ÖZET

Türkiye ve OECD Ülkelerinin İnsani Gelişme Bakımından Karşılaştırılması (1980-2010)

İktisadi İşbirliği ve Kalkınma Teşkilatı'nın kurucu üyeleri arasında yer alan Türkiye, dünya ekonomileri ile işbirliği yapma konusunda ilerleme kaydetmeyi ve gelişmiş ülkelerin seviyesine ulaşabilmeyi amaçlamaktadır. Bu çalışmanın amacı, Türkiye ve diğer OECD ülkelerini insani gelişme indeksi bakımından karşılaştırmak ve Türkiye'nin 1980 ile 2010 yılları arasındaki insani gelişme trendini incelemektir. Bu bağlamda, insani gelişme indeksini oluşturan üç adet alt indeks çalışmanın değişkenleri olarak belirlenemiş ve 34 OECD ülkesinin yer aldığı veri setlerine çok boyutlu ölçekleme analiz yöntemi uygulanmıştır. Çalışmanın sonucunda, 1980'den bu yana Türkiye'nin insani gelişme bakımından yeterli bir ilerleme kaydedemediği görülmüştür.

JEL Sınıflaması: C1, C3

Anahtar Kelimeler: Çok Boyutlu Ölçekleme, İnsani Gelişme, OECD

ABSTRACT

A Comparative Study Between Turkey and OECD Countries in Terms of Human Development (1980-2010)

As being one of the founder members of the Organization for Economic Co-operation and Development, Turkey, aims at progressing on co-operation with world economies and reaching the level of developed countries. The aim of this study is to compare Turkey and OECD countries using human development index and to examine Turkey's human development trend from 1980 to 2010. In this study, the three subindices of human development index are used as variables and multidimensional scaling method is applied to data sets containing information of 34 OECD member countries. In the result of the analysis, it is obtained that Turkey, unfortunately, has made hardly any remarkable progress since 1980.

JEL Classification: C1, C3

Keywords: Multidimensional Scaling, Human Development, OECD

A Comparative Study Between Turkey and OECD Countries in Terms of Human Development (1980-2010)

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I INTRODUCTION

Turkey takes an important place in the world in terms of its economy and strategy. The country, with a population of 73.7 million, as well as being a bridge between Asia and Europe, is also among the countries steering the world with its developing economic situation. Like other countries, Turkey is affiliated to some international organizations in order to represent itself in the best possible way in the international arena and improve transnational co-operation. United Nations (UN), Council of Europe (COE), World Trade Organization (WTO), Black Sea Economic Co-operation Organization (BSEC), North Atlantic Treaty Organization (NATO) and Organization for Economic Co-operation and Development (OECD) are some of the organizations that Turkey is a member of.

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This paper explores Turkey's human development adventure in a period of thirty years and makes some comparisons between Turkey and the other OECD countries. It is investigated whether Turkey has made a substantial progress since 1980 in parallel with its positive economic development. To examine this, using three subindices of human development index as variables, multidimensional scaling method is applied to data sets of member countries for the years of 1980 and 2010. The results are evaluated on graphical displays and figures.

There has been made a number of statistical cross-country comparison studies about OECD countries in recent years. The studies have different topics ranging from finance to health and information technology to knowledge economy. Among these, some studies related to comparison of Turkey and OECD countries can be given as examples. Rehimli et al. (2008), applying multidimensional scaling, find that Turkey shows similarity with Mexico especially for social indicators. Considering selected health indicators, Ersöz (2008) concludes that Turkey, Korea, Slovakia, Mexico and Poland are perceived as similar in the result of multidimensional scaling. Again, Ersöz (2009) finds out a similar result by applying cluster analysis and states Turkey falls behind other OECD countries in terms of health expenses. Yeloğlu (2009), in his study which compares OECD countries with respect to knowledge economy, points out

Turkey mostly bears resemblance to North European countries according to the findings that are obtained by using hierarchical cluster analysis.

The rest of the paper is organized as follows. Section 2 gives general information about OECD and human development concept. Section 3 describes the method of the study. Section 4 examines Turkey's human development adventure between 1980 and 2010. Section 5 contains the statistical analysis. Section 6 concludes.

