat of substitutes; the power of buyers; the power of suppliers;

and the level of the competition. Last, but maybe the most effective technique is offered as scenario planning. Implementing the data gathered from environmental analysis as geopolitical variables to alternative scenarios can be effective in assessing the risks. Scenario analysis leads the management to consider the external forces and run practices tests to see the potential outcomes of the current management intelligence. In that perspective, the companies can identify the worst cases, and would have more time and more resources to resolve the problems.

Scenario planning and future projection methods are useful not only to name the risks, but also to gain extensive data on geopolitical trends (Behrendt and Khanna, 2003). Companies that are looking for stable market conditions need to empower their intelligence to avoid risks. In that sense, it is recommended to establish university-company partnerships to improve the track and assess threats.

Also as a proactive strategy, diversification strategies are offered as useful mediums for spreading the risk for unstable territories. Especially, vertical diversification strategy is suggested for finding alternative sources of factors of production.

2. INNOVATION AND INNOVATIVE ACTIVITIES

In that section, first of all, innovation concept is defined in a few angles and major types of innovations are presented as; product, process, marketing and organizational. Then, the relationship between innovation and economic growth is delineated. The section continues with major innovative activities as Research & Development Expenses, Patents, Foreign Direct Investment and barriers to innovation. Eventually, section ends with metrics measuring innovation and innovation in Turkey.

2.1 Innovation: Definition and Major Types of Innovation

The earliest definition related to innovation is probably coming from Schumpeter (1934), as the generation of new ideas into products and processes, whereby gradually these inventions are diffused to total market. Similarly, Thompson (1965) defined innovation as the creation, recognition and application of new ideas, products or processes (Baregheh, Rowley & Sambrook, 2008). Therrien et al., (2011) regarded innovation as complicated alterations in production techniques or processes for companies and transformed into innovative capabilities to acquire technological competence to be competitive in the market. In that sense, it is claimed that innovation is one of the key factors for companies' success, survival or source of competitive advantage in the rapid business environment (Atalay et al., 2013; Jiménez-Jiménez & Sanz-Valle, 2011, Bell, 2005).

More specifically, Artz et al., (2010) envisioned reasons of increasing demand for innovation as, tense competition and shortened product life cycles. So, in order to attract changing tastes of consumers, companies need to be capable of offering new products and services through innovative capabilities. In the literature there exist multiple classifications of innovation. One of the earliest classifications is proposed as organizational structure, process, people and product/service (Knight, 1967). Innovation is also taken in terms of its impact on total techniques as of incremental or radical (Dewar and Dutton, 1986). Recent innovative models are more integrative, referring to a wider range such as; product (radical and incremental),

service and process (Oke et al., 2007). In a more general term, Francis and Bessant (2005) presented four types; position, process, product and paradigm. Product innovation is related to firms' offerings, whereby process innovation is related to ways how these offerings are created or provided. Position innovation changes how the product/service is introduced to market, paradigm innovation is altering the intellectual capability and models which determine the organization's overall existence (Baregheh et al., 2011; Bessant and Tidd, 2007). Brouwer (1991) classified innovation on two major categories as product and process. However, to better understand the innovation idea, the more widely used four type, that OECD and Eurostat are embracing, is detailed in the next section as of product, process, marketing and organizational.

2.1.1 Product Innovation

Product innovation is defined as presenting new product/ services or offering noteworthy enhancements in the existing product/services lines (Polder et al., 2010). The definition signals that the product by nature has to be novel to be regarded as product innovation. However, OECD (2005) claims that significant changes in design or usage of product can also be considered as product innovation. These significant improvements can be counted as, technical or functional characteristics, user friendliness, component or material changes, integrated software (Atalay et al., 2013, OECD and Eurostat, 2005).

2.1.2 Process Innovation

Process innovation is application of the manufacturing or provision method that is novel or considerably upgraded (OECD, 2005). Since process is a combination of abilities, technologies or facilities, process innovation can be regarded as an innovation type aiding all steps of the production steps, but often invisible, unlike product innovation. In other words, process innovation is usually associated with "changing the production style" rather than "what is being produced". This type includes examples like computer aided design and production, software installations, automations (Atalay et al., 2013).

2.1.3 Marketing Innovation

Marketing innovation means applying novel methods to significantly change the marketing mix (product, place, price and promotion) of the firms' offering (Hassan et al., 2013; OECD, 2005). With respect to product innovations, marketing innovations are more customer-centric, in other word innovation triggered by better referring to changing customer patterns, finding new markets or changing the marketing strategy. To name an innovation as marketing innovation, it has to include noteworthy alterations in the product design itself or packaging, distribution policy, communicational campaigns or pricing strategy.

2.1.4 Organizational Innovation

Organizational innovation is the application of new methods in company policies in terms of arranging internal and external affairs (Atalay et al., 2003). This type of innovation is similar to Francis and Bessant's (2005) Paradigm innovation. Examples can be counted as innovations that are hoped to increase firm's performance in terms of decreasing administrative or operational costs or employee commitment and satisfaction.

20th century brought up two major organizational innovations to business life as technical and managerial sense (Evan, 1966). Organizational innovation in the technical manner is based on developing novel high-tech products and processes for the aim of improving efficiency, profitability, extending market share and creating competitive advantage to the owners (Damanpour & Wischnevsky, 2006). Whereas, managerial organization is related to establishing and nurturing a fresh structure, culture or leadership style within the organization. Both approaches study organization as a means of reflecting their innovational attitude. The primer one is interested in quantitative nature of innovation as of productivity, high performance. The latter one is about improving the climate of the organization by relying on change and development as engines of growth. So, the two dimensions are complementary (Damanpour, 2017). In the literature there are diverse approaches about the typology of organizational innovations; product–process, technical–

managerial, radical–incremental, organic–open. However, more or same they are reflecting variations of these two major types.

2.2 Innovation and Economic Growth

Today's global world is energized by rapid changes in technology, creation and usage of knowledge and qualified human resources. In other words, it is not the technology that is designed or created in labs that dramatically change consumer or business markets, but it is how successful these technologies are applied to routine operations of firms or daily lives of consumers. In that sense, competitiveness of countries is determined by how deeply these scientific and technological improvements are integrated to daily lives of individuals. Schumepeter needs to be counted as the first economists to underline the value of innovation for economic growth and tended to perceive innovation as the limitless fuel of progress (Brouwer, 2000). Schumpeter defends his view by relying on the creative destruction concept, which elucidates role of novel technologies may destroy existing social technologies but improving social well-being of the society (O'Farrell, 1986). Likewise, Özkul and Eren (2016) regarded innovation as the most significant element of as a source of competitiveness by referring to the intertwined relationship between innovation and economic growth. In the same study, authors listed the potential outcomes of innovation as improving efficiency, employment and quality of life for the societies. European Commission (2001) also, underlines the dominant role of innovation in long-term growth of the countries, with respect to capital, savings, labor or other types of inputs. According to OECD reports (OECD, 2007), this innovation effort is gradually taking a larger share of economic activity. Hence innovation and innovative activities, results in overall economic growth, sustainable developed markets and accelerating productivity of nations.

Indeed, in the post-World War II period, radical rise of East Asia, as Japan (1950-1980), Korea (1960-1980) and China (1978 to present), can be explained by creation and application of research, development (R&D) and innovative activities (UK Government Chief Scientific Adviser, 2014). Similarly, OECD (2007) underlines the noteworthy effect of software investments on professional

performance and economic growth. Moreover, OECD reports indicate evidence from different countries (e.g. the Netherlands, Denmark, France, United States) as how their investment in information and communication technologies resulting in GDP growth since 1995.

According to OECD report (2006), significant increases in R&D and innovation investments are due to a large set of variables. Among these factors, low interest rates and additional fiscal incentives to encourage innovation investment, available alternative financing options, lowering anti-competitive market regulations to stimulate companies to differentiate themselves by innovation and openness to foreign R&D facilities and activities can be counted as the most effective ones (OECD, 2007). Also, Hall (2002) stressed the rise of venture capital industry as an operative solution of problems of innovation financing. United States can be accepted as "free market" in terms of its capacity of venture capital. Hall (2002) refers to US market as composed of pools of funds that are invested and handled by knowledgeable people. On the contrary, European market is experiencing a growth especially for high technology startups.

In sum, competitiveness of nations is no longer based on abundance of natural resources or other factors of production, yet now it is determined by their Research and Development and innovation approach (Erdal & Göçer, 2015). Catching the accelerating trend of learning ability to innovate is accepted to be one important factor of agile, successful and sustainable businesses. In their annual report, UK Government Chief Scientific Adviser (2014) proposed four guidelines for the process on effective innovation policies for governments. First principle is adopting long term vision of innovation, instead of focusing on one industry or one period. Effective rules and procedures need to be implemented to all departments and institutions that involve in innovation. To avoid possible failures in communicational or bureaucratical disengagement is only possible, if all parties understand and value vitality of innovation. The second principle is hypothesized as consulting wisely to necessary authorities. Through innovation chain, important voices need to be listened such as, small or medium sized enterprises (SMEs),

academicians or scientists, or even consumers. Actually, policies to emphasize innovation is not designed and implemented in isolation. Third principle is suggested as adopting a learning approach even in the policy design and evaluation phases. This means trying different perspectives, and refining the data collection, interpretation and even feedback from key actors for establishing an operative innovation policy. Fourth principle is considered as composing transparent, consistent and stable policies that resist by time and worth of investment. It is underlined that innovation better works with confident actors rather than confused ones, so in times of ambiguity or uncertainty government members should rely on the persistence and effectiveness of these innovation policies. In that sense, OECD (2007) also highlights that policy coordination between governmental mechanisms is vital, only a broad and widespread strategy to evoke sense of innovation can help attainment of social and environmental goals, whereas future economic growth and competitiveness.

Although economic growth literature counts entrepreneurship and innovation as important factors affecting economic growth, entrepreneurship factor is ignored in most empirical models that explain economic growth. This is due to the difficulty in functionalizing and measuring entrepreneurial activities.

