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Regional Disparities and Territorial Indicators in Turkey: Socio-Economic Development Index (SEDI)

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Abstract

This aim of this article is to examine the problem of regional disparities in Turkey applying to the economic and social development indicators. One of the main problems encountered in the field of regional development in Turkey is the difficulties in having access to qualified data as is the case in other countries. Therefore, it is of great importance to improve the information gathering and evaluation systems in Turkey. Social and economic development index (SEDI) rankings have contributed to the filling of the gap in this field by providing a considerable data input to development and planning initiatives conducted in Turkey on the basis of territories of various scales (districts, provinces, geographical regions, NUTS I, II, III regions). “The Socio-Economic Development Ranking Survey of Provinces and Regions (2003)”, the main findings of which will be presented in this paper covers 81 provinces according to the existing administrative structure of Turkey and includes 58 variables selected from social (demographic, employment, education, health, infrastructure, other welfare) and economic (manufacturing, construction, agriculture, financial) spheres. The survey has applied Principal Component Analysis (PCA), a developed multi-variable statistical technique which allows the use of interdependent variables.

The paper is composed of the following sections: The first section outlines the regional development trends in Turkey and evaluates the increasing importance of territorial development policies, applying to the relevant Turkish and international literature. The second section gives a brief summary of major regional development policies and practices that have been implemented in Turkey and the various problems of regional disparities.. The fourth section includes the methodology of SEDI studies. The fifth section evaluates and summarizes major findings of the survey and briefly lays down the results of SEDI Rankings of 81 provinces, geographical regions and NUTS II regions included in the survey. This section also includes a ranking of the industrial, health and education sectors. The fifth section presents the general conclusion and major recommendations to lessen territorial disparities in Turkey in the light of national and international discussions on the topic.

Key words: Regional disparities, social and economic development indicators, territorial development policies, Turkey

1. Introduction

Globalization trends that increased after 1970s also increased the importance of local dynamics as the thrust of economic growth and regional development, and local approaches assumed paramount importance in development understanding. In the new world economy where product, capital and labour markets have increasingly been opening up to the outside world, where competition has increased and acquired a global characteristic, the need for information has also increased in spite of the vertiginous development in information and communication technologies (Borja and Castells, 1997). On the other hand, both the centralist bureaucratic structures in public administration and the hierarchical firm organizations similar to a pyramide established on the rationale of economies of scale in the business world have proved to be insufficient in having access to and disseminating information (Stöhr, 1990; Bennett and Krebs, 1991). In the new world economy where information has independently become a production factor and competition has increased on global scale, the importance of small sized enterprises with high flexibility and of institutional structures organized on the basis of network interaction on horizontal plane has increased (Konvitz, 2000). In this context, in addition to national governments and public sector, localities, private sector and NGOs and more

importantly institutional structures established with a view to ensure cooperation and partnership on horizontal plane have assumed important functions in new development approaches.

The change in the world economy towards globalization has, apart from localisation in the economy, brought about significant changes in the role and functions of national economies. Of these changes, the one that comes first is the change in the traditional meaning of the distinction between central and local governments and public and private sector (Solesbury, 1993). Because, while the global competitive environment has, in addition to small- and medium-sized enterprises (SMEs) with small, competitive and flexible structures, increased the importance of small and medium-sized cities (SMCs) that may carry local socio-cultural qualitative values more easily relative to economic relations, inter-institutional cooperation initiatives and extending partnership models have gained importance instead of central-local government and public-private sector dualities. The new understanding of development necessitates good governance and a new division of labour based on interaction, cooperation and conciliation between all these levels. Thus, in the last few decades, territories have begun to emerge as new actors in the global economy in the “*glocalisation*” process (Swyngedow, 1992) where the processes of globalisation and localisation are intermingled, and global competition between localities has increased. While these developments have reduced the understanding of development from macro scale to micro scale, cities and regions have become the leading elements in the new understanding of development (Ohmae, 1996; 1993).

The reflections of the *glocalisation* process are witnessed also in Turkey. Local potentials and policies have begun to be more important also in Turkey, in harmony with the *glocalisation* process (Özaslan, 2004). Furthermore, the policy of cohesion to the European Union’s (EU) regional development policies has ensured the elimination of regional disparities, the mobilisation of local and regional potentials and caused the understanding of sustainable development to gain importance in Turkey (DPT, 2004). On the other hand, although great strides have been made in the field of national economic development and diverse regional development policies have been implemented in Turkey in the past, socio-economic developmental disparities between regions have remained as an important national problem until today (Dincer et al., 2003; Dincer and Özaslan, 2004).

