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## Analysis of Innovation-Based Human Resources for Sustainable Development

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### Abstract

The spread of innovation-based human resources will accelerate by the emergence of new business areas, knowledge, skills, and expansion of high value-added production. A research, analyzing a survey of the world's largest 500 companies indicates that 80 % of the value of a company was to create tangible assets 40 years ago whereas, today, large companies constitute 80 % of their values to property rights and high-quality of human resources. The analysis made by the OECD for countries such as USA, France, Denmark, Germany and other OECD members indicates that a relationship has been found between human resources that has grown in the field of science-technology and the development in technology and innovation. On the other hand, technical innovation has been emphasized as an important factor in human resources management. The number of studies conducted in the subjects of technological and overall innovation, human resources management and entrepreneurship has increased in recent years. In this study, innovation-based human resources analysis employed by Western and Far East Asian countries will be analysed through content analysis and the subject will be evaluated in terms of Turkey. In this study, the linear relationship between sustainable development and innovation-based human resources will be investigated. Through multiple analysis methods, innovation-based human resources analysis will be handled especially in developing countries. Training of human resources in this context will be an important opportunity for future as in the example of Japan and South Korea. This research represents a significant analysis of data carefully studied through OECD and other international resources.

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## 1. Introduction

Social anthropologists divide history of humanity into three periods: Hunting-collecting; agriculture; and urban industrial for the last 400 centuries. It is known that technological innovations have been produced during the urban industrial period. Although the first two periods lasted for thousands of years, industrial period has been limited to several centuries. The universities in about 20,000 in the world, higher education have spread and inevitably, trained (qualified) human resources have accelerated the economic development.

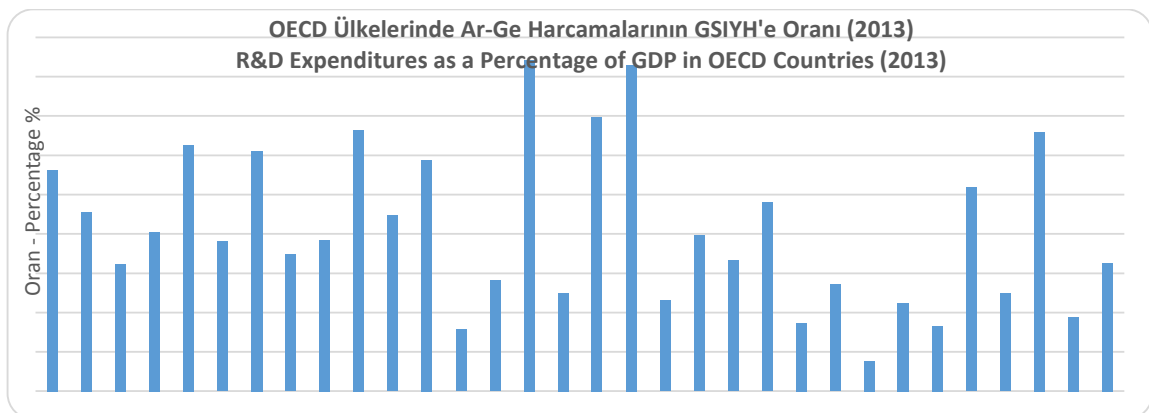
Post World War II the number of academic studies to find out quick answers to development issues with trained human resources has increased. (Eicher, 1979) efficiency, compatibility, total quality management, information technologies and innovation focused production has become among essential elements of economic development of the 21<sup>st</sup> century in the third Millennium.

Human resources have been the engine power of economic development with increase and effective of sources allocated to education. Producing innovation and patents during the last quarter, the human resources has become inevitable for enterprises. The share of education expenditures in fast developing countries such as South Korea, Taiwan, China, India, Brazil, South Africa and Turkey have increased. In short, human resources has become more productive with education and education provides positive contribution to productivity and has positive effects on innovation based sustainable development. (Bircan, 1998, p:8).

As development is to develop variables of social structure by means of some certain policies; The aim is the effort of achieving developed countries standards. The fundamental aim of the development is to enhance living quality together with economic development. Development is also to put into life the sustainability principle in entire socio-economic issues concerning human life including infrastructure, urbanization, agricultural-industrial production increase, natural source development, and environmental protection by use of limited scarce sources.