II. OECD AND HUMAN DEVELOPMENT

1. OECD and Turkey

The OECD, which is the scope of this study, is an international economic organization founded in 1961. The forerunner of OECD was the Organization for European Economic Co-operation (OEEC). OEEC was formed in 1948 within the framework of the Marshall Plan for the reconstruction of Europe after World War II. Later its membership was extended to non-European states. On the basis of Paris Convention signed on 14 December 1961, it was reformed into Organization for Economic Co-operation and Development. The Organization's aims include sustainable economic growth and employment, raising the standard of living in member countries, contributing to the development of world economy and world trade.

The OECD has 34 member countries. Twenty of them, including Turkey, participated in the establishment of the Organization in 1961. Most OECD members are regarded as developed countries with their high human development indices and strong economies. They represent almost 18% of the world population, 54% of the world's energy consumption and 76% of the world trade.

Turkey, due to its membership, aims at progressing on co-operation with world economies and reaching the level of developed countries. In accordance with its targets, involving in the Organization, Turkey follows the latest economic and socio-economic developments all around the world.

Published twice a year by OECD, according to the "OECD Economic Outlook" report of November 2010, Turkey's economic growth rate was 8.2% in 2010. By comparison with other members, Turkey was the fastest growing country last year. The OECD forecasts annualized Turkey growth rates 5.3% and 5.4% respectively in 2011 and 2012. Despite the economic growth, current-account deficit widens compared with OECD average. The report shows that the current-account balance rate of 5.1% in 2010 increases by 5.7 in 2011 and 6.3 in 2012 whereas the OECD average rates are 0.7%, 0.7% and 0.5% . After 2009 crisis, the unemployment rate of Turkey declined from 13.7% to 12%. The OECD forecasts the rate of 11.7% and 11%

Here they are listed with the year of accession:

Founder Members (1961)		Subsequent Members	
Austria	Luxembourg	Japan (1964)	Chile (2010)
Belgium	Netherlands	Finland (1969)	Estonia (2010)
Canada	Norway	Australia (1971)	Slovenia (2010)
Denmark	Portugal	New Zealand (1973)	Israel (2010)
France	Spain	Mexico (1994)	
Germany	Sweden	Czech Republic (1995)	
Greece	Switzerland	Hungary (1996)	
Iceland	Turkey	Korea(Republic of) (1996)	
Ireland	United Kingdom	Poland (1996)	
Italy	United States of America	Slovakia (2000)	

respectively in the following two years. Although there is a promising decline, it seems the unemployment rate is going to stay above 10% (OECD, 2010).

2. Human Development Concept

Historically, development was mostly perceived in terms of economic growth (Jahan, 2000, p.1). Gross national product (GNP), per capita income and other economic indicators were accepted as measures that efficiently represent development. Especially, per capita income was commonly used as a development indicator for a long time on grounds of enabling comparison and classification of countries (Gürses, 2009, p.340). However, towards the 1990's, the countries experienced despite high per capita income or GNP, the level of people's well-being made no progress. Based on this contradiction, people started questioning the content of development concept. It shouldn't have been reduced to economic growth alone. It had to put people at the center of its concerns. Following the discussions and criticisms, the content was started to be expanded. With the publication of the first Human Development Report in 1990, the term "human development", which was more comprehensive than old development perspective, was introduced to the world. Since then, the concept of human development has been changing and improving. Today, development performance is not only about economic growth, but also human well-being.

Human development is a process of widening people's choices and increasing the level of their achieved well-being. The human development concept embraces a wide range of choices such as freedom, security, education, human rights, self-respect and so on. These choices seem to be infinite. However, living long and healthy, acquiring knowledge and having resources for a decent standard of living come into prominence among them. It is obvious that accessing other choices is possible with providing the three essential ones (HDR, 1990).

Human development index is a summary measure that has been used for making cross-country comparisons and categorizing countries as regards human development by the UNDP since 1990. It provides an assessment about countries by means of three essential dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. Each dimension is measured by one or two indicators. With the change of the HDI methodology in 2010, the indicators adult literacy rate(%) and combined gross enrollment ratio(%) were superseded by mean years of schooling and expected years of schooling respectively. In addition, gross national income per capita (GNI per capita-PPP US$) replaced gross domestic product (GDP per capita-PPP US$).