Consequently, governments should be proactive by integrating entrepreneurship and innovation-based approach to existing policies for the ultimate aim of boosting economic growth. Those countries' which give value to entrepreneurial and innovative spirit, give support to Research and Development actions, aid entrepreneurs in the necessary areas, expand high-end efficient manufacturing facilities. In that perspective, national income is increasing, equal income distribution is achieved and eventually societal welfare is better off.

2.3 Major Innovative Indicators

Innovation is often perceived as a function of entities' social capital, research and development infrastructure and a relative amount of capital devoted as innovation investment. In the literature, innovation and innovative activities attracted attention mainly in three waves; analysis of the link between diverse variables (such as investment in Research and Development expenses, number of patents and economic growth), studying genesis of effective global or regional innovation systems and tracking dispersion of spillovers (Rodríguez-Pose and Crescenzi, 2008). In that perspective either as potential steps of innovation or either as innovative activities three major types are elaborated; research and development expenditures, number of patents and amount of foreign direct investment. Like Rodriguez-Pose and Crescenzi's (2008) approach first of all, there need to be extensive investment in Research and Development practices, which are hoped to return into visible or invisible patentable innovations and in the end these innovations would be spreading global arena as of foreign direct investments.

2.3.1 Research and Development Expenditures (R&D)

There are many theories to analyze the nature of innovation. According to "Linear Model" basic research leads to practical research to inventions, which are moreover converted to concrete innovations (Rodriguez-Pose and Crescenzi, 2008; Bush, 1945; Maclaurin, 1953). According to Linear Model, it is believed that the more the investment in R&D, the greater the innovative capability and in the end higher economic growth (Rodriguez-Pose and Crescenzi, 2008). In that perspective importance is heavily dependent on a firm or country's research and development capabilities and is placed at the center of technological progress, innovation and eventually growth. Supportively, Lederman (2007) found that in developing markets, R&D expenditures highly correlate with the probability of product innovation by firms. Griliches (1990) examined the relationship between patents and R&D investments and had taken patent data as a significant indicator output of technological advancement in economies. The role of government in country's R&D capabilities is another crucial subject. Especially in OECD countries, tax

reductions or concessions are heavily used as indirect way to encourage R&D. Tax incentives act as flexible tools to stimulate firms devoting more funds to research. In terms of direct support, governments intervene in areas to prioritize areas of study in science or technology. Industry-university cooperation by undertaking joint research projects are valuable partnerships in terms of sharing risks, merging different abilities of diverse parties. Especially government need to be proactive in establishing cooperation for public challenges, such as delivery of healthcare, social services for elderly people, environmental protection, sustainable public transport solutions (OECD, 2007). For all these efforts, a deliberate evaluation of policies to support any type of innovation is needed to guarantee that the policies are effective and useful for further growth.

However, sometimes emerging technologies might be problematic for regulatory bodies in terms of intensive lobbying efforts. The most important country as heart of research and development is undoubtedly United States. Geographic advantages, innovation concern and qualified social capital made it easy to excel in technological innovation. The country is prideful for not just for existing academic-industry collaborations to foster innovation, but also its robust education systems that empower individuals to become researchers (Bey, 2016). In the United States, there stood a struggle to hold on existing modes of transportation relying mostly on oil and its derivatives rather than automated and alternative resource technology. In that perspective, proactive government regulations are vital for development and wide acceptance of new technologies. Besides, country's overall regulatory environment and culture determine the tendency of cultivation of new technologies (Bey, 2016). As for global competition, Germany tries to concentrate its efforts in chemical industry, whereas Japan in electronics and high technology. As the major actor of Asia, China skyrockets in research and development efforts in terms of new technologies. But even though the company faces fierce competition from European and Asian countries, the R&D background of United States seem to be providing sustainable competitive advantage.

Therefore, it can be suggested that for the nations targeting to accomplish a sustainable and desired rate of growth, it is essential to reserve more physical and intellectual resources for research and development activities, which are integrated to effective patent systems.

Research and development expenditure is an important data category in terms of showing the importance that a country gives to innovation and development. When we look at the development level of countries, we can see the reality of this situation. Another issue that can help in the evaluation of research and development expenditure is the concepts of "economic development" and "economic growth". We can think that "economic development" is the secret concept used in defining the development level of countries.

Economic development, in the basic sense, refers to the improvement in general living conditions of society and in infrastructural issues. Economic growth is a concept that occupies our agenda more and emerges more in our daily lives and is used by many of us much more frequently in the basic sense, it refers to the progress or increase in the total value produced by a country.

We can also evaluate this situation for countries, institutions and companies in the countries. When we approach the subject with this eye, we can see that economically developed countries invest more in their production methods and institutional methodologies. From this point of view, it is a fact that developed economies or economies with high economic development make more spending on infrastructural issues and production methods and technologies of companies and institutions in these economies compared to others.

Economic growth focuses entirely on the output of production. For this reason, the focus of the countries targeting high economic growth is mainly production expenditures. Production expenditures consist of raw material expenses, labor costs, logistics expenses, marketing and sales expenses and general administrative expenses.

When we evaluate the issue from two basic concepts such as economic growth and economic development, we can say that research and development costs are higher in countries that target or realize economic development.

Considering that research and development expenditures directly affect the investment of a country, in institution or company infrastructural issues, we can say that the development and research and development expenses are directly proportional. In line with the previous propositions, we can think that the research and development expenses in the developed economies are higher.

Roughly to illustrate this issue, we can refer to the pharmaceutical companies that can be called global. When we consider the activities of the companies that we can evaluate in this context in various parts of the world, we can see that the development levels of the countries they operate and their research and development expenses are in parallel.

If we think of a global pharmaceutical company that operates in both the United States of America and Turkey, we can say that the patent, innovation and production methodology expenditures are higher in the United States of America than Turkey which is much more developed economy. Similarly, it can be seen that an automotive company operating in both the UK and India was involved in all of the innovations and developments planned by the automotive industry for the future.

2.3.2 Patents

In the literature, Research and Development efforts are linked to patent ability of the entities (Griliches, 1990; Pakes and Griliches, 1984; Scherer, 1983). Stern et al., (2000) visualized international patents as a combination of observable factors such as R&D expenses and manpower, patent protective policies, openness to international trade and collaboration of academic and business world. Similarly, Allred and Park (2007) tend to analyze intellectual property rights as patents and R&D abilities of the firm together. Their work presented empirical findings of patent strength on different characteristics of innovative activity, that are firm level R&D, local patenting and international patenting.

In that sense, in several studies patent rights act as a significant indicator for measuring innovation. Creation of new technologies requires significant funding and excessive research and development capabilities. That's why diverse parties, such as firms, specialized institutions, state or private universities may participate any step of innovation process (UK Government Chief Scientific Adviser, 2014). However, among all these players' maybe government has unique power that can never be underestimated in two ways. First of all, governments may generate policies and regulations, such as taxation, tradable permits/subsidies, price policies, and incentives for the welfare of innovative companies to foster innovative activities and resulting new products and services taking patents (UK Government Chief Scientific Adviser, 2014). OECD (2007) suggests, governments role in Intellectual Property Rights (IPR) regulations, for identifying exceptions for research areas, promote proactive commercialization strategies for institutions, encourage monetization of IPR, establishing free access, pooling mechanisms for appropriate usages. For example, innovation is mainly discouraged by piracy and counterfeiting, new technologies are not covered in recent policies, threat of easy copying to inhibit these, governments tend to strengthen rights of IPR and copyright protection (OECD, 2007). Allred and Park (2007) indicated how strong IPR differ for emerging and stable economies. For stable economies, tough power of the patent policies adversely affects domestic patent and does not affect R&D and foreign patents, whereas emerging economies, patent protection positively influence R&D and domestic patent applications, negatively affect foreign patents, after some critical level of protective precautions are taken. International standards for protection of intellectual rights have been elevated through 1994 TRIPs Agreement for defending high return on investment for their inventions and applying for patents. According to OECD Report (2007), patent and trademark applications have risen over the past two decades. Copyrights have been extended to 70 years after the death of inventor since 1993 in Europe and since 1998 in the US (OECD Report, 2007). Also, new precautions are taken to protect digital form of the innovations.

Secondly, government can take the risks related to innovation, in terms of market failure threat or excessive costs or clarify the uncertainty experienced in the innovation process. In that sense, number of patent rights per country or per institution can signal the innovative attitude of the entity. In other way, governments provide non-refundable funds for companies to be specifically used in research and development reasons.

Another aspect of patenting issue is patentability of the innovations. According to World Bank Report by Lederman (2007), most innovations are not patentable in the developed countries; in that perspective to stimulate product innovation extra policies need to be adopted. Similarly, Criscuolo et al., (2005) caught different correlational patterns of patents and product innovation. Michelacci (2003) referred entrepreneurs' role of commercializing research outputs as of introduction of new products. However, the research and development background of most of these innovations are based on cooperation of firms, universities and institutions.

2.4 Barriers to Innovation

In every system that is unsuccessful regarding innovation, dynamics preventing the innovation differ from each other since each of them is different. Besides, the main barriers to innovation can be generally explained as follows; corporate resistance, organizational structure, prejudgment, lack of visionary leader.

2.4.1 Corporate Resistance

Corporate resistance can be considered as the most important barrier to innovation. Employees of a corporation have some certain habits and organization systems. Innovation will cause these habits to be changed due to reforms that it brings along. With these changes, an uncertainty arises. Therefore, it is not easy for corporate employees to change their habits.

As a resistance to the change, slowing these improvements down or hindering innovation with faulty works can bring innovation to a serious halt. This may prevent the advantages corporations take by innovations. The resistance of employees becomes a corporate culture in time and innovation process may end unsuccessfully.

2.4.2 Organizational Structure

Most of the current organizational structures find it adequate for their employees to complete their jobs. This obstructs creative thinking and productivity. Some other corporations expect their employees to have creative ideas with methods that do not provide motivation. Another reason why organizational structure prevents innovation is lack of management support. It is an optimistic consideration to expect projects that are not supported by managements with adequate sources of budget and time, to be successful. In order to remove these risks and establish successful innovations in organizations, it is required to have management support.

