A Study on Sustainable Innovation Profile of Turkey

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Abstract

Innovation is the only way of solution to achieve sustainable growth, social welfare and employment in a country. This study principally focuses on the relationship between growth and innovation in the light of information derived from a general literature review about definition, sources and risks of innovation, and measurement of innovation performance. Then, the contributions of innovative capability on economic growth and employment as well as innovation systems on a country basis have been discussed, and accordingly, actions to be taken, including a shift in paradigm, for a growth-innovation-national innovation system and its sustainability have been addressed. In addition, current innovation performance indicators of Turkey have been discussed in the light of a scope which is outlined in the initial sections of the study, and the change in such performance indicators between 1998 and 2009 has been examined. After analysis of the above mentioned criteria and comparisons against practices in developed countries and communities, suggestions have been made about the activities to be carried out in order to make Turkey’s current innovation system “sustainable”, to support and improve innovation. In the study, a research application has been conducted using the content analysis method on the “President’s Message” letters of 158 state and foundation universities that are located in Turkey and that have a website, and the importance accorded to innovation by the universities has been determined.

Key Words: Innovation, Innovation Performance, National Innovation System, Growth and Innovation Relationship

JEL classification: O31, O32, O33, O35
Introduction

One of the most-frequently discussed and the most-frequently uttered concepts of the recent years, “innovation” stands out as the only key to maintain and sustain growth, i.e. to survive, both on a country basis and on a company basis.

When viewed in a social context, innovation has greater importance for developing countries including Turkey in particular. It is directly-related to social welfare and employment, i.e., economic power. For this reason, it has top priority in government policies. To improve the innovation capacity and power of a country, it is essential to create and effectively manage the physical and intellectual climate required to support innovation in that country in all aspects and with the participation of all stakeholders. At the same time, it is a prerequisite to monitor, update and sustain the established system. In that case, it is essential to possess and maintain “innovation capability” which is the most indispensable ability to survive either as a country, as a company, or as an individual in today’s world where competition is fierce, physical boundaries are removed, customer demands and expectations are diversified, differentiating one’s self or making and preserving a difference is hard.

In this study, not only structural requirements which have to be improved to gain and maintain innovation capability on a national basis in Turkey but also intellectual change requirements which include the educational system have been discussed.

A Critical Assessment of Innovation for Developing Countries

Concept of Innovation

The concept of innovation which is translated to Turkish as ‘yenilik’ is a word derived from ‘innovatus’ in Latin which means “starting to use new methods in a social, cultural and administrative environment”. Different definitions of innovation have been and are being made by several scientists. However, the concept of innovation was defined as "the driving force of development" for the first time by the economist Joseph Schumpeter.

In his book written in 1911 Schumpeter defined innovation as “the introduction of new goods which are not yet known by the customers or a new feature of an existing product; the introduction of a new method of production, the opening of a new market; the conquest of new sources of supply for raw materials or other inputs; or the carrying out of a new organisation of any industry” (Schumpeter, 1934).

Fisher defines innovation as “any one of or all the acts of producing new ways of thinking, new ways of doing things, trying what is produced and using it in economic and social activities related to man (Fischer, 2001).

On the other hand, Dosi defines innovation as “searching for, discovering, testing, developing a new product, a management method, or an organisational setup, or adopting and commercializing it by simulating part of these stages.” (Dosi, 1988).

Today, the most widely accepted definition of innovation is the one that is used in the Oslo Manual co-published by OECD and European Commission in 2006. Accordingly, innovation is “the implementation of a new or significantly improved product, good or service, or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OSLO, 2006).

Innovation may occur in three basic areas, i.e. in the product, the process and the organization, and an idea, product, process, a system, or a tool may be perceived as new by a person, a group of people, a firm, a sector, or the entire society (Rogers, 2010).

Innovation is one of the most crucial factors of achieving growth, development and sustainable competitive power in both micro- and macro-economies. It is for this reason every country, every company and every organisation have to ask the questions “How can I be innovative? How can I support innovation? How can I establish an innovative structure?”
Particularly, innovative efforts in the areas of science and technology are the basic factors that determine a country's level of development. Thus, countries aim to develop by creating national innovation systems in the areas of scientific and technological innovation. Innovation systems are categorised into six different levels according to the size of the system. These categories include corporate, sectoral, regional, national, continental and global innovation systems (Özdemir, 2008). Corporate, sectoral and regional innovation systems are the basic constituents of the national innovation system in a country.