Before calculating human development index, the first step is to calculate subindices called "life expectancy index", "educa-

tion index" and "gross national income index".[1]

Taken into consideration that the indicators have different units, they have to be transformed into a unitless scale between 0 and 1. To make this transformation goalposts (minimum and maximum values) are needed. The old and new goalposts are given in the following table:

Using the goalposts shown above, subindex values can be easily found according to the given formula below:

$$\text{Dimension index} = \frac{\text{actual value-minimum value}}{\text{maximum value-minimum value}} \quad (1)$$

Table 1 : Human Development Index Indicators and Their Goalposts

Dimensions	Old Methodology			New Methodology		
	Indicators	Goalposts		Indicators	Goalposts	
		Minimum	Maximum		Minimum	Observed Maximum
A long and healthy life	Life expectancy at birth(years)	25	85	Life expectancy at birth(years)	20	83.2 (Japan, 2010)
Access to knowledge	Adult literacy rate(%)	0	100	Mean years of schooling	0	20.6 (United States, 2000)
	Combined gross enrollment ratio(%)	0	100	Expected years of schooling	0	13.2 (Australia,2002)
A decent standard of living	GDP per capita (PPP US$)	100	40,000	Per capita income (PPP US$)	163	108,211 (United Arab Emirates,1980)

Source : HDR, 2006; 2010

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1 Life expectancy index is measured by life expectancy at birth (years) indicator. Life expectancy at birth denotes the number of years a newborn infant could expect to live if prevailing patterns of age-specific mortality rates at the time at birth were to stay the same throughout the child's life. Education index is measured by mean years of schooling and expected years of schooling indicators. Mean years of schooling denotes average number of years of education received by people ages 25 and older in their lifetime based on education attainment levels of the population converted into years of schooling based on theoretical durations of each level of education attended. Expected years of schooling denotes number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrollment rates were to stay the same throughout the child's life. Gross national income index is measured by per capita income (PPP US$). GNI per capita denotes sum of value added by all resident procedures in the economy plus any product takes not included in the valuation of output plus not receipts of primary income from abroad, divided by midyear population. When expressed in PPP US dollar terms, it is converted to international dollars using PPP rates (HDR, 2009;2010).

Until 2010, HDI was the arithmetic mean of the three subindices. Under this aggregation, there was perfect substitutability across dimensions. In other words, for instance, a country with relatively higher income can get a higher HDI value even if it has low health and education dimensions (Nathan and Mishra, 2010, p.2). To remove the substitutability, the aggregation was changed as the geometric mean of the subindices:

$$\text{HDI} = \sqrt[3]{(I_{\text{Life}} \cdot I_{\text{Education}} \cdot I_{\text{Income}})} \qquad (2)$$

HDI classification was also changed last year. In the past reports, the classification was based on certain cut-off points of HDI values. In 2009, the last year that the old methodology was valid, the countries were classified into four groups. The first group was "very high human development" with HDI value of 0.900-1.000. The countries included in this group were referred as "developed countries". The remaining countries whose HDI values were less than 0.900 were referred as "developing countries". Developing countries were classified into three groups: "high human development (HDI of 0.800-0.899), "medium human development (HDI of 0.500-0.799) and "low human development" (HDI of less than 0.500). (HDR,2009) After the change, the classifications are still based on the four categories. But they are done according to quartiles instead of cut-off points. (HDR, 2010)

Commonly used, human development index has been criticized for being inadequate and unreliable. Ranis et al. (2006, p.348) argue that the HDI is an incomplete measure not considering the important aspects of life. They investigate how broadly HDI can be defined. They suggest 31 indicators which encompass all the major dimensions of human development in order to represent human development index. In addition to inadequacy of HDI, Srinivasan (1994, p.241) criticized the index for being empirically unsound. According to Srinivasan, especially less developed countries encounter the problem of collecting data. Also, the conversion factor using purchasing power parity and exchange rate is problematic. Similar to Srinivasan's arguments, Wolff et al. (2010, p.3) discuss the data error in the health, education and income statistics. They identify three sources of data error which are due to data updating, formula revisions and thresholds and find that 11%, 21% and 34% of all countries are currently misclassified because of these sources of data error, respectively. On the basis of these criticisms, it may be considered to refine the HDI conceptually. However, despite all, human development index is a widely used statistic when making country comparative studies. It has a strong impact on the mind and draw public attention powerfully (Streeten, 1994, p.235).