The first step in formulating, monitoring and evaluating regional development strategies is certainly to determine the structural characteristics of territories in terms of economic and social sectors and to shed light on their potentials. In this context, studies are being conducted separately or jointly in Turkey approximately every five years to determine the socio-economic development indexes (SEDI) of territories of various levels (districts, provinces, geographical regions, NUTS I, II, III regions) SEDI studies use a large number of variables selected from economic and social fields that may best reflect the level of development. These studies determine the economic and social structural characteristics of territories.

Great importance is attributed to SEDI studies in that they are based on the composite index of a large number of variables classified as demographic, employment, education, health, industry, agriculture, construction, financial and other welfare indicators. It is possible to identify territorial groups with different levels of development, to analyze regions and sub-regions and to determine homogenous regions by using SEDI results. These studies which aim to shed light on the changes in the socio-economic development level of territories not only ensure that all these levels are monitored within the process in terms of economic and social sectors and that comparisons are made, but they also constitute the basis in identifying the policies relating to the establishment of priority development areas (PDAs), the allocation of public resources and the orientation of private sector investments with incentives and other support instruments. Another dimension of SEDI studies is that it allows the identification of priorities based on the comparative advantages of territories and ensures specialisation in line with national priorities in existing sectors and those with a prospect of development. The main expectation in these studies is to provide data input to territorial development and planning studies.

2. Major Regional Development Policies Implemented in Turkey: Basic Problems and Common Characteristics of Less Developed Regions

Before the planned era in Turkey, regional planning was considered as a public development tool and described as the formulation of a physical settlement plan. In the planning era that extends from 1960 up till now, planning is no longer considered within the narrow scope of public development planning and is being evaluated within the framework of an integrated approach including physical, social and economic dimensions. Moreover, special importance has also been attributed to regional development and the elimination of developmental disparities between regions in the planned era. The elimination of the imbalance between regions has been one of the priority areas in all development plans devised.

One of the developments in the planned era is the identification of regional disparities with concrete data and the allocation of resources in line with the objective of speeding up regional development. One of the main characteristics of investment and expenditure policies in the planned era is the incurring of expenses for underdeveloped territories in such amount which is far beyond the budget revenues obtained from these regions. Priority has, to this end, been given to underdeveloped territories in the distribution of public investments in all plans and programmes. In addition to public investment policies, state aids provided and personnel policies implemented to attract the private sector to these regions have been major public tools used to eliminate the imbalance between regions. Various development means such as integrated regional development plans (IRDPs), investment incentives, priority development areas (PDAs) policies, organised industrial estates (OIEs), Small Industry Sites (SISs) and rural development projects (RDPs) have been used as basic tools in speeding up regional development and in eliminating the imbalance between regions (Özaslan, 2004b).

IRDPs which come first among these have been formulated both to integrate the spatial dimensions and sectoral priorities of comprehensive national development plans, to decrease developmental disparities between regions and to realize sustainable development. The main IRDPs which have been devised at various times are Eastern Marmara Planning Project, Antalya Project, Çukurova Region Project, Southeastern Anatolia Project (SEAP), Zonguldak-Bartın-Karabük Regional Development Project, Eastern Anatolia Project, Eastern Black Sea Regional Development Plan and Yeşilirmak Basin Development Project¹. However, apart from SEAP, the remaining IRDPs cited above did not have the opportunity to be implemented.

Investment Incentives (IIs) which is another regional development tool have, from the beginning of the Republic, been used as an important national development means. Nevertheless, with the introduction, in the planned era after 1960, of comprehensive national development plans which are of a guiding nature for the private sector, investment incentives started to be carried out under decrees and communiques issued within the framework of development plans and annual programmes. One of the objectives of investment incentives policies is to implement specific incentives policies with a view to speed up the development of economically and socially underdeveloped regions.