**National Innovation Systems and Entrepreneurial Innovation**

Nowadays countries that are dependent on information-based economies are increasingly interested in “National Innovation Systems” which are integral institutional structures that aim to enhance the ability to produce innovations as it has now become very important for countries to make innovations in order to achieve economic growth, to gain international competitive superiority and to produce high technologies (LeBel, 2008). In several studies which evaluate innovation performances of countries, it is observed that countries that exhibit brilliant performances have quite systematic, well-structured and good-working “National Innovation Systems”. Almost in all these countries, innovation systems are highly embraced and defended by the state.

For enterprises, innovation is an indispensable factor for distinguishing oneself from competitors, gaining and sustaining competitive power, and attaining profitable growth. The policy of being innovative which was only attributed to leading enterprises until recently is no longer a question of preference, but an obligation for almost all enterprises.

J. Schumpeter discussed economic innovation in two different styles including "Creative Innovation” and "Adaptive Response". Creative innovation approach brings together great changes and innovations for both the enterprise and the employees because it requires to go beyond existing practices, procedures and processes whereas adaptive response gives rise to an innovation in the real sense of the word because it requires to act within the boundaries of existing habits and practices (Chandler, Alfred, Miller, & Brankovic, 1990). For the enterprises, being a “creative innovator” guarantees sustaining competitive superiority.

Arie de Geus who identified the criteria for being a long-lasting enterprise sees being innovative as the most important one among these criteria. He sees creating an environment that favours continuous learning, flexible structuring and supporting employees as the foundation of innovations (Öztok, 2009). When viewed from this standpoint, developing the innovation capability of an enterprise is closely related with improving the capability of the employees to produce creative and innovative ideas. Similarly, it is important for the society to possess characteristics like creativity, ability to produce new ideas and being open to change so that the country improves its innovation performance.

The idea of innovation is based enlivening the enterprise through innovations and proactive competitive actions with regards to products, process, technology, etc., improving performance, meeting or exceeding customer expectations, offering something new and different to the customer, and increasing competitive power.

Small companies that lack competitive power find the technology that best suits their requirements and adapt it to their own organisations, and include it in their innovation processes. Companies that do not possess a technology development capability have to know the suppliers of the technologies they need, to create a network with such suppliers, and to know how to use such technologies effectively and adapt them to their needs.

The direction of the phenomenon of change that forces enterprises to be innovative is from outside of the enterprise (environment, customers, competitors) to the inside of the enterprise, and constantly increases its pressure every passing day. If an enterprise has an innovative structure, it reverses the direction of that pressure from inside to outside, and becomes not a follower but an author of the agenda, and achieves competitive superiority.

Peter Drucker divides the sources of innovation into seven. The first four of these are sources related to the industry in which one operates, whereas the others are sources related to the social environment, i.e. the society.

These resources are:

The Unexpected: An unexpected success, failure or outside event can be a symptom of a unique opportunity.

The Incongruity: A discrepancy between reality and what is expected can create an innovative opportunity.
Process Need: When a weak link is evident in a particular process, which is not corrected by the people around it, an opportunity is available to those willing to supply the “missing link”.

Changes in Industry and Market Structure: The opportunity for an innovative product, service or business approach occurs when the underlying foundation of the industry or market shifts.

Demographics: Changes in demographic structure such as the population’s size, age structure, composition, employment, level of education and income, etc. can create innovative opportunities.

Changes in Perception, Mood and Meaning: Innovative opportunities can develop when a society’s general assumptions, attitudes and beliefs change.

New Knowledge: Advances in scientific and non-scientific knowledge can create new products, new opportunities and new markets.

Eric Von Hippel divides sources of innovation into four categories as user-, manufacturer- , supplier- and competitor- based. Users, i.e. customers are active in needs assessment, research and development, and prototype production stages, and they are not often interested in the implementation – commercialisation of the innovation. Manufacturers focus on the implementation, commercialisation and diffusion of the innovation, i.e. they are interested in the economic aspect of the innovation.

However, in today’s sophisticated and dynamic business world, converting an innovative enterprise identity into a sound structure is, first, contingent upon identifying the structural and environmental conditions of innovation, the types, components and risks of innovation properly.