III. DATA AND METHODOLOGY

The data used for the analysis are drawn from the UNDP database. In 2010, Human Development Report Office updated the data used for the calculation of human development index according to the new methodology. Two samples belonging to 1980 and 2010 are taken from these updated data. In each sample, 34 OECD countries are cross-classified by three variables which are life expectancy index, education index and income index. In the data set of 1980, income index values of Slovakia, Slovenia, Poland, Estonia and Czech Republic and education index values of Slovakia and Germany are missing. In order to impute the missing data, semi-logarithmic (semilog) econometric model is used.

Semilog models are used to find out the rate of growth of variables such as population, GNP, employment, money supply, productivity and trade deficit. The formula of the model is $Y_t = Y_0(1 + r)^t$ where r is the compound rate of growth of Y (Gujarati, 2004, p.178). This formula can be converted into a linear form by taking the natural logarithm. After this, the formula can be written as

$$InY_t = InY_o + t.In(1 + r) \tag{3}$$

When taking $\beta_o = InY_o$ and $\beta_1 = In(1 + r)$, the semilog model formula can be written as

$$InY_t = \beta_o + t.\beta_1 + \varepsilon_t \tag{4}$$

For the imputation, the data from the period 2000-2010 are used to constitute models for each country mentioned above except Germany. All models are found as statistically significant.

Table 2 : Estimated Values of Countries for the Year 1980

Country	Model		Estimation
	Adjusted R^2	P	
Slovakia (Education_Index)	0.897	0.000*	0.6690627236
Slovakia (Income_Index)	0.968	0.000*	0.5431365330
Slovenia (Income_Index)	0.874	0.000*	0.6613065590
Poland (Income_Index)	0.979	0.000*	0.5528678128
Estonia (Income_Index)	0.676	0.001*	0.5487591928
Czech Republic (Income_Index)	0.909	0.000*	0.6329981961

* $P < \alpha = 0.05$

Since Germany has a lot of missing cases in this period of time, the semilog model cannot be applied. The missing education index value of Germany is calculated by taking the average of the education index values of United Kingdom, France and Netherlands. Having done this, the education index value of Germany for the year 1980 has been found 0.6328507598.

1. Multidimensional Scaling

Multidimensional scaling (abbreviated MDS) is a commonly used multivariate technique that gives a configuration of N-items in a multidimensional space and reveals the correlation among the items by plotting points in one, two or more dimensions. Besides being a Q technique like cluster analysis and discriminant analysis, MDS is also an R technique since it aims to make data reduction (Tatlıdil, 2002, p.353). The primary objective of MDS is to fit the original data into a low-dimensional coordinate system such that any distortion caused by a reduction in dimensionality is minimized (Johnson and Wichern, 2002, p.700). In other words, the aim is to obtain a geometric representation as good as possible in a small number of dimensions.

In MDS, the main focus is on distances between pairs of items. So, the input data for MDS is in the form of a distance matrix. For being the distance matrix symmetric, it is possible to arrange the N items in a low-dimensional coordinate system using only the rank orders of the

$$M = \frac{N(N-1)}{2}$$

original similarities (distances), and not their magnitudes. When only this ordinal information is used to obtain a geometric representation, the process is called *nonmetric MDS*. If the actual magnitudes of the original similarities (distances) are used to obtain a geometric representation, the process is called *metric MDS*.

The similarities can be arranged in an ascending order as

$$s_{i_1 j_1} < s_{i_2 j_2} < \ldots < s_{i_M j_M} \qquad (5)$$

Here $s_{i_1 j_1}$ is the smallest of the M similarities. The subscript $i_1 j_1$ indicates the pair of items that are least similar. In order to find a q-dimensional configuration of the N items such that the distances, $d_{ij}^{(q)}$, between pairs of items match the ordering in (5). If the distances are laid out in a manner corresponding to that ordering, a perfect match occurs when

$$d_{i_1 j_1}^{(q)} > d_{i_2 j_2}^{(q)} > \cdots > d_{i_M j_M}^{(q)} \qquad (6)$$

That is, descending ordering of the distances in q dimensions ($q \leq N-1$) is exactly analogous the ordering of the initial similarities (Johnson and Wichern, 2002, p.701).