In this context, PDAs have been identified and incentive policies have been introduced for these areas. The scope of PDAs first determined in 1968 was broadened in 1990s and reached 49 provinces and 2 districts today (Bozcaada and Gökçeada islands). The PDAs which were introduced in the Planned Era were connected with the incentives system, resource allocation and public expenditure policies at the planning, programming and implementation stages of development activities as

¹ Moreover, preparations are underway for regional development programmes which will be implemented with financial support from the EU in the recent years when the harmonization process with the EU has speeded up.

mentioned above. Because, while no special measures were taken for underdeveloped regions under the general incentive legislation, the PDAs practice aimed to carry out the general investment measures implemented nationwide at a higher rate in these regions. The public support that was introduced under PDAs policy was not limited with only investment measures, but also included the following supports (Sarica, 1991; Özaslan, 1999): (1) practices that relatively improved the salaries of those working at PDAs, (2) agricultural and vocational credit support, (3) financial support provided to investments from the Public Participation Fund, (4) Financial facilities provided to projects carried out by local governments at PDAs from the budget of the State Planning Organisation (SPO).

Another spatial regulation means used as a tool for both urban and regional development and for developing the infrastructure for industrial enterprises in Turkey has been the establishment of organized industrial estates (OIEs) for medium-sized industries and small industry sites (SISs) for small-sized industries. The OIEs and SIS policies that have been implemented since the beginning of the planned era until today have served as an important regional development means in preventing local capital accumulations from leaving the province and in transferring such capital to the local economy. The OIEs and SISs that made a major contribution to the formation of external economies, to the decentralisation of industry and to the development of complementary relations between industrial units also made a notable contribution to the localisation of the industry and thus to a more balanced distribution of the industry among regions by creating an environment suitable for the development of SMEs at local level.

Another policy which was and is currently being implemented under territorial development in Turkey is the rural development projects (RDP). The main objective of *RDPs* has been to raise the welfare level by increasing agricultural activities and income in underdeveloped regions. RDPs were introduced by State Planning Organization (SPO) at the end of 1970s and included mainly the following fields of activity: the development of agriculture and stock-breeding, irrigation, construction of village roads, construction of forest roads, potable water ponds, providing potable water, increasing agricultural and livestock production, afforestation. RDPs that have been completed and are continuing are as follows: Çorum-Çankırı, Erzurum, Bingöl-Muş (1990-1999), Yozgat (1991-2001) and Ordu-Giresun (1995-2003).

A general evaluation would reveal that although the Turkish economy made considerable progress in terms of structural transformation and integration into international markets, regional disparities still remain as a major problem also today as is the case in all developing as well as, to a great extent developed countries (Dincer et al., 2003; Dincer and Özaslan, 2004). The economic growth performance of Turkey in the long term could not create the positive impact as expected on the elimination of developmental disparities between regions. Although the policies which are currently being implemented, the major ones of which are cited above, made notable contributions to the mobilisation of local potentials in some regions, they proved to be insufficient in reducing regional disparities nationwide.

As can be seen in Section Four, at this stage, there is a wide developmental disparity between first and second tier developed provinces and those included in other tier groups under the average in Turkey (see Map 1). Economic and social indicators would reveal that there are considerable disparities between Turkey's average and the indicators of provinces in underdeveloped regions such as Eastern, Southeastern Anatolia, Black Sea and Central Anatolia regions in particular (see Graphic 2). A general evaluation would show that there is an imbalance between territories of different scales in terms of income, demographic structure, physical and social infrastructure, entrepreneurship, human resources, education level, access to health services, environmental quality, employment and the role of women. Taking into consideration the basic problems of underdeveloped territories, it is important to support local economic development (LED) initiatives in order to mobilize the endogenous potentials of

these regions in an human-focused approach to development. Reducing disparities in economic and social development between regions by raising the employment level and competitive power of underdeveloped territories is among the basic priorities of Turkey. Development areas that need to be addressed immediately to attain this objective may be summarized as follows:

(1) Strengthening human resources and entrepreneurship skills and developing particularly the potential for self-employment and creating jobs and employment,

(2) Supporting existing SMEs and those to be newly established and increasing their competitive power on collective level by increasing their potential for cooperation through network form of local industrial organisations (NFLINDOs),

(3) Supporting physical and social infrastructure investments that are important for raising the quality of urban life,

(4) Ensuring diversity of economic activities in rural areas,

(5) Strengthening new local governance models and local institutional structures that will increase local participation, develop joint venture areas and regulate the collective intervention of local actors to the LED process.

The problem areas summarized above, the solution of which requires immediate attention, place a barrier to a balanced development nationwide and to making use of the potential of less developed regions in Turkey. The main strategy in attaining both objectives is to enable less developed regions to create a sustainable local development structure. LED strategies and programmes aimed at developing local potentials and primarily human resources and local governance capacities are of great importance for ensuring sustainable development on local scale. This inevitably requires development initiatives starting from province and district levels and an interactive and flexible planning system consistent with the above which operates both from bottom-up and from top-down.