The continuity of an innovative enterprise identity depends first and foremost upon a competition strategy that is set up according to innovation requirements and also upon the introduction of an administrative approach that puts such strategy into practice. Subsequent to this process, it is essential to focus on continuous learning efforts and R&D investments.

It is undisputable that the most important and difference-making sources of an enterprise are the knowledge, skill and experience of its human source, i.e. its employees. It is the basic function of managers who adopt an innovative understanding to translate the synergy which is created by bringing out the intellectual and physical capabilities of the employees and by encouraging them to share those capabilities with other employees into a competitive advantage.

In order for innovation efforts to be successful either on a country basis or an enterprise basis, an innovation management system in which strategy, man and process dimensions are each considered as the legs of a trivet and are integrated to each other must be established.

Being innovative is meaningful when the innovation ensures the enterprise is a step ahead in the competition, otherwise, innovation is considered as waste. At this point, being innovative always brings together an element of risk. However, avoiding to take that risk will ultimately give rise to the risk of failure for the enterprise. According to Drucker, defending yesterday, that is, not innovating, is far more risky than making tomorrow. (Beaty, 1998)

Innovation can often be a journey to the unknown when we consider that innovation is an authentic product, a process or a method, not a point of reference or benchmark (Sebell, 2005). According to R. Matthew and W.Wacker, innovations inherently carry risks, but only things that deviate from what is considered as normal can be evaluated as innovations (Mathews & Watts, 2004).

Two classical views have been supported most throughout the historical process. According to the point of view of economists, "Necessity is the mother of invention", and without a demand, it is vain to start an innovation effort. According to the opinions of other scientist, what is important is “Innovation and Creativity”. Whether a demand arises in the market or not is not taken into account and evaluated in that process (Freeman & Soete, 1997)

For an enterprise, in contrast to what scientists and economists say, being innovative requires in the first place to invest in commercial and marketable innovations. This is because innovation includes both a process and a result. When the process is concerned, innovation means converting an idea into a new product, service or method, and when the result is concerned, innovation is related to whether the product, service or method resulting from such conversion is marketable or not.
As with many performance measurements, there are different views in the literature about how innovation performance should be measured (Kanji, 1996). The literature includes objective measurements which evaluate innovation performance with reference to number of patents obtained, number of reports published, and number of projects accepted as well as subjective measurements which compare new products or processes with competitors in terms of quality and functions (Hung, 2010).

On the other hand, criteria that measure product and process innovation such as the number of innovations, the rate of innovation, the level of innovation (technological image innovations), or being a first in the market, are used to measure innovation performance (Prajago & Sohal, 2006). Furthermore, Faems, Looy and Debackere have been the first authors who categorised innovation performance under two types as derivative innovation performance and radical innovation performance taking into account whether the innovation is incremental or radical. (Visser, 2010)

Alegre and Chiva who deal with innovation on a product basis and describe it as a process comprised of technical design, R&D, production, management and commercial activities related to marketing of a new product express “innovation performance” as a structure with two dimensions comprised of innovation effectiveness and innovation efficiency. While innovation effectiveness reflect the degree of success of an innovation, innovation efficiency indicates efforts spent to improve that degree of success. Thus, according to Alegre and Chiva, innovation performance is equal to the sum of the success in realising innovation and the efforts spent to achieve success.

The relationships between development, competitiveness and innovation which are important indicators of socio-economic development have been examined through both theoretical and practical studies; and it has widely been accepted that competitive structures in economy and government policies that encourage innovation have often a positive effect on development. Although conditioning the growth performances of a country upon a single factor provides convenience in theory, it proves insufficient in practice. The basic drivers of a high growth and development performance are technology and innovation. In 1990s when the relationships between science, technology and economic performance reached new dimensions, organisations were significantly influenced by the increased importance of networking, cooperation and flow of information at home and overseas. Innovation stands out in such a changing economic environment where it is guided by the market, is much faster and intense, is much closely related with the scientific process, and is spread much widely across the economy.

**Innovation as a competitive Power and Global Competitiveness Index**

Innovation is the key to development and gaining competitive power, increasing quality of living, raising productivity and employment, achieving a sustainable economic growth and ultimately, social welfare.

According to OECD, improving welfare and employment is conditional upon “the capability to make and adapt innovation”. In an economy where innovation activities are carried out at a sufficient level, new companies are founded, existing companies persist and gain increased competitive power.