2.4.3 Prejudgments

Mostly, people think that innovation is not easy and a good idea is already thought by another so any source to allocate for the relevant works is a waste. Due to these prejudgments, many innovations end in the beginning.

We must challenge the assumptions we make regarding people's capabilities. Prejudgments like older people cannot be creative, there are creative and uncreative people or nations can be harmful as it will control our thinking and kill the creativity.

2.4.4 Lack of Visionary Leader

Innovation is a process that is labor intensive for employees and costly for corporations. Innovative projects require a systematic sense of work and have a production aim that is parallel to the general strategies of corporations. Considering all these reasons, corporations need a leader to provide required sources, keep required motivation alive and monitor process efficiency.

The way to eliminate the opposition to innovation in corporations is mainly based on two tools which are strong communication and effective leadership. When these two concepts are fully implemented, the barriers to innovation can be largely eliminated. Corporate units with different functions can take action with a clear and open-minded understanding. An appropriate and effective corporate communication culture can incorporate innovation into their own operating systems. At this point, it is very important to keep the corporate communication channels always open.

Leadership is one of the issues that should be implemented effectively for the initiation, operation and successful completion of all these processes. When leaders succeed in using their guiding and guiding roles in the presence of a good corporate vision, integrating the concept of innovation into the corporate identity is no longer a matter.

Institutions that are aware of adapting to change, open to innovation and renewal, can achieve a permanent and impressive position in their sectors by achieving branding in a short time.

The matters mentioned above have the feature of main barriers to innovation. However, the barriers to innovation are not limited to these. Situations where employees think innovation has a specific team and they are not a member of this team, innovation is considered as limited to science and technology, it is believed that innovation must be realized only by large corporations, there is no written business plan related to innovation, and efficiency of innovation process is not monitored regularly, are regarded as other difficulties against innovation.

According to Karahan and Karhan in relation to difficulties that prevent firms for making innovation, %21 firms give up making innovation for not having enough financial sources, %31 for the high cost of innovations, %21 for not having qualified staff, %18 for the homogony of established firms, %25 for uncertainty of demand in product and service. According to their research it can be said that the most important obstacle that prevent firms is the high costs (Karahan & Karhan, 2013).

2.4.5 Macro Barriers

Government policy has tended to play a significant role in the development of new technologies. Governments in most emerging markets lack the technical and administrative capabilities, as well as the human and financial resources, to play such a significant role in spurring innovation (Broadman, 2016).

Additionally; lack of skills, existence of uncertainty, low level of technological capabilities and capacity, deficient fiscal and legal policies in nations play a critical on macro barriers to innovation.

2.5 Metrics Measuring Innovation

According to a BCG Report (2009) on "Measuring Innovation", which is based on a technological company's strategy on innovation metrics, there are alternative ways to identify the innovation ability as of; inputs, processes and outputs. Inputs are symbolized with quantity of new ideas, business unit investments, Research and Development as a ratio of sales, number of technical employees. Processes are related to the time it takes to turn an idea to a working product/service and sum of estimated present values of projects. Outputs, as the well-known metrics of all, are considered as number of patents, business units launch of new products/processes/services, innovative products sales and profits, Innovation Return on Investment.

Similarly, according to another report by Gamal (2011) and his team, there exist two mainstream approaches to measure innovation; through inputs (R& D concentration, number of employees, budget etc.) or outputs (patents).

The Global Innovation Index (GII), which is prepared with the joint efforts of Cornell University, WIPO and INSEAD, aims to provide a comparative investigation of the innovation performance and progress in European countries. The GII uses input sub-index and output sub-index to calculate innovation efficiency ratio and global innovation index. As Figure 1 presents, input sub-index is composed of institutions, human capital and research, infrastructure, market sophistication and business sophistication, whereas output sub-index includes knowledge and technology with creative outputs.

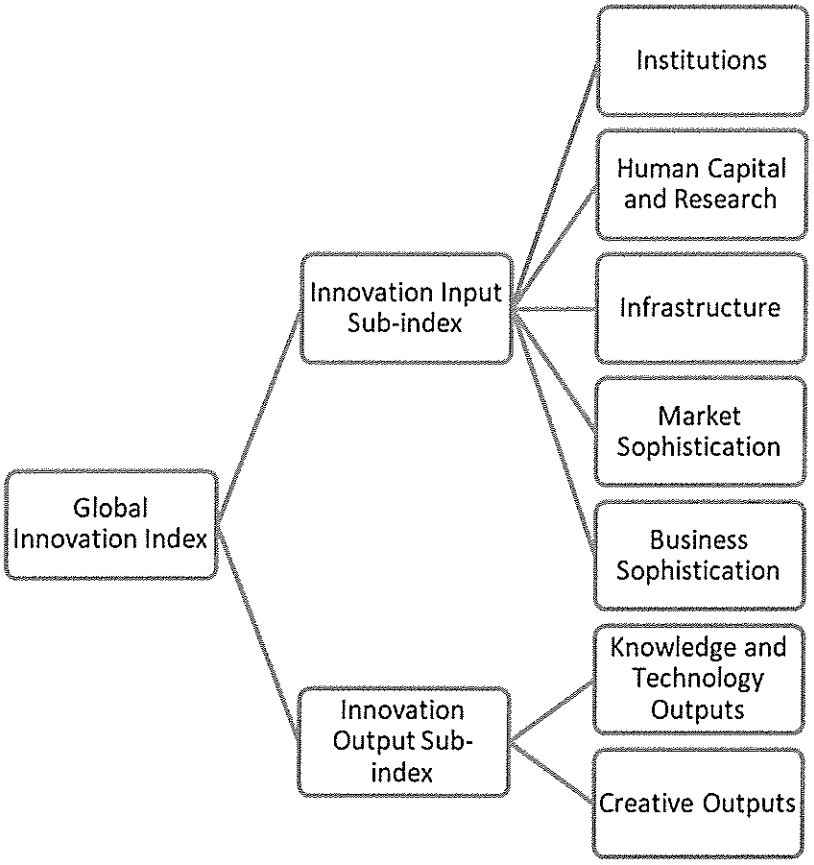

Figure 1 Components of Global Innovation Index

Source: The Global Innovation Index, 2018

Another metric is European Innovation Scoreboard (EIS), which provides a relative evaluation of the innovation performance of EU Members and selected third countries. This metric interprets innovative performance as framework conditions, investments, innovation activities and impacts which are given via Figure 2.

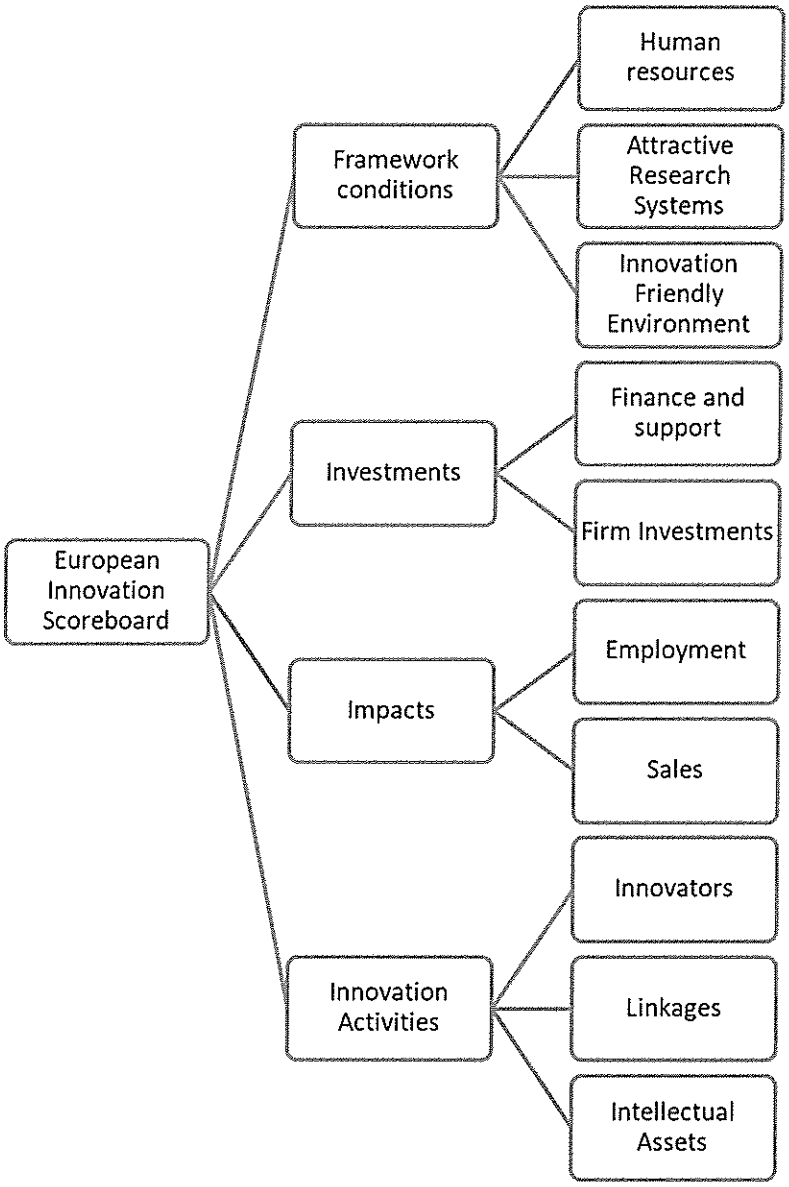

Figure 2 Components of European Innovation Scoreboard

Source: European Commission, 2018

Also there exist alternative measures as OECD Science Technology and Innovation Outlook, assessing innovation and technology policies of OECD countries, and Innobarometer, that detects behavioral attitudes and trends in EU businesses through a variety of variables.