3. Research Methodology in SEDI Rankings

3.1. Purpose and Scope

In the preparation stage of strategies and plans to be formulated to reduce developmental disparities between regions, it is important to measure the development level of regions with the help of socio-cultural and economic variables and to make an analytic comparison between them. Establishing the current development level of territorial units and determining the level of their development as compared to other territorial units within the boundaries of the same country, region and province with the help of measurable and comparable indicators has a key role in the formulation of public policies, orientation of development and preparation of strategies and plans.

Several studies are also being conducted in the world to measure developmental disparities between countries, regions and territorial units. The human development index (HDI) used in UNDP's Human Development Report which evaluates countries in terms of their level of development includes an evaluation of data in three main areas such as per capita GDP, level of education and health (average life expectancy) (UNDP, 2001). In the European Union, major important indicators in evaluating developmental disparities between territories and in implementing territorial policies are per capita GDP expressed in purchasing power parity (PPP), demographic structure, population density, unemployment rate, sectoral distribution of GDP and employment and other statistical data that reflect economic and social development. On the other hand, problems are experienced in gathering regular, reliable and comparable statistics that reveal developmental disparities between countries and regions. In fact, the monitoring of global goals established at various UN conferences still pose a major problem in many countries.

Therefore, the concept of development required to be measured and its components should first be defined on account of the fact that different meanings have, been attributed in time to the concept of development. While development previously meant economic growth, several indicators were used as main criteria such as national or personal income, value added created, the level of production and the number of employees in the industrial sector. The concept of development included social welfare in the beginning of the twentieth century and covered the physical and social infrastructure possessed by communities. Development has started to be measured by the quality of life in the last quarter of the twentieth century. The quality of life means the existence of and the opportunity to consume a qualified natural, physical, social and cultural environment.

Socio-economic development is defined as the change that the demographic structure of a society, its rural population, rate of births and deaths, horizontal and vertical mobility, urbanization rate, family size and income distribution undergo in line with economic development. In the SEDI studies conducted in Turkey, the concept of development is considered to be economic developments such as the increase in physical capacity and income, and the distribution of these between different sectors of the community, income groups and regions, and the level of social development where social and cultural accumulation is reflected. Such a consideration emphasizes that in addition to income, labour structures, unemployment levels, education levels and investment levels of territories and in general terms real life standards are more effective in establishing the levels of competition.

The recent developments that have taken place with the glocalisation process in the understanding of development and the emphasis given to the sustainable development approach since 1970s increased the importance of multi-dimensional SEDI series based on territories. The SEDI studies conducted in Turkey use a data set consisting of a large number of variables selected from economic, social and cultural spheres, including the GDP variable rather than dwelling only upon the income element measured by gross domestic product (GDP), in establishing and evaluating the performance and the current situation of regions. In other words, these studies take a qualitative socio-economic development approach rather than a quantitative growth understanding. A comparison of GDP series to SEDI series in Turkey used in the evaluation of development performances of territories and their coherency to future projections would reveal the strength of SEDI series as follows:

(1) While GDP series use a data set that explains only economic development, SEDI series use a data set selected from economic, social and cultural spheres, which includes a large number of variables. In other words, while GDP variables include only capacity expansion and physical growth, the multi-dimensional structure of SEDI reflects the general level of development including various indicators that reflect the social structure. This implies a holistic approach where a large number of indicators interacting with each other is addressed together in line with the principle of sustainable development. SEDI studies take a qualitative socio-economic approach and in general terms a social development approach that covers structural and humanitarian development and includes measurable qualitative social variables rather than a quantitative economic growth understanding.

(2) SEDI series make it possible to obtain realistic and explanatory results about the “direction of development” in addition to making an analysis of the existing situation. The direction of development in terms of economic and social sectors and the most recent situation of territories at various levels may be monitored on the basis of time series throughout the country by means of SEDI series repeated approximately every five years, on provincial, district and regional levels. While the periods mentioned in SEDI series include a medium term process of approximately five years, the GDP series are conducted on annual basis. Nevertheless, GDP series reveal a fluctuating and instable structure during economic crisis in Turkey. For this reason, SEDI studies present a data set which is more suitable for formulating, implementing and monitoring the results of medium- and long-term development policies.

(3) SEDI studies use a data set selected from social and economic spheres which includes a large number of variables². This makes it possible to make a more realistic evaluation that takes into account the structural weaknesses and strengths of territories and to implement more coherent medium- and long-term local development policies.