For developing countries, another factor which is considered necessary to enhance the welfare of the society in the future is the increase of competitive power. In this context, it is obvious that increasing international competitive power can be possible via a sound economic structure and a rapid development when developing countries like Turkey are concerned.

Determining a country’s international competition level in a comprehensible and detailed manner will have a guiding role in comparing a state with others during the decision-making and policy-making processes of the policy-makers and senior administrators of the governmental organisations, in monitoring the country’s performance in time and analysing how not only companies but also countries compete in the international market.

From this standpoint, the **Global Competitiveness Index** of a country consists of the following pillars (Sebell, 2005):

i. Institutional structure
ii. Infrastructure
iii. Macroeconomic stability
iv. Health and primary education
v. Higher education and training
vi. Goods market efficiency
vii. Labour market efficiency
viii. Financial market development
ix. Technological readiness
x. Market size
xi. Business sophistication
xii. Innovation
xiii. Interrelation of the pillars

For a developing country for Turkey, innovation performance is particularly an important criterion for improving international competitive power. At the same time, innovation profile and performance are issues which need to be supported and identified with national strategies and policies.

"National Innovation System" is defined as an integrity of structures that systematically defines the entities and tools that are required in order to gain competency in the fields of science and technology and the ability to convert science and technology into economic and social benefits.

Certain criteria are used to evaluate the performance of a country’s national innovation system and innovation efforts, and the innovation performance of the country is evaluated with reference to the changes or improvements in such criteria.

Some of the generally accepted criteria which are used to evaluate national innovation performance are: number of triadic patents, number of scientific papers, amount of R&D investments, R&D expenditures in the private sector and public sector, number of R&D personnel, number of researchers, the ratio of researchers to total employment, amount of innovative products introduced to the market.

**Innovation in Developing Countries and Turkey**

Innovation which has become important for several countries, notably developing countries, has been a focal point in government policies. In this connection, it may be said that the rates which governments dedicate to education and R&D from their budgets have significant effect on innovation performance and a country can achieve quality, efficiency and welfare if innovation is included in the strategy making process in detail.

It is true that Turkey has the ability to produce science and technology policies since 1960s and also an institutional framework. Almost all stakeholders seem to be involved in the science, technology and innovation policy development process since 1996 in particular. On the other hand, the lack of a common vision which is shared by all stakeholders gives rise to various problems in implementing the policies specified. It is evident that this lack creates obstacles before the formation of a good-working national innovation system. Weak cooperation, lack of communication and coordination between the actors in the innovation management system are also described as obstacles before the effective operation of the national innovation system.

On the other hand, the project *Vision 2023* completed at the end of 2004 aims to eliminate the problems aforementioned. This project involves new science and technology strategies for Turkey, *Vision 2023* represents our current innovation and strategy as a country (Mathews & Watts, 2004).

Accordingly, Turkey’s science, technology and innovation vision is defined as, “a Turkey capable of converting the knowledge and technologies it has produced and developed into innovative products, processes and services for the benefit of the country and the humankind”. Owing to the studies carried out in this framework, Turkey has been one of the countries that has recorded the fastest development in R&D and innovation indicators in the recent years. However, the results obtained are still far from being satisfactory.

The horizontal axes that will support these basic approaches are (Freeman & Soete, 1997):

i. Development of human resources for science, technology and innovation, and the mobilisation of human capital towards this strategy.

ii. Stimulating the transformation of research results into products and services, and thereby, creating added value to the economy.

iii. Supporting inter-sectoral and inter-disciplinary interactions for the diffusion of a multi-actor and multi-discipline R&D cooperation culture.
iv. **Invigoration of the role of SMEs within the National Innovation System, and integrating more SMEs into being R&D and innovation actors.**

v. **Boosting the contribution of existing and new infrastructures to strategic approach and national research area with a view to strengthening this area.**

vi. **Activating and supporting international strategic co-operations in science, technology and innovation in the interests of the country.**

With the national science, technology, and innovation system, Turkey has recorded a fast-paced increase recently in science-technology and innovation compared with the previous years.

Although it is hard to say that these efforts are sufficient, these activities which are carried out with a strategic approach and in an organized manner have positive reflections on the R&D and innovation performance indicators of our country. At the same time, Turkey is among the countries within EU and OECD that have recorded the fastest pace in the said indicators in the recent years. It is not, however, ranked in the top of the list.