2.6 Innovation in Turkey

According to World Bank Group's the Innovation Policy Platform, Turkey is a fast-growing and middle-income country, that is rapidly developing by having almost 4% of growth rate in 2016 (The Innovation Policy Platform, 2016). Since 2004, observable progress is achieved in terms of national innovation system as can be traced in increases by; support in public R&D projects, diversity in private R&D programs for innovation, incentives in innovation based public or private projects (Szczygielski et al., 2017). Heightened interest in increasing innovation capability of Turkey is also visible via development plans innovation policies (İTO, 2014). The major purpose of these policies is to raise the competitiveness of Turkey with exclusive products and services by increasing the private sector involvement in R&D and innovative activities, establishing and nurturing an innovation friendly environment (İTO, 2014). As for innovational capacity, the major problem is lack of proper financial support. The significance of presenting financial support to related institutions is not to be underestimated. Yet this issue is emphasized since the government' seventh five-year development plan as how venture capital should penetrate to boost research and development ability of the companies. Tenth five-year development plan, regarding 2014-2018, increased the support and incentives to R&D activities (İTO, 2014). The governmental support is granted via TUBITAK, Technology Development Foundation of Turkey, KOSGEB and incubation centers. The major actor that is responsible from the R&D and innovation capability of Turkey is the Scientific and Technological Research Council of Turkey (TUBITAK), which is established in 1963, but significant and path-breaking innovation support policies are not achieved until early 1990's (Szczygielski et al., 2017).

The incentives given as R&D support packages under the law no. 4691, can be summarized as exemptions of corporate taxes, stamp duty and VAT with special discounts in R&D activities (İTO, 2004).

Ünalan and Erciş examined the positions of innovation in Turkey and South Korea. The purpose of their paper was to examine innovation comparing Turkey and South Korea using Innovation Global Index reports between 2007 and 2015. Their data source was the Global Innovation Index which is co-published by Cornell University, INSEAD and The World Intellectual Property Organization by taking into consideration the time period 2007-2015. The results highlighted that Turkey should focus innovation more than before with regards to pillars (Erciş & Ünalan, 2016).

Uzun's paper is focused on nation-wide survey of technological innovation activities of 2,100 firms in Turkish manufacturing industry. According to his research innovation activities are more common in the firms having large sizes of employment. In some sectors of manufacturing industry 60–80% of the firms carry out innovation activities. Improving the product quality and opening up new markets rank at the top of the main objectives of innovation activities. Internal R&D is the main sources of information supporting innovation activities. 51.2% of the firms that are engaged in innovation carry out joint R&D with consultancy firms, and 52.3% of the firms with which Turkish firms co-operate are in the EU countries. In the majority of the manufacturing sectors, more than 50% of the total sales are derived from technologically new and improved products. Only 19% of the firms had patent applications with a return of very few patented inventions. A correlation analysis of basic indicators of innovation activities demonstrates that sales of new products, R&D expenditures, and firm sizes correlate only weakly (Uzun, 2001).

According to data obtained from 2010 - 2012 and 2012 - 2014 seasonal database which is obtained from Turkish Statistical Institute, Karahan and Dinç achieved the following results; the percentage of innovative enterprises grow up from 48,5% to 51,3%. People who work on product innovation increased from 77,1% to 77,7% and who works on process innovation increased from 61,3% to 63,3%.

Initiatives that carry out innovation activities, the rate of receiving financial support during the period 2012 - 2014 has increased, and the highest growth was 72% in financial support from central public institutions (Karahan & Dinç, 2017).

GII relies on eighty indicators that capture elements of the national economy that support innovative activities, such as human capital and research, market sophistication, and business sophistication. The GII is committed to different themes each year. The GII 2017 theme was committed to innovation in agriculture and food systems. The theme of 2018's index was energizing the world with innovation namely to supply the increasing global demand for energy with climate friendly, innovative, green technology. Turkey ranked 43 in 2017's index and 50 among 126 countries in the 2018's index. According to the inputs of the Turkish Statistical Institute, the Turkish public and private sector spent 24,641,000 Turkish Liras for R&D in 2018. 12,950,000 liras of the total amount have been allocated initially in the 2018 central administration budget. To compare it with Switzerland that tops the GII list, two thirds of R&D spending are made by the private sector and amount to 16 billion Swiss francs. It has been concluded as the fact that Turkey went down in the list and keeps losing ground on the issue of innovation is a very serious situation (Benmayor, 2018).

GII 2018 rankings demonstrated as below table 1. According to GII table abbreviations for World Bank Income Group Classification are LI = low income; LM = lower-middle income; UM = upper-middle income; and HI = high income. According to GII table abbreviations regions are based on the United Nations Classification: EUR = Europe; NAC = Northern America; LCN = Latin America and the Caribbean; CSA = Central and Southern Asia; SEAO = South East Asia, East Asia, and Oceania; NAWA = Northern Africa and Western Asia; SSF = Sub-Saharan Africa.

Table 1 Global Innovation Index 2018 rankings

Country / Economy	Score (0 - 100)	Rank	Income	Rank	Region	Rank	Efficiency Ratio	Rank
Switzerland	68.40	1	HI	1	EUR	1	0.96	1
Netherlands	63.32	2	HI	2	EUR	2	0.91	4
Sweden	63.08	3	HI	3	EUR	3	0.82	10
United Kingdom	60.13	4	HI	4	EUR	4	0.77	21
Singapore	59.83	5	HI	5	SEAO	1	0.61	63
United States of America	59.81	6	HI	6	NAC	1	0.76	22
Finland	59.63	7	HI	7	EUR	5	0.76	24
Denmark	58.39	8	HI	8	EUR	6	0.73	29
Germany	58.03	9	HI	9	EUR	7	0.83	9
Ireland	57.19	10	HI	10	EUR	8	0.81	13
Israel	56.79	11	HI	11	NAWA	1	0.81	14
Korea, Republic of	56.63	12	HI	12	SEAO	2	0.79	20
Japan	54.95	13	HI	13	SEAO	3	0.68	44
Hong Kong (China)	54.62	14	HI	14	SEAO	4	0.64	54
Luxembourg	54.53	15	HI	15	EUR	9	0.94	2
France	54.36	16	HI	16	EUR	10	0.72	32
China	53.06	17	UM	1	SEAO	5	0.92	3
Canada	52.98	18	HI	17	NAC	2	0.61	61
Norway	52.63	19	HI	18	EUR	11	0.64	52
Australia	51.98	20	HI	19	SEAO	6	0.58	76
Austria	51.32	21	HI	20	EUR	12	0.64	53
New Zealand	51.29	22	HI	21	SEAO	7	0.62	59
Iceland	51.24	23	HI	22	EUR	13	0.76	23
Estonia	50.51	24	HI	23	EUR	14	0.82	12
Belgium	50.50	25	HI	24	EUR	15	0.70	38
Malta	50.29	26	HI	25	EUR	16	0.84	7
Czech Republic	48.75	27	HI	26	EUR	17	0.80	17
Spain	48.68	28	HI	27	EUR	18	0.70	36
Cyprus	47.83	29	HI	28	NAWA	2	0.79	18
Slovenia	46.87	30	HI	29	EUR	19	0.74	27
Italy	46.32	31	HI	30	EUR	20	0.70	35
Portugal	45.71	32	HI	31	EUR	21	0.71	34
Hungary	44.94	33	HI	32	EUR	22	0.84	8
Latvia	43.18	34	HI	33	EUR	23	0.69	39
Malaysia	43.16	35	UM	2	SEAO	8	0.66	48
Slovakia	42.88	36	HI	34	EUR	24	0.74	28
Bulgaria	42.65	37	UM	3	EUR	25	0.79	19
United Arab Emirates	42.58	38	HI	35	NAWA	3	0.50	95
Poland	41.67	39	HI	36	EUR	26	0.69	42
Lithuania	41.19	40	HI	37	EUR	27	0.63	58
Croatia	40.73	41	UM	4	EUR	28	0.70	37
Greece	38.93	42	HI	38	EUR	29	0.59	74
Ukraine	38.52	43	LM	1	EUR	30	0.90	5
Thailand	38.00	44	UM	5	SEAO	9	0.71	33
Viet Nam	37.94	45	LM	2	SEAO	10	0.80	16
Russian Federation	37.90	46	UM	6	EUR	31	0.58	77
Chile	37.79	47	HI	39	LCN	1	0.60	68
Moldova, Republic of	37.63	48	LM	3	EUR	32	0.89	6
Romania	37.59	49	UM	7	EUR	33	0.66	47
Turkey	37.42	50	UM	8	NAWA	4	0.75	25