1.1. Metric Scaling

In metric MDS, the aim is to find a configuration in a low number of dimensions such that the distances between the points

in the configuration, d_{ij}, are close in value to the observed distances δ_{ij}. The method treats distances as Euclidean distances.

The Euclidean distance between objects i and j is

$$\delta_{ij} = \sqrt{\sum_{k=1}^{p} (x_{ik} - x_{jk})^2} \tag{7}$$

In judging how good the fit is, the main interest is now on how close the distances, $d_{ij}^{(q)}$, are to the observed distances δ_{ij}. A numerical measure called stress is used to determine the closeness. The goodness-of-fit measure can be written then,

$$Stress(q) = \sqrt{\frac{\Sigma\Sigma_{i<j}\left(d_{ij}^{(q)} - \delta_{ij}\right)^2}{\Sigma\Sigma_{i<j}\left(d_{ij}^{(q)}\right)^2}} \tag{8}$$

Values of stress that are close to zero would indicate that the MDS solution is a good fit to the original δ_{ij}'s.

1.2. Nonmetric Scaling

In nonmetric scaling, the aim is to find a configuration such that the d_{ij}'s are the same rank order as the original similarities, δ_{ij}'s. In this method, disparities $(\widehat{d_{ij}})$, that are the fitted distances of d_{ij}'s, are constructed such that the $\widehat{d_{ij}}$'s are in the same rank order as the δ_{ij}'s. Disparities are derived from a method called "least-square monotonic regression". Using this method, the d_{ij}'s are regressed on the δ_{ij}'s (Bartholomew, Steele, Moustaki and Galbraith, 2002, p.60). Unlike metric scaling, in jud-

ging how good the fit is, we are now interested in how close the distances, d_{ij}, are to the disparities, $\widehat{d_{ij}}$, rather than the observed distances δ_{ij}. Hence, in nonmetric MDS, the stress is can be defined as

$$Stress(q) = \left[\frac{\Sigma\Sigma_{i<j}\left(d_{ij}^{(q)} - \widehat{d}_{ij}^{(q)}\right)^2}{\Sigma\Sigma_{i<j}\left(d_{ij}^{(q)}\right)^2}\right]^{1/2} \tag{9}$$

It can also be written in matrix notation as,

$$D_{Mx1} = \left(d_{i_1 k_1}, d_{i_2 k_2}, \dots, d_{i_M k_M}\right)^{'}$$

$$Stress = \left[\frac{(D - \widehat{D})'(D - \widehat{D})}{D'D}\right]^{1/2} \tag{10}$$

(Press 1972, p.403)

Considered the stress mesure as a function of q, the number of dimensions for the geometrical representation, Kruskal (1978) suggests the stress be informally interpreted according to the following guidelines:

Stress	Goodness of Fit
20%	Poor
10%	Fair
5%	Good
2.5%	Excellent
0%	Perfect

For each q, the configuration leading to the minimum stress can be obtained. As q increases, minimum stress will decrease and will be zero for q = N-1 (Johnson and Wichern, 2002, p.702).

IV. TURKEY'S HUMAN DEVELOP-MENT TREND, 1980-2010

Turkey seems to have made a little progress between 1980 and 2010. The HDI value of the country increased by 0.212 in the last three decades. While it ranked 57th across 95 countries with an HDI value of 0.467 in 1980, it ranked 83rd across 169 countries with an HDI value of 0.679 in 2010. Although the index value increased in this period, ranking of the country decreased in contrast. It is owing to the fact that the countries who had similar HDI values to Turkey's value showed better performances and increased their ranks (Demir, 2006, P.14).

When accepted Chile, Estonia, Slovenia and Israel as OECD members in 2010, unlike HDR 2010, 31 OECD countries were in the "very high human development category" and other 3 countries, Turkey, Mexico and Chile, were in the "high human development category" in 2010. Norway, Australia, New Zealand, United States and Ireland were in the first five in HDI ranking between 2005 and 2010. The HDI values of Turkey, that have been calculated according to new methodology, are shown in the Table 4.

Table 3 : *Turkey's HDI Trend Across UN Countries, 1980-2010*

	1980	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
HDI Value	0.467	0.515	0.552	0.583	0.629	0.656	0.679
HDI Rank	57	59	71	72	66	82	83
Number of Countries*	95	103	118	129	137	169	169

* Does not denote the whole number of UN member countries for corresponding year.