When the improvements of innovation performance indicators between 1998 and 2009 are assessed, it is observed that the share dedicated to R&D during this period increased more than three folds. This increase is approximately four folds the average increase of OECD and EU-27. Similarly the ratio of R&D expenditures to GDP increased by 130% and stood at 0.85% in 2009. The increase of the same rate during the same period was 10.4% and 14.7% for OECD and EU-27, respectively.

The number of R&D personnel and researchers increased more than thrice the value in 2009. In addition, another striking point is the doubling of the rate of private sector R&D personnel and the reduced rate of personnel in universities. In the same period, the numbers of R&D personnel and researchers per 10,000 employees increased approximately by three folds.

Another indicator of innovation performance, the number of scientific publications increased rapidly and almost quadrupled. Though insufficient compared with the developed countries, the rate of increase seems to be positive. However, it should be noted that the quality of publications is equally as important as the number of scientific publications.

The number of domestic patent and utility model applications lodged with the Turkish Patent Institute in the eleven-year period also recorded a ten-fold increase in the time interval in question. In the same period, international patent applications entered a trend of increase in the scope of Patent Cooperation Treaty and triadic patents. (Freeman & Soete, 1997)

Another tool which is used in the European Union in evaluating innovation performances of the countries and which is published since 2001 is the “European Innovation Scoreboard” that assesses the innovation performances of EU countries as well as candidate countries.

According to this index which is published annually, countries are separated into four groups as leaders, followers, moderate innovators and modest innovators based on the scores they obtain.

The criteria that are considered in the assessment include R&D activities, patent studies, number of scientific publications, number of researchers, scientific surveys, technological change and advancement processes.

**According to 2010 innovation index summary, the countries have been placed as follows:**

**Innovation Leaders:** Denmark, Finland, Germany, Sweden, Switzerland, and the UK.

**Followers:** Austria, Southern Cyprus, Estonia, France, Iceland, Ireland, Luxembourg, Netherlands and Slovenia.

**Moderate Innovators:** Czech Republic, Greece, Hungary, Italy, Lithuania, Malta, Norway, Poland, Portugal, Slovakia, and Spain.

Turkey, Bulgaria, Croatia, Romania and Serbia are placed in the “modest innovators” group. Even though Turkey’s innovation index is far below the EU average, its **innovation growth rate** is much above the EU average.
This shows that we have a high potential to climb up to the top of the list if we develop well-planned macro- and micro-economy policies regarding science, technology and innovation in the years ahead and put these policies into action in an effective manner.

Based on the assessments regarding Turkey in the scope of studies analysing innovation trends in the European Union, Turkey’s deficiencies are university-industry cooperation, development of technology-based new companies, financing of innovation and information technologies. It is obvious that innovation performance can be developed further if strategies which are identified to improve the said areas are implemented successfully and a new point of view is developed in the society in the period ahead.

At this point, the duty and responsibility of the State are setting a new general vision, creating strategies and policies, establishing necessary infrastructures and developing processes. For an operating and effective system, existing and potential enterprises that are involved in the system as stakeholders have important roles. Of course enterprises should accord importance to R&D activities in their development plans and activities that are designed to help them be ahead of the competition, target innovations and inventions, mobilise their employees towards that target, create a culture whereby they can improve their creativity, encourage innovative ideas and document the studies carried out, and thus, they should include the efforts to obtain international patents in their basic activities.

Assuming that the innovative power of a country is the reflection of the innovative power of the enterprises operating in that country and one of the most important inputs of an enterprise is the creativity and innovative capability of its employees, it is obvious that universities, which are the final step of the educational process, represent another important dimension in improving the capabilities of the employees. Universities occupy an important place in the innovation process with two different missions: educating students through a creative and innovative educational system and carrying out R&D activities and developing technology. In this study, a research has been conducted to give a foresight of how much place the universities in Turkey allocate to innovation and innovation-related targets in their visions.

In this study, a content analysis method has been conducted on the “President’s Message” letters of 158 state and foundation universities that are located in Turkey and that have a website, and thereby it has been tried to identify the importance accorded to innovation and innovation-related concepts by the universities and the place innovation holds in their educational visions. To that end, the frequency of appearance of the following words in the “President’s message” sections has been determined.

From among the state and foundation universities located in Turkey, 158 universities were included in the sample. Schools of Advanced Vocational Studies were not included in the sample. 81 out of the 158 university websites analysed contained a President’s message. For this reason, the study was carried out on 77 websites, and the participation rate has been 48.7%.