Table 1 Global Innovation Index 2018 rankings

Country / Economy	Score (0 - 100)	Rank	Income	Rank	Region	Rank	Efficiency Ratio	Rank
Qatar	36.56	51	HI	40	NAWA	5	0.57	81
Montenegro	36.49	52	UM	9	EUR	34	0.63	56
Mongolia	35.90	53	LM	4	SEAO	11	0.72	30
Costa Rica	35.72	54	UM	10	LCN	2	0.68	43
Serbia	35.46	55	UM	11	EUR	35	0.63	57
Mexico	35.34	56	UM	12	LCN	3	0.59	72
India	35.18	57	LM	5	CSA	1	0.65	49
South Africa	35.13	58	UM	13	SSF	1	0.55	83
Georgia	35.05	59	LM	6	NAWA	6	0.58	79
Kuwait	34.43	60	HI	41	NAWA	7	0.74	26
Saudi Arabia	34.27	61	HI	42	NAWA	8	0.47	104
Uruguay	34.20	62	HI	43	LCN	4	0.64	51
Colombia	33.78	63	UM	14	LCN	5	0.50	94
Brazil	33.44	64	UM	15	LCN	6	0.54	85
Iran, Islamic Republic of	33.44	65	UM	16	CSA	2	0.82	11
Tunisia	32.86	66	LM	7	NAWA	9	0.63	55
Brunei Darussalam	32.84	67	HI	44	SEAO	12	0.31	124
Armenia	32.81	68	LM	8	NAWA	10	0.80	15
Oman	32.80	69	HI	45	NAWA	11	0.51	92
Panama	32.37	70	UM	17	LCN	7	0.61	64
Peru	31.80	71	UM	18	LCN	8	0.47	100
Bahrain	31.73	72	HI	46	NAWA	12	0.55	84
Philippines	31.56	73	LM	9	SEAO	13	0.61	62
Kazakhstan	31.42	74	UM	19	CSA	3	0.44	111
Mauritius	31.31	75	UM	20	SSF	2	0.47	105
Morocco	31.09	76	LM	10	NAWA	13	0.61	65
Bosnia and Herzegovina	31.09	77	UM	21	EUR	36	0.50	97
Kenya	31.07	78	LM	11	SSF	3	0.69	41
Jordan	30.77	79	LM	12	NAWA	14	0.65	50
Argentina	30.65	80	UM	22	LCN	9	0.51	91
Jamaica	30.39	81	UM	23	LCN	10	0.57	80
Azerbaijan	30.20	82	UM	24	NAWA	15	0.49	99
Albania	29.98	83	UM	25	EUR	37	0.44	110
The former Yugoslav Republic of Macedonia	29.91	84	UM	26	EUR	38	0.47	103
Indonesia	29.80	85	LM	13	SEAO	14	0.61	66
Belarus	29.35	86	UM	27	EUR	39	0.37	119
Dominican Republic	29.33	87	UM	28	LCN	11	0.60	71
Sri Lanka	28.66	88	LM	14	CSA	4	0.58	78
Paraguay	28.66	89	UM	29	LCN	12	0.54	86
Lebanon	28.22	90	UM	30	NAWA	16	0.50	98
Botswana	28.16	91	UM	31	SSF	4	0.39	118
Tanzania, United Republic of	28.07	92	LI	1	SSF	5	0.72	31
Namibia	28.03	93	UM	32	SSF	6	0.41	116
Kyrgyzstan	27.56	94	LM	15	CSA	5	0.45	106
Egypt	27.16	95	LM	16	NAWA	17	0.66	45
Trinidad and Tobago	26.95	96	HI	47	LCN	13	0.43	114
Ecuador	26.80	97	UM	33	LCN	14	0.51	93
Cambodia	26.69	98	LM	17	SEAO	15	0.61	60
Rwanda	26.54	99	LI	2	SSF	7	0.31	125
Senegal	26.53	100	LI	3	SSF	8	0.60	70

Table 1 Global Innovation Index 2018 rankings

Country / Economy	Score (0 - 100)	Rank	Income	Rank	Region	Rank	Efficiency Ratio	Rank
Tajikistan	26.51	101	LM	18	CSA	6	0.60	67
Guatemala	25.51	102	LM	19	LCN	15	0.56	82
Uganda	25.32	103	LI	4	SSF	9	0.45	108
El Salvador	25.11	104	LM	20	LCN	16	0.43	112
Honduras	24.95	105	LM	21	LCN	17	0.47	101
Madagascar	24.75	106	LI	5	SSF	10	0.69	40
Ghana	24.52	107	LM	22	SSF	11	0.51	90
Nepal	24.17	108	LI	6	CSA	7	0.45	107
Pakistan	24.12	109	LM	23	CSA	8	0.66	46
Algeria	23.87	110	UM	34	NAWA	18	0.42	115
Cameroon	23.85	111	LM	24	SSF	12	0.58	75
Mali	23.32	112	LI	7	SSF	13	0.59	73
Zimbabwe	23.15	113	LI	8	SSF	14	0.60	69
Malawi	23.09	114	LI	9	SSF	15	0.52	89
Mozambique	23.06	115	LI	10	SSF	16	0.52	88
Bangladesh	23.06	116	LM	25	CSA	9	0.53	87
Bolivia, Plurinational State of	22.88	117	LM	26	LCN	18	0.43	113
Nigeria	22.37	118	LM	27	SSF	17	0.50	96
Guinea	20.71	119	LI	11	SSF	18	0.47	102
Zambia	20.66	120	LM	28	SSF	19	0.45	109
Benin	20.61	121	LI	12	SSF	20	0.35	123
Niger	20.57	122	LI	13	SSF	21	0.36	120
Côte d'Ivoire	19.96	123	LM	29	SSF	22	0.40	117
Burkina Faso	18.95	124	LI	14	SSF	23	0.28	126
Togo	18.91	125	LI	15	SSF	24	0.36	121
Yemen	15.04	126	LM	30	NAWA	19	0.36	122

According to Karahan and Karhan when the innovation activities' increasing of firms competitive power in micro -size rate and contributing the growth and development in national economy in macro-size rate, innovation and research and development activities in Turkey should be supported. By supporting the research and development activities, the firms should be encouraged to make innovations and so the innovation activities of firms will increase and will ensure innovation activities continuity and increase the power of competitiveness of firms (Karahan & Karhan, 2013).

Mechanisms such as paying money to the owner of the idea, supporting the scientific work and allocating resources have not yet been met in the current system. The level, awareness, efficiency and effectiveness of the existing support mechanisms do not seem to be enough for the needed improvement. Turkey must overcome significant progress to develop high-tech products. Organizing, increasing communication and playing the team seem to be our most important goals.

3. ENTREPRENEURSHIP AND ECONOMIC GROWTH

This section is composed of three subsections, which are economic growth, entrepreneurship and relationship between entrepreneurship and economic growth.

3.1 Economic Growth

Economic growth and prosperity of nations are accepted to be a critical topic in economic research that attracted economists interest for the aim of naming effective factors (Wennekers & Thurik, 1999). It is usually related to increase in potential output, usually as a result of growing demand or products/services level (Almfraji & Almsafir, 2014). It is assumed that economic growth is relying on productivity, efficiency and savings rate. Productivity increase is achieved by producing more output with same level of inputs, whereas high savings rate leads to capital accumulation and hence better life quality (Almfraji & Almsafir, 2014). It is frequently measured by real gross domestic product (GDP), which is the total monetary value of the goods and services produced within the specific boundaries of a country in a given period of time (Callen, 2008). For long, GDP is accepted as a reference point to indicate the well-being of a country (Callen, 2008). Growth is frequently measured in real terms, to erode the effect of inflation over the prices (Almfraji & Almsafir, 2014). As Gross Domestic Product is going up, whereby stable inflation and unemployment rate is achieved, usually the economic health of nation is accepted to be better off percentage increase is related to economic growth. In sum, an accelerating trend in real GDP is a strong indication that economy in general is promising, for its potential effects on growing employment and improving life conditions of people (Callen, 2008).

3.2 Entrepreneurship

Though, the "entrepreneurship" concept played a significant role in the literature and still considered as an attractive research topic, there is not a consensus about its definition (Iversen et al, 2008). Bull and Willard (1993) state that there exist no deliberate entrepreneurship theories or models, or even the existing few ones are highly insufficient to define this complex term. Hebert and Link (1989) define entrepreneurs as individuals that are unique in terms of their responsible and judgmental approach in critical business-related decisions. As a constructive element, in the factors of production, entrepreneurs have the special ability to influence and integrate other factors as of natural resources, capital and human capital. The background of "entrepreneur" term is traced up to 1755 when Richard Cantillon first used it to define a person's judgmental role in uncertainty times (Hebert & Link, 1989). Cantillon explained the necessity of entrepreneurs' intuitions an risk taking trait, due to lack of clear far-sightedness (Wenneker & Thurik, 1999). Also in the literature, there is a sharp distinction between capital owners and entrepreneurs, as entrepreneurs' ability to organize the resources in an efficient manner (Lumpkin & Dess, 1996; Hebert & Link, 1989). This perspective underlines the characteristics and behaviors of entrepreneurs.

On the other hand, as demand-side approach, emphasizes the entrepreneurs' work and output rather than the specific traits of the entrepreneurs. In other words, it is important what entrepreneurs do rather than who they are (Rocha & Birkinshaw, 2007).

Also, complementary to entrepreneurial studies, social entrepreneurship is a niche topic in the field. Braunerhjelm and Hamilton (2012) claimed that social entrepreneurship did not attract much interest up to 1990s, both from the society and academia. Social entrepreneurs are individuals or institutions that utilize their entrepreneurial skills and resources to create non-profit organizations for the welfare of the society (Brajevic, Babic & Jukic, 2015; Noya, 2009).

3.3 Relationship between Entrepreneurship and Economic Growth

Numberless economy theories attempted to dissolve the success factors of economic growth and prosperity by relying on variables of a great variety. But it seems that there is no single theory, model or factor to explain the efficient and effective working economies (Martin et al., 2010). However, among many underlying variables and concepts, entrepreneurship emerges significantly by its significant positive effect on economic growth. Besides business world practitioners', researchers seem to have a consensus about its positive effect on economic growth (Wong et al., 2005; Rocha, 2004; Caree & Thurik, 2003; Acs & Armington, 2003). Some tie that close relationship to entrepreneurship's contribution to a more sustainable national development than industrial employment opportunities (Casson, 2003), some suggest how entrepreneurial spirit may evoke innovation, stimulate change, create and improve the conditions for constructive competition (Wong et al., 2005). Özkul and Dulupçu (2007) clarify how entrepreneurial activities rush economic growth, as improving efficiency and enabling advent and development of new sectors.

Entrepreneurships' role in economic and social growth is a growing are of interest both for academic and business world (Ferreira et al., 2017). Martin et al., (2010) also, underlined economic and social benefits of entrepreneurs by acting as engines of economic growth while at the same time contributing to social harmony in the public. Yet, in the study entrepreneurship's ability to increase social harmony is explained by growing employment opportunity through increase the number of outputs (either in products or services) and dissemination of these values to the society (Martin et al., 2010). Wenneker and Thurik (1999) identify two distinct economic roles of entrepreneurs as contributing to the macro economy by starting up new businesses and adopting a more innovative approach in the industry.