The portion allocated from GDP to education by the countries show the importance of human resources in economic development. Quality and effectiveness of qualified education system is one of the most important factors determining the competitiveness in international economic relations. (See Graphic :1).

On the other hand, Socio-economic indicators of developed countries indicate that high level of welfare, high educational indicators, long life expectancy (average life expectancy) are all owed to qualified managers and human resources. In short, quality of the educational system educating the human resources, quality of the curriculum and the education staff are the inevitable factors in economic development. (Keskin, 2011). In other words, development is only possible with qualified human resources and qualified managers. According to the economist faculty members of Tempe University, the effect of education in economic development and growth cannot be ignored. (OECD, 2011/2).



Graphic 1: R&D Expenditures as a Percentage of GDP in OECD Countries (2013)\* Source: TÜİK (with 2014 fixed prices)

## **2. Human Resources and Sustainable Development Relation**

Upon acceleration of technological development, sustainable development and sustainability, becomes more significant in developed and developing countries today for more efficient use of natural sources so as to enable use by next generations. Sustainable development is the process of establishing balance between human resources and nature in a way and setting a better life style for next generations without damaging natural resources. It is the planning of life in future and sustainable development. It is the human resources, the fundamental factor of production that will provide such sustainability because sustainable development is possible with the use and management of human resources not only in aspect of socio-economic but also in ecological, local and cultural dimensions. Quality of life is associated with the quality of those variables.

Revealing of issues of fast capitalist growth causing ecologic unbalancing post World War II has also started questioning of relations between development and environment. (Torunoğlu, Vizyon 2023). Sustainable development defined as “improvement of the quality of human life while living within the carrying capacity of supporting eco-systems” under the report issued by UNEP and WWF will be conducted by human resources (Ministry of Development; 2012 p.6) as the most important component of development and fundamental production factor is human resources.

## **3. Innovation Based Human Resources**

The European Union has put into practice “Innovation Union” in 2010 within the framework of information based competitive economy policy in 2020s. With this union, the EU has envisaged that the EU public resources will activate innovation potential of private sector. (Özgenç, 2011). A report issued by the EU in 2010 emphasizes that R&D investments in 2020 will be increased to 3% of GDP and thus 3,7 million new jobs could be created. Therefore, innovation is one of the most essential policy applications of the EU. The first European Innovation Convention was held in Brussels in 2011. In this convention, “Horizon 2020” Program was put into practice and the program emphasizes three themes: “Excellence in Science; Competitive Industries; and Innovation for Better Society”. A fund of 80 million Euros was estimated for the Program. The 15<sup>th</sup> Innovation Convention will be held in University of Geneva (Italy) in September 2015.

“American Innovation Strategy” was put into action by Barack Obama in 2009. The strategy emphasizes that the required innovation infrastructure of the country should be reinforced but extreme interference into innovation should be avoided. A report (A Dozen Economic Facts About Innovation) issued by Brookings Institute states that Innovation drives economic growth, raises wages, improves life expectancy and makes technology affordable. (Özgenç, 2011 Capital).

The study on strategic visions of CEOs in Spain and effect of those making team work in company on innovation planning have revealed the following results. 97 Spanish companies participated in the study and the visions of their CEOs do not have effect on innovation performance of the companies. However, innovation is affirmatively affected in case of project teams and motivation by top management. (Ordag, Fernandez et al.)

A study conducted in China suggests that successful strategic human resources management practices have affirmative influences on Chinese Entrepreneurship and innovation models. It has been observed that contributions of HR to competition and new product development have contributed to global incorporation. (Wang an Zang, 2005)

There are several OECD policy documents that emphasize importance of human resources for innovation because within the framework of importance of human resources, improvement of skills, competencies and qualifications, provide support to innovation skills of human resources. (OECD,2012)

Research and innovation does not exist without effective human resources. Development of research and innovation is only possible through knowledge and spread of knowledge. The knowledge indicates itself with patent production, publications and innovative productions.