(4) According to the practice in Turkey, GDP values are obtained by using the production values during the year. However, in the case of territorial economies, such an approach has two main drawbacks. Firstly, the production units producing on national scale, but the externality and contribution of which is limited to the local economy in which they are located cause an artificial increase in the income level of the local economies in question. The second one is the extreme vulnerability to conjunctural fluctuations in production during the year. In other words, this method focuses on production in the recent year and neglects the performance and structural characteristics of local units in previous years. SEDI studies include in the evaluation social and physical investment stocks in previous periods by means of a large number of economic and social variables used. Thus, social and physical infrastructure investment stocks in previous years such as education, health, roads, OIEs and energy are the major variables that measure the socio-economic development of local units and in this manner a more realistic determination may be made of the general level of development and local structures.

(5) SEDI studies that apply the PCA Technique as a sophisticated multi-variable statistical technique use objective and scientific criteria and this method does not allow for subjective interventions.

3.2. Variables Used in SEDI Rankings

As the concept of development includes many data such as progress in economic, social, political and cultural structures, there is a need to take into account, in the studies to be conducted, as many dimensions of these variables as possible, which variables constitute development. The SEDI survey began with the gathering from various institutions and organizations of around 100 indicators assumed to reflect the level of socio-economic development of 81 provinces nationwide which appear as the cause and/or result of development. Preliminary examinations and evaluations made at this stage of the coherency and reliability of indicators showed that only 58 indicators were qualified to be used on provincial scale³.

Then, selected indicators were proportioned using auxiliary data and put into variables. In doing this, almost all data were divided by the population of respective provinces to nullify the effect of the population size of territories or by various sizes to nullify this effect and were put into proportion. This ensured that the extent of development of territories is evaluated as per capita welfare and not in proportion to populations or surface areas.

Development concerns the socio-economic structure of territories as a whole together with its effects on individuals. It may be asserted that values which reflect accumulation and potential for development throughout territories and indicate total size are a better indicator as compared to average or per capita values (Hacıhasanoğlu, 1980). On the other hand, the fact that the population of territories is an important element which is affected by socio-economic development may not be neglected. In the development process, there is a population movement from underdeveloped regions

² For example, 58 variables were used in the SEDI studies conducted in Provinces and Regions in 1996 and 2003 (Dincer et al., 1996; 2003). The use of a similar data set in both surveys made it possible to monitor the developments between two periods. Although the data sets used in index studies conducted in the recent two periods included the same variables, no major disparities were observed that would imply a leap in the series.

³ The variables used are given in Appendix-1.

to territories which are economically and socially more attractive. While as a result of population movements arising from developmental disparities the population of less developed regions decreases or increases at lower rates, the population of developed regions increases at higher rates. If all variables used are proportioned to population and used as per capita values, the resulting situation will be unfavourable to regions with excess population.

For this reason, the variables were used as proportioned or per capita values in cases where these raised the vulnerability of indicators, otherwise they were used as total absolute sizes as of territories in an effort to strike a balance. In this way, while on the one hand territories with a dense population were prevented from ranking high on account of this, they were prevented from ranking low for the same reason, on the other. This needs to be taken into account while examining the socio-economic development ranking of territories (provinces and regions) obtained as a result of the survey.

3.3. Research Technique

3.3.1. Technique Selection

Generally, the methods like indexing and hierarchical classification were used in similar development ranking researches. In these techniques, each development indicator has the same weight and therefore a significant initiative about the results is left to the researcher. These techniques can be used for ranking based on a certain variable or variable group. However, if the desired ranking is a general development ranking, then the objectiveness of the technique to be used will be inevitable.

On the other hand, the researchers working toward the determination of spatial developmental differences have the difficulties of considering a large number of variables together and deciding in a multivariate space. This can be achieved by reducing the number of variables in multivariate space and reducing the analysis into a smaller dimensioned space.

The multivariate statistical method of *principle components analysis* (PCA) is a very useful tool for reducing the number of variables in a data set and for obtaining useful one, two or three dimensional views of a multi-dimensional data set. In this study, principal components analysis was utilized as a statistical technique.

Principal components analysis provides a summary of several characteristics based on a certain quality and allows the user to make an abstraction from the common characteristics of the variables. With this feature, the PCA is a technique capable of revealing, observing and defining common and fundamental meaning or information essence covered by several data sets with different dimensions.