Yet, contribution of that innovative approach, as of technological innovation, has its roots in economy theories (Solow, 1956; Romer, 1986) and in economical empirical studies (Mansfield, 1972; Nadiri, 1993) (Wong et al, 2005). Similarly, in their study Acs et al., (2018) investigated the validity of a resource distribution arrangement to utilize organizations, human capital, resources and entrepreneurs by collecting data from 46 countries for 9 years (2002-2011) and eventually, found empirical evidence in the role of entrepreneurs in the economic growth. On the other hand, due to bankruptcy or other fail risks involved, entrepreneurship may also create negative impact on growth (Ferreira et al., 2017).

4. GEOPOLITICAL RISK AND INNOVATIVE ACTIVITIES

Geopolitical risk and innovative activities might seem two apart concepts; however, they are output of changing paradigms in rapid macro and micro environmental conditions. In that perspective, how these two terms relate each other can be traced under umbrella of a popular term: quest for sustainable competitive advantage in the global arena. As Damanpour and Gopalakrishnan (1998) suggest, companies have to be inventive and open to change, to avoid costs of macro threats. There exist similar studies, emphasizing how companies succeed or even survive in the competitive market conditions, by investing in innovation, being responsive or even proactive in technological advancements, acquire or maintain power by patenting new technologies, extend market power by relying on new generation of technology (Parry, 1997; Gilbert and Newberry,1982; Arrow, 1962). Intellectual assets as of social capital, R&D facilities and capabilities, or more accurately outputs of intellectual assets such as patents, brand or company value are becoming key factors in value creation (OECD, 2007).

In this information age, competitive advantage stems not just from the information gathering or processing steps, but effective usage of information from mountains of data and creating superior value by using this information. For this aim, innovation is accepted as a crucial factor for national growth as of sustainable employment, social prosperity and better life quality value (Akçalı & Şişmanoğlu, 2015). Karaata (2012) regarded innovation as a value adder to social and economic welfare of the society, by improving productivity and employment opportunities. However, measuring innovation performance or indicating innovative capabilities are problematic issues to be clearly quantified. Though significant improvements or new methods are gained for this quest, there stands a long way. In that sense, the most detailed and realistic metric for innovation is proposed as "Oslo Manual", which is a joint study of OECD and European Commission. Shortly Oslo Manual brings clear cut standards for defining and assessing innovation. Just like many countries, Turkey follow the guidelines and principles of this manual. (Karaata, 2012).

Contributing to ongoing debate about how to measure innovative activities in the most valid way, among many indicators patent weigh far more the most well-known and widely used one. According to Chinese patent facts it is examined whether numbers of patents serve as a successful indicator for innovative activities (Dang & Motohashi, 2015). It is found that patent number significantly correlate with research and development input and financial output (Dang & Motohashi, 2015). So it can be concluded that patents are valid metrics for innovation. Bronzini and Piselli (2014) support that patents are valuable indicators, also proving the quality of innovation, whereby to name an invention as innovation it has to be approved by an impartial judge in terms of functionality and novelty.

In his article, Alvis (2018) identified innovation as a great disturber of overall geopolitical climate. He made a dramatic comparison of how anyone with a smartphone in this century is far more powerful than Dutch East India Company, which became monopoly of telecommunication for 21 years in Asia in the 17th century. Not only individuals, but politicians, industrialists, and academics acknowledged how the next wave of revolution in innovation technologies, change the world entirely. Countries, and moreover companies are now competing for catching the new innovation to lead the global market. For example, China is again given an example about being a science powerhouse and spending 20% of global research as single country.

Overall national strategies can also be influential on the developed or adopted technology. Bey (2016) indicated how geopolitical boundaries and domestic strategies determine the technologies used by the country. In the same article, he exampled Russia as how geological characteristics as having large territory and more boundaries to preserve, being paranoiac about invasion. For the risk of invasion, the country devoted most of its research and development capabilities to military. On the other hand, Japan, has shifted its research and development resources from military to commercial applications, whereby they are attributed as global leader in consumer technologies.

Corporations, entrepreneurs and even governments, regard geopolitical risk, as a crucial determinant of investment decisions (Caldara & Iacoviello, 2018). Geopolitical volatility and risk associated with it, is said to become the key driver of today's global arena. All these market players somehow suffered from rising geopolitical risk levels and volatility and moreover acknowledged they have to respond proactively. Similarly, Sinha and Terdiman (2002) placed geopolitical risk as a risk category in terms of as how terrorism, war or other military conflicts may disrupt international economic relations, especially in terms of foreign direct investment (FDI) in terms of offshore outsourcing (Beulen et al., 2005). In that sense, FDI is proposed as a significant factor in nation's growth. In their empirical study Almfraji and Almsafira (2014), researchers studied effect of FDI on economic growth in years of 1994-2012. Findings indicated that most of the numbers validate the significant positive effect of Foreign direct investments on economic growth, at the same time identified influential factors such as human capital, strength of the markets, domestic investments and open trade policies (Almfraji & Almsafira, 2014). Similarly, Li and Liu (2005) supported the significant positive relationship between FDI and economic growth on 84 countries as of 1970-1999. In addition to that, this study delineated the positive interaction effect of FDI with human capital, whereby negative interaction effect of technology gap and FDI (Li and Liu, 2005).

According to Tallman (1988), overall political and economic climate of the home country are significant factors for choice of FDI decisions. Yet, he studied Western advanced countries and United States from 1974 to 1980. Similarly, it was found that there is an adverse relationship between political risk and FDI (Zhoa, 2003; Albuquerque, 2000). According to Zhoa's (2003) study, that analyzed 21 countries FDI to China, the most crucial factor was the degree of political risk. It was also suggested that less risky countries made fewer investment to China, whereas risky countries are more likely to make higher investment to China to decrease the unlikely effects of political uncertainty in home countries. Specifically, FDIs are important both for developed and developing countries by positive effects as capital reserve, technology and know-how transfer, accelerating innovation capabilities for host countries (Erdal & Göçer, 2015; Temiz & Aytaç, 2014).

More specifically, Busse and Hefeker (2007) studied 83 developing countries for almost 20 years (1984-2003) via political risk, institutions and FDI. Findings illuminated how political risk is related to FDI as of, corruption, political tensions, transparency of government, bureaucracy, legislative stability significantly affect the choice of countries for foreign investments (Busse and Hefeker, 2007).

Jadhav (2012) focused on BRICS (Brazil, Russia, India, China & South Africa) by examining the effect of economic, political and institutional elements on FDI through panel data (2000-2009). It was concluded that, economic parameters weigh far more than political or institutional elements. In that sense, real GDP as a gauge of market size is stated to be the most influential one, whereby abundance of natural resources, accountability, trade regime and rule of law also significantly affecting amount of FDI (Jadhav, 2012).

Another distinct view is iniated by Özkul and Orün (2016), which regards the moderating effect of social welfare on economic growth. Though, recognizing innovative and entrepreneurial approach as critical to growth, the inclusive power of globalization and information technological advancements are identified as macro trends (Ozkul & Orün, 2016). In the related empirical research, examining the effects of innovation and entrepreneurship on growth, researchers studied on Global Entrepreneurship Monitor (GEM) data as of 2002-2013 on 9 OECD countries. The research validated the significant constructive influence of innovation on economic growth (Ozkul & Orün, 2016). Similarly, Galindo and Mendez (2014) studied the interaction among entrepreneurship, innovation and economic growth in thirteen developed countries. Findings supported entrepreneurship and innovative effects' significant effect on economic well-being (Galindo & Mendez, 2014). Also in addition to these, researchers illuminated the significant feedback effect of work, whereby commercial actions encourage entrepreneurship and innovation, later on, these concepts boost economic activities (Galindo & Mendez, 2014).

According to Gallup 2017 survey, more than 75% of the respondents voiced their concern for economic effect of military and diplomatic clashes, placing geopolitical risk in front of political instability and economic uncertainty (Caldara & Iacoviello, 2018). According to another research, which is performed, predominantly on Forbes Global 500 and Forbes Global 2,000 companies (the remaining are the SMEs) the industry admitted the snowballing relation between technology and geopolitical risk. In that perspective, it should be noted that not only companies, but also governments realized the power of innovation and hence, value outcomes of R&D efforts as a capability in that rapid environment. However, as a specific term "corruption" also triggered attention of researchers on FDI decisions of corporations. Wei (2000) and Gastanaga et al., (1998) acknowledged the negative effect of corruption on firms' FDI decisions. In that perspective, it can be inferred that companies that have confidence in countries' devotion for democracy, would be more interested in FDI. Also, Lau et al., (2015) modelled corruption index as one independent variable to understand innovative activity in their international analysis of Europe and Central Asia. The underlying reasons are probably stemming from either firms' zero tolerance for political and economic instability or either their concern on protection of their investments (in terms of physical and intellectual property).

Multinational companies are accepted to favor host countries whereby patent law protection is higher, to avoid valuable know-how or any private information leakage to the market (Alexiou et al., 2016; Fisman et al., 2004; Zhao, 2006) Supporting that perspective, Allred and Park (2007) contributed to robustness of nations' attitude towards patent protection on intensity of innovative activity. Innovative activity is theorized as companies' R&D expenditures, domestic patents and foreign patents. The results differ according to development level of countries. For emerging countries, robust patent legislations have adverse impact on domestic patents, whereas don't have any significant effect on domestic R&D and foreign patents. For mature markets, patent strength has significant direct impact on R&D and domestic patents, and adverse impact on foreign patents (Allred & Park, 2007).