It was analysed whether the following words were included or not in the president’s message letters of 77 universities, and in what frequency the following words appeared therein.

Innovation: The terms innovation and innovativeness have both been taken as “innovation”.

Creativity: The terms creativity and creative have both been taken as “creativity”.

Technology: The terms technology, technology production, high technology, science and technology have all been taken as “technology”.

Entrepreneurship: The terms venture and entrepreneurship have both been taken as “entrepreneurship”.

Competitiveness: The terms competition, competitiveness and competitive power have all been taken as “Competitiveness”.

Change: The terms change, adaptation to change have all been taken as “Change”.

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Results and Discussion

Innovation appears at least once in 17 university websites, representing a rate of 22%. The number of university websites in which this term appears more than once is 1, representing a rate of 1.3%.

Creativity appears at least once in 7 university websites, representing a rate of 9%.

Technology appears at least once in 31 university websites, representing a rate of 40%. This is the value with the highest rate.

Entrepreneurship appears at least once in 9 university websites, representing a rate of 11.7%.

Competitiveness appears at least once in 12 university websites, representing a rate of 15.6%.

Change appears at least once in 13 university websites, representing a rate of 16.8%.

There are no university websites in which all the terms appear at least once. However, the number of university websites in which the terms innovation and creativity both appear is 1, representing a rate of 1.3%.

When the analysis results are evaluated, it can be said that innovation is not much included in the educational visions of the universities yet, and a point of view that would improve the creativity of the students and increase their capabilities to produce innovative ideas is not widespread, or at least, does not appear in the statements of senior academic administrators.

Having an education system that backs creativity and innovation is one of the most crucial subjects in raising the innovation performance of a country, ensuring adoption of innovations and bringing up employees with advanced new idea producing skills. The most difficult thing is to invoke a transformation of mentality in addition to establishing and activating an innovation system.

Based on the conceptual analysis and data provided during this study, it is possible to argue that Turkey’s National Innovation Strategy and the activities related with it must be focused on the basic steps below:

i. Entrepreneurship, Efficiency and Innovation
ii. Science and Technology Transfer to Companies
iii. Improving Competitiveness
iv. Infrastructure and Platforms
v. International Cooperation
vi. Innovation Management and Coordination

The activities to be carried out in relation to supporting entrepreneurship, efficiency and innovation must include:

i. Ensuring that the results of scientific and technological research are used by the industry,
ii. Supporting innovation activities that will develop competitiveness on a regional scale,
iii. Supporting participation in national and international cooperation programs;
iv. Promoting the learning and adoption by the industry of best practices and technologies developed at home/overseas,
v. Enhancing the use of information technologies by companies,
vi. Emphasising the importance of science, technology, design and innovation for SMEs in particular, and developing supporting tools,
vii. Opening public sources in R&D to the private sector for use,
viii. Encouraging innovative ventures, and activating the risk capital model.

In terms of science and technology transfer to companies, the aim must be to use science and technology capacity in the country in the most efficient way. Activities that may be carried out for that purpose include:

i. Supporting general science and technology structure,
ii. Increasing the number, competencies and abilities of the scientists working in the fields of science and research,
iii. Establishing effective co-operations with local and international researchers and research institutions
iv. Attaching importance to knowledge transfer to support science and research
v. Analysing the current R&D and innovation performance of the private sector
vi. Supporting science and research studies, including in particular basic sciences and technology researches and R&D activities which are carried out in cooperation with the industry
vii. Ensuring that innovation is accorded priority in science and research sponsorships
viii. Diversifying academic and industrial sponsorship programs to support innovation
ix. Encouraging the strengthening of relations of science and research institutions with companies in regards to innovations, and the publication of the results of the activities
x. Strengthening the relationship between academic researchers and the industry
xi. Promoting recruitment of internationally recognised and skilful researchers by research centres
xii. Establishing educational programs to adapt current work force skills to the work sites of the future, and incorporating additional courses into university educational programs that will help improve creativity
xiii. Developing appropriate sponsorship programs to commercialise the results of the researches conducted.
xiv. It is important to support the formation of sustainable, strong and competitive markets for improving competitiveness. Activities that may be carried out for that purpose must include:
xv. Securing the support of the public and society for science, research and innovation, and raising awareness in that sense
xvi. Managing, protecting intellectual property rights to promote innovation and competition
xvii. Building an infrastructure that will promote access and use of information technologies by corporations and individuals, and develop electronic commerce
xviii. Ensuring that knowledge of patent legislation and procedures is spread
xix. Taking measures to simplify patent application procedures and reduce costs thereof
xx. Developing national regulatory and standard systems to support industrial innovation and to meet the needs
xxi. Removing the technical obstacles before commercial activities, supporting the development of technical standards regarding products, services and quality management
xxii. Monitoring the effects of current supports on individuals, corporations and the economy in general, and conducting continuous improvements.