The technique is established on the assumption that the statistical relations among the variables were formed as a result of the effects of one or more principal factors. Significant part of the relation among the variables arises as a result of the effect of a single principal factor. This principal factor is called in literature as 'general casual factor', 'component' or 'dimension'. In this study, socio-economical development levels of territories units were assumed to be the 'general causal factor' having an effect on all variables used and caused them to change together.

3.3.2. Principal Components Analysis (PCA) Technique

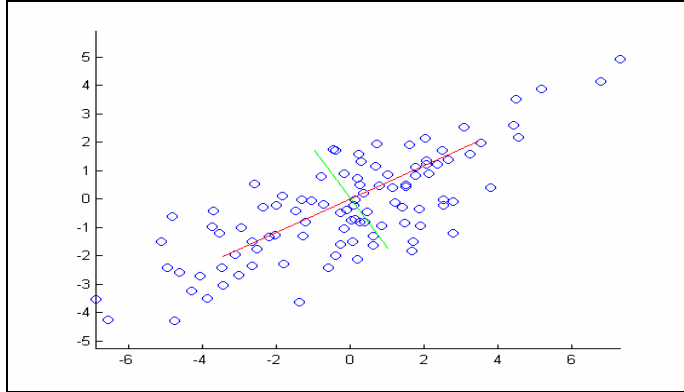
In multivariate statistical analysis, p variables (characteristic) related to n individuals (subject) is evaluated. Correlation between large number of variables makes the evaluation process difficult. In these cases, the PCA is the most commonly applied technique to eliminate the dependency pattern among variables, reduce the dimensionality of a data set and identify new meaningful underlying variables. In addition to dimensionality reduction, PCA has been shown to be a useful tool in other data analyses such as extracting information, seeking important regressors in regression analysis and effectively visualizing and clustering subjects.

The PCA is a multivariate statistical analysis technique providing data reduction and evaluation by explaining variance–covariance structure of a variable set with linear combination of these variables. In this technique, p variables with n measurements exhibiting correlative dependency pattern was transformed into k number of new variables with the characteristics of being linear and independent of each other.

When a system consists of p number of variables each with n measurement is considered, total variability of the system (variance) is explained by all of p number of variables. In cases where a significant part of total variability can be explained by k components, the k components can represent the original p variables. Then p variables with n measurements are reduced to k variables with n measurements without a significant loss of information. The k number of new variables is the various linear combinations of original variables formed by holding to some certain restrictions.

Algebraically, principal components are particular linear combinations of the p variables with n measurements. Geometrically, as seen in the Figure 1, these linear combinations represent the selection of a new coordinate system obtained by rotating the original system with p variables as the coordinate axis. The new axes represent the directions with maximum variability and provide a simpler and more parsimonious description of the correlation matrix.

Figure 1. Principle Component Axis



The first result aimed by the analysis is to reduce the p number of variables like Z_1, Z_2, \dots, Z_p into less number of variables representing them without a significant loss of information and to obtain general casual factors affecting the variables.

Consider p number of linear combination of Z_1, Z_2, \dots, Z_p ;

$$\begin{aligned}
 Y_1 &= (\mathbf{a}_1)^t \mathbf{Z} = a_{11}Z_1 + a_{21}Z_2 + \dots + a_{p1}Z_p \\
 Y_2 &= (\mathbf{a}_2)^t \mathbf{Z} = a_{12}Z_1 + a_{22}Z_2 + \dots + a_{p2}Z_p \\
 &\dots\dots\dots \\
 Y_p &= (\mathbf{a}_p)^t \mathbf{Z} = a_{1p}Z_1 + a_{2p}Z_2 + \dots + a_{pp}Z_p
 \end{aligned}$$

Here, Z_1, Z_2, \dots, Z_p are the row vectors of the standardized data matrix (p number of row vector for p number of variables), Y_1, Y_2, \dots, Y_p are principal components and a_{ij} are the constants indicating the degree of relation of each principal component with corresponding variable. a_{ij} constants are called component loadings. Component loadings are the weights showing the variance contribution of principal components to variables. Since the principal components are selected orthogonal to each other, a_{ij}

weights are proportional to correlation coefficient between variables and principal components. Then, variance and covariance of particular principal component;

$$\begin{aligned}\text{Var}(\mathbf{Y}_i) &= \text{Var}((\mathbf{a}_i)' \mathbf{Z}) = (\mathbf{a}_i)' \mathbf{S} \mathbf{a}_i = (\mathbf{a}_i)' \mathbf{R} \mathbf{a}_i \\ \text{Cov}(\mathbf{Y}_i, \mathbf{Y}_k) &= (\mathbf{a}_i)' \mathbf{S} \mathbf{a}_k = (\mathbf{a}_i)' \mathbf{R} \mathbf{a}_k \quad i, k = 1, 2, \dots, p\end{aligned}$$

In the equation, \mathbf{S} is the covariance matrix of standardized data matrix, \mathbf{R} is correlation matrix of standardized data matrix. Since the standardized data matrix was used, $\mathbf{R} = \mathbf{S}$.