Governmental attitude towards patent protection is out of question, determine the R&D investment level of the market for granting new inventions. R&D investments draw much attention, since they require high initial fixed costs and may lead to indefinite results. In that perspective how the various existing financial markets support innovative and R&D investments is an interesting topic. Triggered by that motivation, Maskus et al., (2018) examined the effect of market growth and patent security on R&D activities in 20 OECD countries between 1990 and 2009. Results also validated that tougher patent protection increase R&D activities, especially in countries that have a market structure as of limited equity and credits (Maskus et al., 2018). In the same study, also it is suggested that countries attracting more FDI seem to leverage R&D expenses no matter in which structure the financial markets are based on (Maskus et al., 2018). Similarly, Alexiou et al., (2016) investigated the patent legislations on economic growth through mediating effect of FDIs. The results confirmed previous findings as, patent protection is significantly related to economic growth no matter how developed the economies are (Alexiou et al., 2016). Specifically, inward foreign direct investments are claimed to have a considerable effect on growth for all of the countries (Alexiou et al., 2016).

In his empirical study, Gocer (2013) traced the potential effects of R&D expenses on economic growth, high-tech exports and information-communication exports by examining 11 developing Asian countries between 1996 and 2012. Yet it is found that, 1% increase in R&D expenses increased high technology export by 6.5 %, information communication exports by 0,6 % and total economic growth by 0,43 %. Similarly, Inekwe (2014) attempted to prove R&D expenses on growth in 66 developing countries between 2000 and 2009, and findings supported the significant positive effect of R&D expenses on growth. Most of the studies on innovation and economic growth supported the view that R&D expenses enabled growth in terms of healthy competition and sustainable development opportunities (Akçalı & Şişmanoğlu, 2015).

Another study, considering the interaction of R&D investments, innovation rate and production output growth in manufacturing industry, was performed in 17 OECD countries (Ulku, 2007). It was concluded that R&D involvement raises the innovation rate in three industry types (chemicals, electrical &electronics, drugs medicine), whereas innovation level positively affect growth of all studied industry types (Ulku, 2007). In his study, Adak (2015) performed the major question in Turkish economy as, the potential effect of technological improvements and innovative activities in economic growth. He also confirmed the positive significant effect of new technology investments ending up with increased efficiency and hence, progressive economic growth (Adak, 2015). Ozcan et al., (2014) shared the conclusions for 15 OECD countries, as R&D expenses influence economic growth in the progressive manner.

Bronzini and Piselli (2016) studied the effect of R&D funding on innovation by companies that received R&D aid and that are located in Italy. They validated the support program's success on patent potential just for small companies (Bronzini & Piselli, 2016). In that sense, the importance and flexibility advantage of SMEs should not be neglected for their incremental innovative potential.

Friedman (2010) put out paradigm changed end up unanticipated consequences, just like experienced in Industrial Revolution. Usage of steam engines in industry changed the world dynamics, as it resulted in oil dependence on Middle East countries. Just like that example, nowadays R&D capabilities and technological dependence on some countries, cause geopolitical power shifts from developed countries to developing or emerging markets. In that perspective, innovational capacity and geopolitical risk/power are closely related but need further investigation.

5. DATA AND METHODOLOGY

The following two graphs shows the number of patent applications between 1995 - 2015 for the selected eighteen countries, which are Turkey, Mexico, Korea, Russia, India, Brazil, South Africa, Argentina, Colombia, Venezuela, Thailand, Ukraine, China, Indonesia, Saudi Arabia, Israel, Malaysia, Philippines (See Table 2).

Table 2 Countries Included in the Analysis (1995–2015)

TURKEY	SOUTH_AFRICA	CHINA
MEXICO	ARGENTINA	INDONESIA
KOREA	COLOMBIA	SAUDI_ARABIA
RUSSIA	VENEZUELA	ISRAEL
INDIA	THAILAND	MALAYSIA
BRAZIL	UKRAINE	PHILIPPINES

One important limitation of the study is linking higher rates of innovation and economic growth solely on patents and excluding the effect of other various external factors. Though not all novelty and technical innovations are in patentable version, and there exist a debate on the appropriateness of using patents as a metric for innovation, patents are chosen for two reasons. First of all, in the literature many studies agreed upon the validity and practicality of using patent fillings as an innovation indicator (Maskus et al., 2018; Dang & Motohashi, 2015; Bronzini and Piselli, 2014). Secondly because patents are intensely correlated with increased innovation, knowledge sharing and economic growth, patent applications was considered as a good indicator in this research.

Figure 3 presents top five countries for the patent applications for the mentioned timeframe. The highest ratio is achieved by China (51%), followed by Korea (24%), Russia (6 %), India (4%) and Brazil (4%) respectively. That figure represents the productivity of BRIC (Brazil, Russia, India and China) countries in patent fillings.

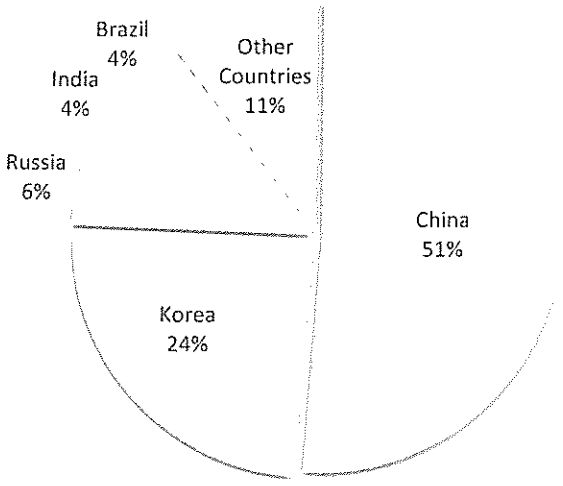

Figure 3 Top Five Countries with the Highest Number of Patent Applications

Patent application over the years of 1995 to 2015 can be seen via Figure 4. Number of patent applications is following an accelerating trend over the years and by 2015 exceeded 1,500,000.

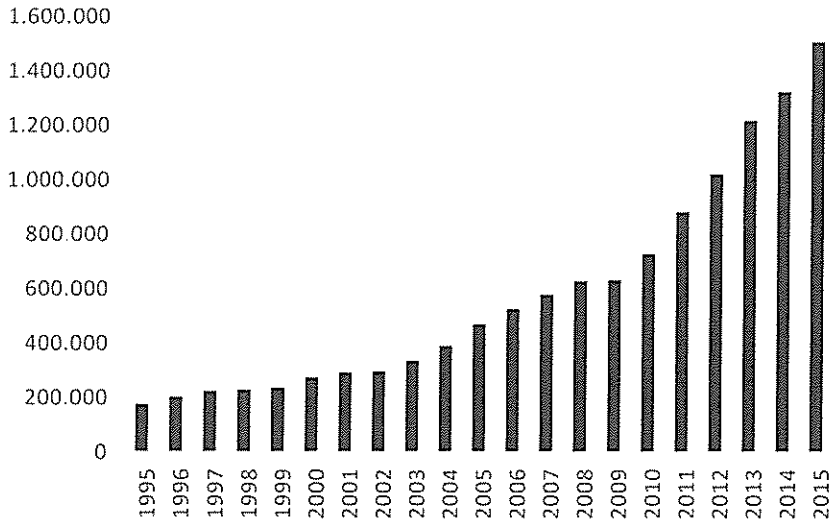

Figure 4 Distribution of Patent Application Number by Years

As measure of innovation, instead of total patent applications, the data of patent applications for residents and non-residents per capita had been used. By this preference, it is aimed to eliminate population effect of the total patent applications (See Figure 5). As for Total Per Capita Patent Number, Korea is acting as a leader, whereby it is posterior to Israel, Russia and Malaysia.

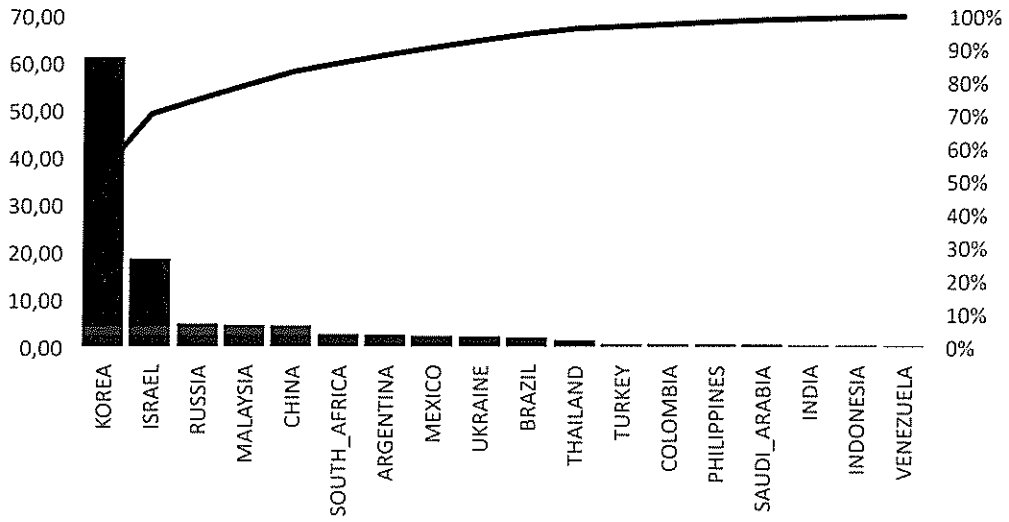

Figure 5 Total Per Capita Patent Number by Country

Total patent for Turkey has an interesting trend line (See Figure 6). Unlike the accelerating trend in total number of worldwide patents (Figure 4), Turkey had dealt with ups and downs in that period 1995-2015. Yet the lowest number of patents were recorded as in 2003. However, after 2003, the growth line always headed up, except 2013.