The countries who didn't have reliable data were excluded.

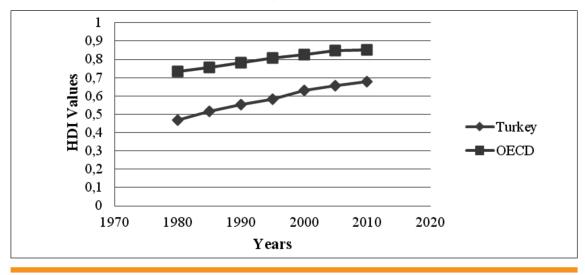**Table 4 :** *Turkey's HDI Trend Across OECD Countries, 1980-2010*

	1980	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
HDI Value for Turkey	0.467	0.515	0.552	0.583	0.629	0.656	0.679
Average HDI Value for OECD*	0.734	0.756	0.781	0.806	0.825	0.847	0.853
HDI OECD minus HDI Turkey	0.267	0.241	0.229	0.223	0.196	0.191	0.174
HDI Rank	24	24	24	26	30	30	34
Number of Countries**	24	24	24	26	30	30	34

* In HDR 2010, the OECD averages were calculated only for "developed" countries.

   So, the values are different from those in the table above.

** Denotes the number of OECD member countries for corresponding year.

The numbers for each year were determined by taking into consideration only the "year of accession."
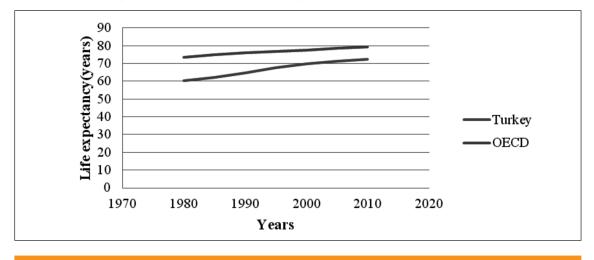
***Graph 1 :** HDI Values of Turkey and Averages of OECD Countries*

As shown in the graph and almost in the table, Turkey's HDI values has tended to close to the OECD average since 1980. HDI differences between OECD and Turkey have gradually decreased over the years. However, in the last thirty years, the position of Turkey on the OECD list unfortunately remained unchanged.

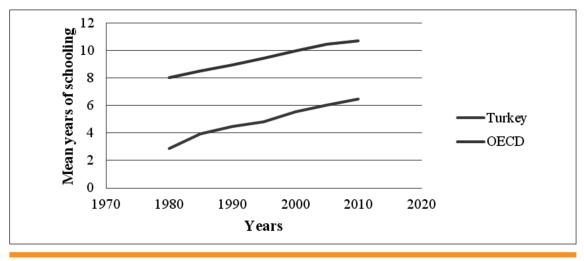***Table 5 :** HDI Values of Turkey and Three Indicators*

	Life expectancy at birth(years)	Mean years of schooling	GNI per capita($)	HDI value
1980	60.3	2.8	6,291	0.467
1985	61.9	3.9	7,139	0.515
1990	64.6	4.5	8,632	0.552
1995	67.6	4.8	9,243	0.583
2000	69.9	5.5	10,422	0.629
2001	70.3	5.6	9,581	0.631
2002	70.6	5.7	10,091	0.641
2003	70.9	5.8	10,493	0.647
2004	71.2	5.9	11,370	0.651
2005	71.4	6.0	12,206	0.656
2006	71.6	6.1	12,862	0.665
2007	71.7	6.2	13,315	0.672
2008	71.9	6.3	13,417	0.674
2009	72.1	6.4	12,271	0.674
2010	72.2	6.5	13,359	0.679

Graph 2 : *Life Expectancy of Turkey and Average of OECD Countries*

Life expectancy at birth is one of the determiner of HDI. Thanks to the achievements of developed OECD countries towards in health, the average life expectancy at birth moved from 73.5 to 79.3 years in the last three decades. In the same period of time life expectancy at birth of Turkey rose from 60 years to 72 years. As a result, the life expectancy gap between Turkey and the OECD as a whole has narrowed from 13 years to 7 years. Across the OECD, Japan, Iceland and Switzerland has ranked at the top three since 2000.