The first principal component (\mathbf{Y}_1) is determined as the linear combinations of $\mathbf{Z}_1, \mathbf{Z}_2, \dots, \mathbf{Z}_p$ provided that the variance contribution is maximum. The second principal component (\mathbf{Y}_2), independent from the first principal component, is determined as to provide a maximum contribution to total variance left after the variance explained by the first principal component, then the third and the other principal components are determined as to provide the maximum contribution to the remaining variance and independent from each other.

The first principal component is a weighted linear combination of the original variables $\mathbf{Y}_1 = a_{11}\mathbf{Z}_1 + a_{21}\mathbf{Z}_2 + \dots + a_{p1}\mathbf{Z}_p$ accounting for the largest amount of variation. That is, it maximizes $\text{Var}(\mathbf{Y}_1) = (\mathbf{a}_1)' \mathbf{R} \mathbf{a}_1$. It is clear that $\text{Var}(\mathbf{Y}_1) = (\mathbf{a}_1)' \mathbf{R} \mathbf{a}_1$ can be increased by multiplying any \mathbf{a}_1 by some constant. To eliminate this indeterminacy, it is convenient to restrict attention to coefficient vectors of unit length. We therefore define;

First principal component = linear combination $(\mathbf{a}_1)' \mathbf{Z}$ that maximizes
 $\text{Var}((\mathbf{a}_1)' \mathbf{Z})$ subject to $(\mathbf{a}_1)' \mathbf{a}_1 = 1$

Second principal component = linear combination $(\mathbf{a}_2)' \mathbf{Z}$ that maximizes
 $\text{Var}((\mathbf{a}_2)' \mathbf{Z})$ subject to $(\mathbf{a}_2)' \mathbf{a}_2 = 1$ and
 $\text{Cov}(\mathbf{a}_1' \mathbf{Z}, \mathbf{a}_2' \mathbf{Z}) = \text{Cov}(\mathbf{Y}_1, \mathbf{Y}_2) = 0$

At the i th step,

i th principal component = linear combination $(\mathbf{a}_i)' \mathbf{Z}$ that maximizes
 $\text{Var}((\mathbf{a}_i)' \mathbf{Z})$ subject to $(\mathbf{a}_i)' \mathbf{a}_i = 1$ and
 $\text{Cov}(\mathbf{a}_i' \mathbf{Z}, \mathbf{a}_k' \mathbf{Z}) = \text{Cov}(\mathbf{Y}_i, \mathbf{Y}_k) = 0 \quad \text{for } k < i$

The aim here is to determine a_{ij} coefficients providing the linear combinations of variables based on the specified conditions. Some of the important results obtained from the above theoretical structure were given below;

Result-1

- \mathbf{Z} ; standardized data matrix consist of p variables with n measurements
- \mathbf{R} ; correlation matrix of \mathbf{Z}
- $\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_p \geq 0$ eigenvalues of correlation matrix,
- $\mathbf{e}_1, \mathbf{e}_2, \dots, \mathbf{e}_p$ standardized ($\mathbf{e}_i' \mathbf{e}_i = 1$) eigen vectors of correlation matrix then i^{th} principal component will be;

$$\begin{aligned}\mathbf{Y}_i &= (\mathbf{e}_i)' \mathbf{Z} = e_{1i} \mathbf{Z}_1 + e_{2i} \mathbf{Z}_2 + \dots + e_{pi} \mathbf{Z}_p \quad \text{and} \\ \text{Var}(\mathbf{Y}_i) &= (\mathbf{e}_i)' \mathbf{R} \mathbf{e}_i = \lambda_i \quad i = 1, 2, \dots, p \\ \text{Cov}(\mathbf{Y}_i, \mathbf{Y}_k) &= (\mathbf{e}_i)' \mathbf{R} \mathbf{e}_k = 0 \quad i \neq k\end{aligned}$$

From the *result-1*, the principal components (\mathbf{Y}_i);

- are independent of each other,
- have variances equal to corresponding eigenvalue of correlation matrix,

• component loadings (\mathbf{a}_i vectors) are the standardized eigenvectors (\mathbf{e}_i vectors) of corresponding eigenvalues.