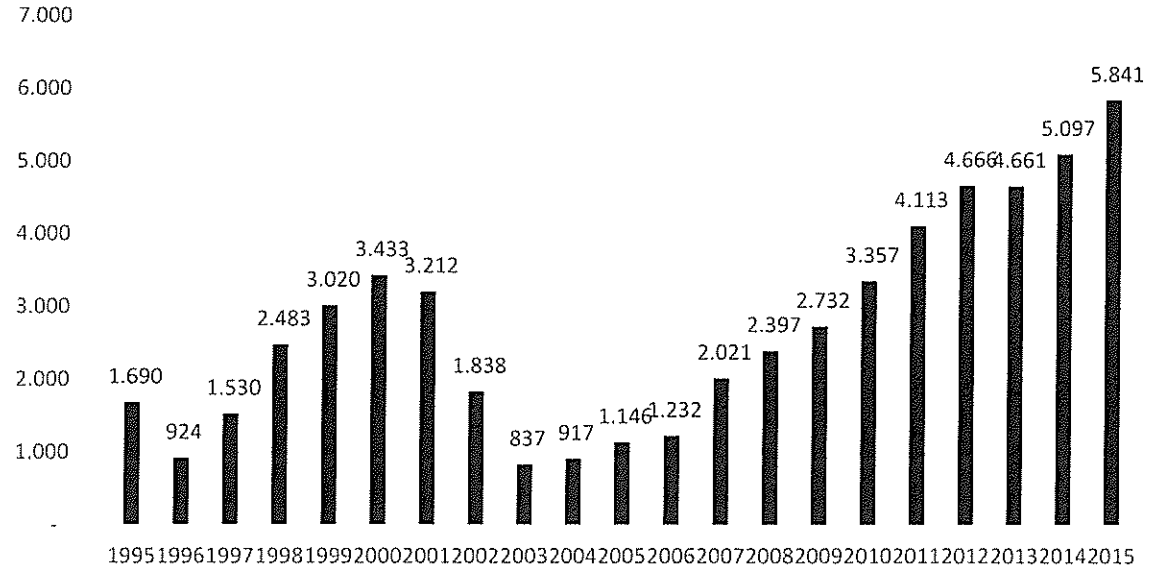

Figure 6 Total Patent for Turkey

Total Per Capita Patent for Turkey follows the same trend as discussed in Total Patent for Turkey (See Figure 7). Especially with 2013 three consecutive progressive rates were achieved.

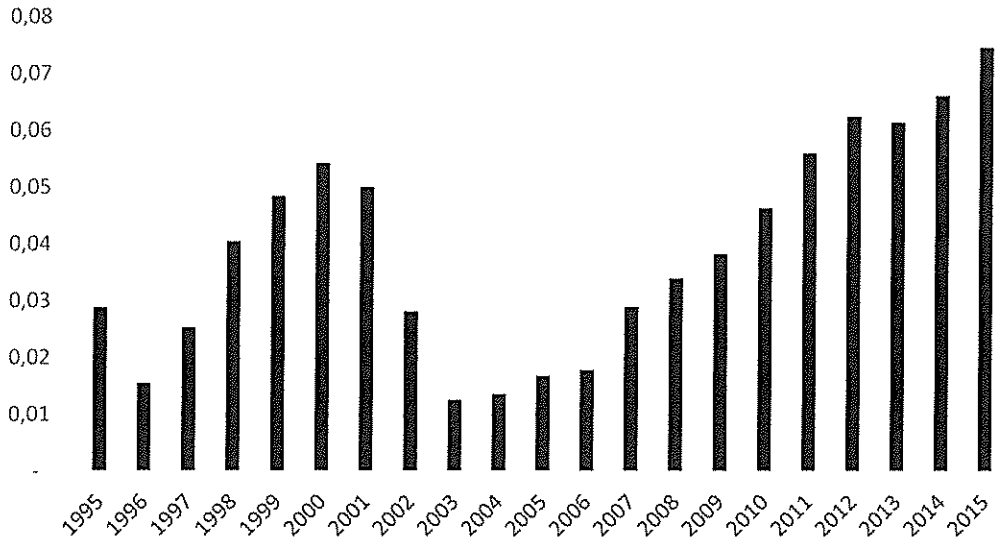

Figure 7 Total Per Capita Patent for Turkey

There is a limitation of the dataset as GPR data is available for only eighteen countries. Therefore, we couldn't run a dynamic analysis as the number of countries is less than the year. We run an OLS model as follows. The choice of variables are done based on the literature (Lau et al., 2015):

$$NRPatent_{i,t} = \beta_0 + \beta_1 GPR_{i,t} + \beta_2 TRADE_{i,t} + \beta_3 GDPPC_{i,t} + \beta_4 POP_{i,t} + \beta_5 R\&D\ Exp_{i,t} + \varepsilon_{i,t}$$

$$RPatent_{i,t} = \beta_0 + \beta_1 GPR_{i,t} + \beta_2 TRADE_{i,t} + \beta_3 GDPPC_{i,t} + \beta_4 POP_{i,t} + \beta_5 R\&D\ Exp_{i,t} + \varepsilon_{i,t}$$

where $Patent_{i,t}$ is the number of patent application to quantify the innovation level for country i at time t; the larger the number of patent application, the higher the innovation level; GPR is the Geopolitical Risk measured by Caldara and Iacoviello; R&D Exp is Research and Development Expenditure (% of GDP); Trade is Trade (% of GDP); NRPatent is the Nonresidents Patent Applications; Rpatent is the Residents Patent Applications; GDPPC is the GDP per capita; POP is the Population. GPR data is obtained from Geopolitical Risk Index developed by Dario Caldara and Matteo Iacoviello at the Federal Reserve Board and other variables are downloaded from World Bank.

Table 3 presents the summary of the variables.

Table 3: Summary of Variables

Variable	Mean	Std. Dev.	Min	Max
NRPATENT	8.561281	1.308229	4.905275	11.8027
RPATENT	7.315864	2.140989	3.295837	13.78325
GPR	4.558533	.2360393	3.583519	5.56452
R&D Exp	1.084187	1.086583	.04233	4.40546
Trade	67.14584	38.70969	15.63559	220.4073
GDPPC	8.766469	.8825279	6.433428	10.40406
POP	18.1501	1.267993	15.52841	21.03897

Table 4 presents the correlation matrix.

Table 4: Correlation Matrix

	NRPATENT	RPATENT	GPR	R&D Exp	Trade	GDPPC	POP
NRPATENT	1.0000						
RPATENT	0.6939	1.0000					
GPR	-0.0532	0.0841	1.0000				
R&D Exp	0.3341	0.4978	-0.0019	1.0000			
Trade	-0.0945	-0.0854	0.0401	0.0649	1.0000		
GDPPC	-0.0452	0.0374	0.0065	0.5553	0.0473	1.0000	
POP	0.5040	0.4550	0.0443	-0.3249	-0.3603	-0.6719	1.0000

Correlation matrix displays the correlation coefficients among numerous variables in the research study and shows the relationships among variables. We used correlation matrix for our analysis to summarize the data where the goal is to see patterns; to input in regression analysis and as a diagnostic when checking regression analysis performed in table 5.

6. FINDINGS

According to regression estimations performed in table 5; GPR has a negative effect on the patent application of non-residents. However the interesting finding is that for the case of residents GPR has no effect. Since the residents have been living with the effects of GPR for a long time, they are not affected by the circumstances of GPR in application of R&D activities compared to non-residents.

Lau et al.'s research investigated the effects of FDI, corruption and educational expenditure on innovation. They used World Bank's archival dataset that contains 57 countries and found that FDI, educational expenditure, and corporate bribery are positively related to innovations.

As a result of our examination, we find that as the R&D expenditures increase in the country, patent applications increase and also trade has a positive effect on innovation activities. Trade points to the development of relations with the outside world in terms of both imports and exports. And this relation brings the know-how transfer. GDP per capita has a positive effect. As the country becomes more prosperous, it will increase the investment in R&D and innovation activities.

Table 5: Regression Estimations

	NRPATENT	RPATENT	NRPATENT	RPATENT
GPR	-0.688***	0.341		
	(0.26)	(0.32)		
R&D Exp	0.557***	1.197***	0.556***	1.197***
	(0.05)	(0.09)	(0.05)	(0.09)
Trade	0.008***	0.011***	0.008***	0.011***
	(0.00)	(0.00)	(0.00)	(0.00)
GDPPC	0.541***	0.760***	0.538***	0.763***
	(0.09)	(0.15)	(0.09)	(0.15)
POP	0.992***	1.490***	0.991***	1.492***
	(0.03)	(0.08)	(0.03)	(0.08)
GPR_{t-1}			-0.633**	0.241
			(0.27)	(0.34)
Constant	-12.116***	-29.703***	-12.305***	-29.321***
	(1.79)	(2.78)	(1.79)	(2.83)
R2	0.60	0.73	0.60	0.73

7. CONCLUSION

In this study, the effect of geopolitical risk on innovative activities was analyzed. Because patents are intensely correlated with increased innovation, knowledge sharing and economic growth, patent applications was considered as a good indicator in this research. We extended the existing literature by incorporating the geopolitical risk index in the estimation procedure.

In this study, we examined the impact of Geopolitical Risks (GPR) on innovative activities in eighteen countries for 1995-2015. We observed that as the R&D expenditures increase in the country, patent applications increase and also trade has a positive effect on innovation activities. Additionally, GPR has a negative effect on the patent application of non-residents. However the interesting finding is that for the case of residents GPR has no effect.

As a result of our study, we observed that the R & D expenditures and the patent applications in the country are directly proportional and we also found that international trade has a positive effect on innovation activities by increasing the interaction. Trade is observed as an increasing point of interaction due to the convergence of relations with the outside world. And this relation brings the know-how transfer. GDP per capita has a positive effect. As the country becomes more prosperous, it will increase the investment in R&D and innovation activities.

As a conclusion government policies tends to play a significant role on countries' innovation and technological development, governments should create strong incentives for innovative activities through governmental policies such as; legal protection of intellectual property and product standards. Additionally, emerging-market governments should enhance labor productivity, make economic growth stable and reduce poverty to create a sustainable economic environment for the non-resident firms and entrepreneurs.

Consequently, governments should be proactive by integrating entrepreneurship and innovation-based approach to existing policies for the ultimate aim of boosting economic growth. Those countries' which give value to entrepreneurial and innovative spirit, give support to Research and Development actions, aid entrepreneurs in the necessary areas, expand high-end efficient manufacturing facilities. In that perspective, national income is increasing, equal income distribution is achieved and eventually societal welfare is better off.

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