The reason why France is successful in higher education and in R&D is the importance it pays to education and human resources quality and being strong in this field. (OECD, 2014)

Human resources is one of main actors for innovation in the field of science and technology. As of 2008, more than ¼ of total employment in several OECD countries is in science and technology. The rates in Northern Europe are respectively, 39,6% in Sweden , 39,1% in Denmark, 38,0% in Norway, 34,2% in Finland. The represented rates are 35,8% in Austria, 35,5% in Canada and 32,3% in USA. (OECD,2009)

The rate of women employed in science and technology has been increasing. The rate of women is 34,2% (except Turkey), and in OECD countries the rate of women in the field is higher than the rate of men. For instance, the rate for Hungary, Poland and Slovakia is 60% in 2008. (OECD, a.g.e. 2009)

#### **4. Human Resources, Innovation, Patent and Technology Production**

There can be no doubt that technology plays an essential role in the increase of the level of welfare. Technology production and its use are considered as essential factors of success when the development levels of countries are measured. (Yılmaz, 2014 p:1).

Neo-classical economists from Chicago University were the first to study human capital in the ends of 1950s. According to the theory, the individual having education invests in himself/herself and therefore, production increases and thus much more revenue is gained with the efficiency. (Eicher, 1979). The studies conducted by Shultz and Becker (1961, 1963) and Denison (1964 and 1993) studied the role of human capital in the relationship of education and production increase. On the other hand, Soviet economist Strumilin contributed to educational economy discipline with similar studies conducted in Russia. (Strumilin, S. 1962).

Today several professions disappear and new jobs emerge. Majority of new jobs require knowledge, skills, competencies and high value added creation. According to a study conducted by Standard and Poors on top 500 companies in the world in 1975, 40 years ago, while 80 percent of the company assets corresponds to tangible capital, today, 80 percent of assets of big companies correspond to intellectual property rights and qualified human resources. (Yüzak, 2015, p:15).

Thinking, investigating, questioning, conducting innovation, producing technology, the qualified human resources have been the fundamental resources for development and welfare improvements of countries today.

Several studies have suggested the importance of technology production in economic development. Whether or not production of technology is performed by private sector companies, by public or foreign capital does not affect the result and in short no matter where the production arises from, it accelerates economic development (Guellec, 2001/2 no:33).

A positive relationship between Research-Development (R&D) innovation and efficiency and economic development has been established. Social efficiency of R&D is higher than the special efficiency of the firms. For that reason, R&D investments of firms should be supported by public sources. ( Guellec, a.g.e). Financing and encouragement of R&D by public sources in priority is because of its effect on economic development in the long run. The studies conducted accordingly have indicated that the capacities of countries to absorb such technologies and innovations will improve when they are open to foreign technology (importing etc.) and also could adopt new ideas (innovations) (OECD, 2011).

Table: 1 Number of Patents on country basis (2012)

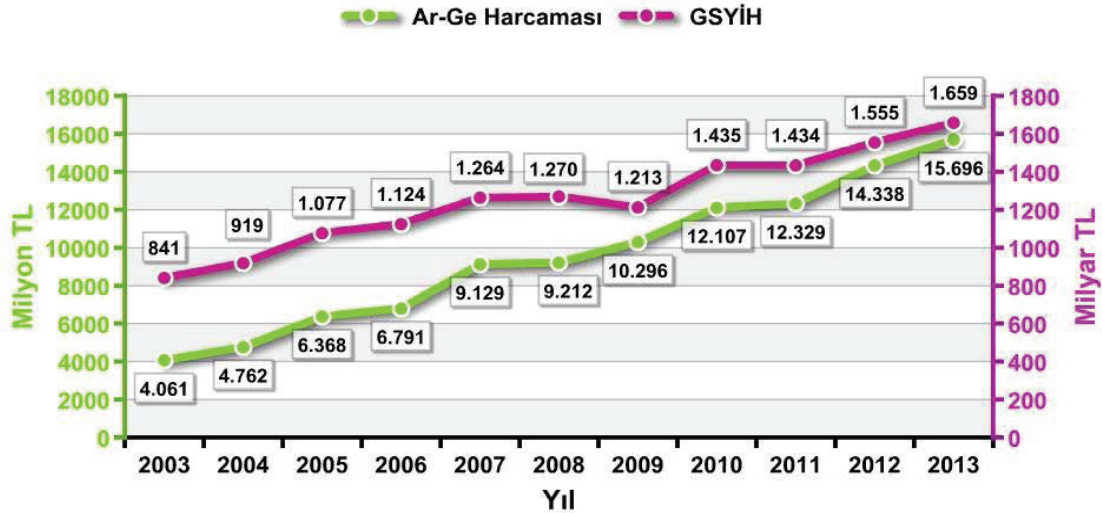
Rank ↕	Country ↕	No. of Patent Applications ↕
1	 Japan	472,417
2	 China	435,608
3	 United States	432,298
4	 South Korea	187,454
5	 Germany	172,764
6	 France	65,349
7	 United Kingdom	49,938
8	 Switzerland	37,477
9	 Netherlands	32,376
10	 Russia	31,433
11	 Italy	27,679
12	 Canada	24,528
13	 Sweden	21,480
14	 India	15,717
15	 Denmark	11,565
16	 Finland	11,516
17	 Belgium	11,427
18	 Austria	11,393
19	 Australia	11,348
20	 Israel	10,821