To establish appropriate infrastructures and platforms, the basic strategy to focus on should be to prepare the necessary climates that will create the required synergy.

i. Developing technoparks and making them accessible
ii. Increasing and spreading innovation incubators
iii. Developing and spreading innovation management systems
iv. Providing consultancy services that are designed to guide enterprises for an effective innovation management system
v. Changing the current working capital system in the universities to promote University-Industry cooperation, and making legal and financial arrangements that will permit the carrying out of contracted researches
vi. Forming an academic promotion system that would, at the same time, encourage to focus on innovation and development in the universities
vii. Developing a “National Information System” that ensures production, derivation, storage and use of “knowledge” which is the most important input in innovation studies by the academic, public and industrial sectors
viii. Spreading technology platforms, and similar applications that would be useful at this stage.

To improve international cooperation, activities that can be realised include:

i. Setting up and participating in inter-country working groups
ii. Developing common projects and “common mind” platforms that will be set up with the participation of more than one country and will include also the private sector
iii. Supporting exchange programs which involve particularly R&D personnel, researchers and academicians
iv. Taking measures that facilitate the way of doing business for foreign private sector representatives and foreign investors, and reducing bureaucracy.

To improve innovation system management and coordination, activities that should be carried out include:
i. Strengthening the dialogue between the public sector and the industry
ii. Improving coordination and dialogue between institutions that fund innovation and innovative entrepreneurship
iii. Promoting recruitment and involvement of specialists from both public institutions and organizations (such as TUBITAK, KOSGEB) and industrial organizations that support innovation in all applications related to the innovation system
iv. Ensuring that all stakeholders, including the private sector, take part in the development of all systems, legislation, laws and other mechanisms to be created with regards to innovation
v. Organising workshops to develop a common mind for the solution of problematic areas, setting up discussion platforms that will allow to discuss and review international best practices.

Conclusion

Innovation is the only way of solution to achieve sustainable growth, social welfare and employment in a country, and to that end, a climate that would foster innovation must be created in the country. Particularly in developing countries like Turkey, state and government policies have great importance in changing the point of view about innovation, increasing welfare and employment and breaking the vicious circle.

In today's dynamic business world, being a leader of the age is much more important and vital than being a follower of it. At this point, the importance of innovation cannot be ignored, however, it should also be remembered that innovation must be “sustainable”.

The three basic value drivers which are necessary to ensure sustainable innovation must complement each other. These value drivers are technology, business world and the society. In order for innovation to become a sustainable competitive advantage, these three aspects must function in harmony and interactively.

As it can be understood from all these studies, “innovation” will be meaningful and become sustainable to the extent it is adopted as a philosophy of life, as a social thinking system, and is internalised by every segment and individual of the society.

Efforts which are not supported by such a foundation create only temporary, project-based and periodic benefits, and fail to guarantee a sustainable competitive power. For this reason, while backing innovation efforts of companies, entities and institutions, it should be ensured that creativity and innovation are supported by every segment of the society as a national policy, and the importance of creativity and innovation for personal, social and economic development is well understood.

This must be established as a social awareness and thinking system. For example, social awareness must be increased by supporting artistic areas and other areas of creativity during pre-school, primary and secondary education, emphasising cultural diversity as a source of creativity and innovation, supporting mathematics, science and technology educations for the development of creative minds, supporting innovation as a path to sustainable development, realising regional and local development strategies that are based on creativity and innovation, and supporting innovation in private and public services.

Turkey’s National Innovation System will be strengthened if the activities recommended under the six basic stages above which are designed to strengthen the weak points and areas for improvement are put into practice. However, for a sustainable system, it is important and necessary to monitor the performance based on generally-accepted criteria, compare it against the best practices (for example innovation leaders in EU members) and revise it accordingly, and to keep the system always kept up-to-date, and ensure that it operates bi-directionally and is interactive.

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