Graph 3 : *Mean Years of Schooling of Turkey and Average of OECD Countries*
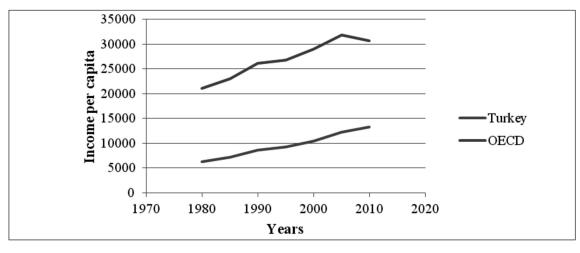
Mean years of schooling is also the second determiner of HDI values. Turkey's mean years of schooling increased by about 3.6 years and reached the value of 6.5 years in 2010. It can be said that the increase of the values has gone parallel to the OECD since 1980. But, since Turkey started from a low point in 1980, the increase has not been enough to catch the OECD average.

Income per capita is the last important determiner of HDI values. None of the OECD countries has seen declines in health or education since 1980. However, global economic crises in certain years negatively influenced world economies. GNI per capita values of Turkey showed regular increase in this period except the years 2001 and 2009. The economic crises in 2001 and 2009 undoubtedly affected per capita income values of those years, but following years the values have continued to rise reasonably.

V. STATISTICAL ANALYSIS

In this study, a nonmetric MDS method was applied through a sample of 24 OECD member countries and two samples of 34 countries, respectively. Three human development subindices were used as variables. Having obtained two-dimensional perceptual maps of each samples, principle component analysis (PCA) was applied to the same data sets in order to understand what the dimensions meant. The results for 24 countries for 1980 showed that the proportion of total variance explained by the first dimension was 83.2% and another dimension had very little proprotion compared to the first one. PCA gave almost the same results for other samples. Thus, it was determined to make interpretations about MDS outputs on Dimension 1. Since all three variables were found highly effective on Dimension 1, the dimension was thought to be interpreted as an indicator of overall development.

Graph 4 : *Income Per Capita of Turkey and Average of OECD Countries*
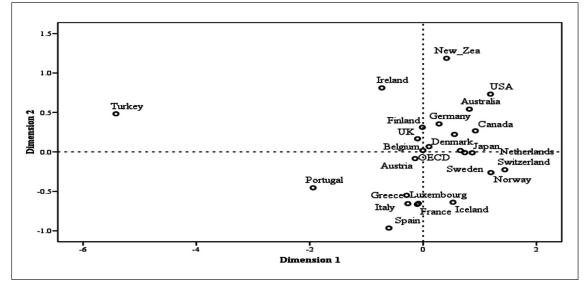
Figure 1 : Two Dimensional Plot of 24 OECD Countries for the Year 1980

Notes: In this analysis, Germany's estimated education index value was used.

Figure 1 and Figure 2 present two-dimensional perceptual maps for 1980 and Figure 3 for 2010.

The pictorial representation referring to 24 countries known as members of OECD in 1980 is presented in Figure 1. Kruskal stress value of 0.067 is the evidence that there is a "good" fit between original distances and graphical distances. As can be seen in the figure above, Turkey considerably differs from the other countries with regards to all three variables. It is the most distant country from the OECD average. The country is then followed by Portugal. More developed countries are grouped on the right hand side of the figure.

Chile, Czech Republic, Estonia, Hungary, Israel, Korea, Mexico, Poland, Slovakia and Slovenia are not involved in the first figure since they were not members of the Organization in 1980. However, in terms of making elaborate interpretations, it will be beneficial to give a representation including all member countries even if some of them are supposed to be excluded theoretically. Considering this, new resulting solution in two dimensions is shown in Figure 2 below.