Regarding sustainable development and innovation, many entities and companies now believe that creation of future lies in creative and participant HR. Consequently, conventional competition variables such as cost, total quality management, product design, technology use, production methods are copied immediately and thus sustainability advantage is gained. (Özgenç, Algoritma, 2015). For that reason, the first issue for the companies regarding competition is to create difference and this is only possible by innovation. As those to achieve innovation are the people, the human resources is the leading actor. As also stated above, the most essential capital of entities and companies is the innovative ideas in the mind of human resources which must be released.

What is important in innovation based HR is to collect information from any sources, to use it in creative way and transform into original and beneficial innovation, which will provide sustainable competition. Every company may have undiscovered talents. Identifying and encouraging them, taking critical decisions are all the duties of innovation based HR for sustainable development. For that reason, supporting diversity in organizations for the creation of new ideas is crucial.

Recently, importance of innovation has increased in Turkey. The TV program titled in Turkish “Bir Fikrin Var mı, English translated; ‘Do you have an Idea’, broadcasted on a TV channel, has attracted a great attention and raised the interest and curiosity. (Özgenç, a.g.e).

On the other hand, human resources have been facilitating production and use of technological knowledge as human capital as well as adaptation of human resources to technological development and thus provided technological development (Çakmak and Gümüş, 2005).



Graphic 2: R&D Expenditures in Turkey (2003-2013) Source: TÜİK 2013

## 5. Conclusion

Several studies have suggested that qualified education of human resources, use of in-born and gained skills pave the way to economic development. Innovation is known as an essential instrument in human resources management. Well-trained, developed and managed human resources have become important today, and competitiveness will be continued by innovation.

Technology production, high number of patents (see table 1) is only possible by means of well qualified, educated human resources with high motivation and job satisfaction. It is observed that innovation has attracted a special attention in Turkey recently. For instance, applications seen rarely in other countries have been put into practice in banking and insurance sector, e-government applications of innovation. Credit card installments, applied as 9 installments in trading and e-trade and mobile banking, are just some of those innovations.

Similarly, samples of innovations and entrepreneurship policies which are applied in white goods industry, construction and food sectors, can be increased. In brief, Turkey seems to have achieved a certain level in innovation applications. However, spread of the case to entire sectors of production process is needed for innovation based human resources. This case will also affect the sustainable development affirmatively.

Innovation in every field will be possible with fast developments in technology production and consequently with the acceleration of increase in GDP and qualified human resources enjoying their works. More tangible assets to be allocated to education sector will create difference thanks to human resources development and innovation, and thus will return to society as welfare increase.

In conclusion, the precondition for management success lies in paying importance to human resources and developments executives of public and private sectors, and encouragement of entrepreneurship, innovation, and patent producing human resources. To wrap up, innovation is possible with human resources. Entrepreneurship policies and innovation in sustainable development will be possible only by means of good qualifications (education) and effective use (management).

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