With the addition of new countries there has been some changes on the locations of countries in the first figure. Some countries have moved up or down. But, since horizontal projections are taken into cosideration, any moving on the vertical axis does not pose a problem. Stress of new perceptual
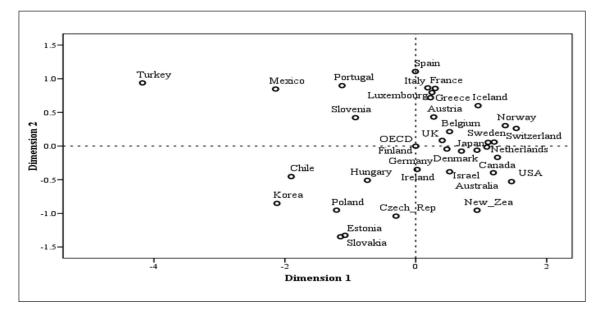
Figure 2 : *Two Dimensional Plot of 34 OECD Countries for the Year 1980*

Notes: *In this analysis Germany's estimated education index value and seven estimated values given in Table 2 were used.*

map is 0.052, which is still a "good" fit. In Figure 2, Mexico, Chile and Korea are close together when horizontal projections are considered. Similarly, Protugal, Slovenia, Poland, Estonia, Slovakia and Hungary can be thought as a group. Czech Republic is closer to developed countries than others. On the right hand side developed countries stands very close to each other.

The last figure presents the current situations of countries. Stress of the last perceptual map is 0.092, that again indicates a "good" fit. After a period of thirty years, almost all of the countries lie approximately where they are expected. Although Turkey has greatly improved its economy in this period of time, it hasn't been enough to change the countries' position in HDI ranking. Turkey still stands out from the others. And then, the country is followed by Mexico. Moving up 20 positions in HDI ranking, Korea has made a breakthrough in thirty years. Now, it stands togehter with developed countries on the right hand side.

When taken the HDI profiles of countries in 2010, it can be said the last ten countries across OECD lie on the left hand side of the first dimension. The first five countries, which are Norway, Australia, New Zealand, USA and Ireland, are located at the bottom right of the figure. It would not be right to assess countries located on the left as "develo-
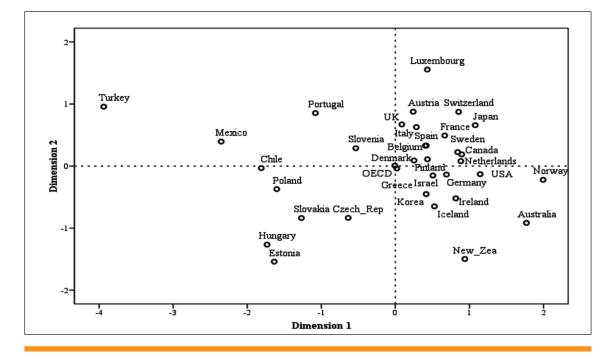
Figure 3 : *Two Dimensional Plot of 34 OECD Countries for the Year 2010*

ping" countries altogether. Because, according to HDR 2010, beforementioned countries except Turkey, Mexico and Chile are included in very high human development category. So, it will be more convenient to interpret countries as more developed when moved rightward on the Dimension 1.

VI. CONCLUSION

This paper has investigated Turkey's human development level by using components of HDI over the period 1980-2010. The empirical analysis of the article, which has been applied to cross-section of OECD countries for two separate years, has showed that although HDI values of Turkey had a reasonable increase in thirty years,

the position of the country across OECD unfortunately remained unchanged.

First, we imputed the missing data by using semi-logarithmic model. Having done this, we applied a nonmetric multidimensional scaling to three different samples of countries and obtained two-dimensional perceptual maps. Second, through principle components analysis, we tried to find out the proportions of total variance explained by these two dimensions. Based on statistical results, we determined the first dimension had very large proportion compared to the second one. Also, Dimension 1 indicated overall development. Evaluating countries on Dimension 1, Turkey was found to be the most distant country from the OECD

average with its low education, health and income values for both 1980 and 2010.

The main reason that Turkey has taken place at the bottom of the OECD list is the country's failure especially in the fields of health and education. Even though Turkey's economy has grown considerably since 1980, it has not shown a remarkable success in the mentioned fields. According to data drawn from UNDP database, Turkey's expenditure on education in GDP was 2.3% in 1980, while it was 2.9% in 2006. The values were the lowest for both years compared to other OECD countries. According to WHO Statistical Database, total expenditure of Turkey on health was 6.7% of GDP in 2009, which was about 2.7% less than the OECD average. The leading country was United States of America with a value of 16.2%. In addition, per capita total expenditure on health (PPP$) of Turkey was 965$ in 2009, which was about one-third of the average. Based on these data, it is obvious that Turkey should increase expenditures on these fields and rearrange health and education systems correcting deficiencies. If it is accomplished, then it can be expected to have better subindex values and therefore a better human development index value.

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