Here, $a_{ij} = e_{ij}$ = weight of i th variable on j th principal component.

Result-2:

Total variance of original system is equal to total variance of principal components.

$$s_1 + s_2 + \dots + s_p = \sum_{i=1}^p Var(z_i) = \lambda_1 + \lambda_2 + \dots + \lambda_p = \sum_{i=1}^p Var(Y_i)$$

Since the total variability of data matrix is equal to total variability exhibited by principal components;

$$\text{Proportion of total variance due to } k\text{th principal component} = \frac{\lambda_k}{\lambda_1 + \lambda_2 + \dots + \lambda_p} \quad k = 1, 2, \dots, p$$

If most (for instance, 80%) of the total variance, for large p , can be attributed to the first one, two or three components, then these components can “replace” the original p variables without much loss of information. This ratio is even smaller in social researches. Also the principal components corresponding to eigenvalues with a value of lower than 1 are excluded from the evaluations since they bear statistically insignificant information.

Result-3:

The correlation coefficients between variables and principal components,

$$r_{Y_i, Z_k} = \frac{e_{ki} \sqrt{\lambda_i}}{\sqrt{s_k}} \quad i, k = 1, 2, \dots, p$$

As it can be understood from the equation, the eigenvectors $\mathbf{e} = (\mathbf{e}_1, \mathbf{e}_2, \dots, \mathbf{e}_p)$ are proportional to correlation coefficients between variables and principal components. Each e_{ki} indicates the significance of k th variable on formation of i th principal component.

Here $(\lambda_1, \mathbf{e}_1), (\lambda_2, \mathbf{e}_2), \dots, (\lambda_p, \mathbf{e}_p)$ are the eigenvalue-eigenvector pairs for \mathbf{R} .

The summary of the principal components method explained above can be given as follows;

- Data matrix belonging to p variable with n measurement is standardized,
- Correlation matrix of standardized data matrix is determined,
- Eigenvalues and eigenvectors of correlation matrix are calculated,
- Total variance explanation ratios of principal components are obtained from eigenvalues,
- Principal component scores are obtained by multiplying the transposed vector of each eigen vector with standardized data matrix.

3.4. Application of Principal Component Analysis Technique

The study has started by using 58 social and economic variables specified in Appendix 1.

Therefore, the data matrix contains 58 data set belonging to 81 provinces and has dimensions of 58x81.

$$\mathbf{X} = \begin{bmatrix} X_{1,1} & X_{1,2} & \dots & X_{1,81} \\ X_{2,1} & X_{2,2} & \dots & X_{2,81} \\ \vdots & \vdots & \dots & \vdots \\ X_{58,1} & X_{58,2} & \dots & X_{58,81} \end{bmatrix}$$

— —

Rows of the matrix indicate the variables and columns indicate the provinces.

X_{ij} = values of i th variable in j th province

Since the values of the variables are in various units and quantities, they were standardized. Every standardized variable has a mean value of 0 and a variance of 1. With this standardization, more or less weighting of the variables with various units and quantities are prevented.

Statistical analysis were carried out by computer software selected proper to the objectives. A standardized data matrix with a dimension of 58x81 was used as an input in the software. The principal component loading vector formed by eigenvectors of correlation matrix were obtained from data matrix. Next, principal component score matrix were obtained by multiplying transpose of principal component loading vector (e^t) with the standardized data matrix. Outputs also include the eigenvalues of correlation matrix, explanation ratios of principal components, correlation coefficients between principal components and variables, and results of statistical significance tests carried out various stages.

Eigenvalues and explanation ratios of principal components were given in Appendix-2. As it can be seen from the table, among the obtained 58 principal components, only 11 of them have a variance of higher than one. These components explain 87.8 % of total variability. On the other hand, the first principal component has half of the information carried by total variability of data set. The first principal component alone among the obtained 11 principal components explains 46.4 % of the variability in data. This 46.4 % explanation ratio was found to be significantly high when considered that the research was carried out on province level with 58 variables and taken into consideration that it should include social indicators besides the indicators of economic dimensions.

Together with the significantly high explanation ratio of the first principal component, the weights taken by each variable on this component and high correlation coefficients indicate that the first principal component could represent 58 variables assumed to represent the development levels of the provinces and under the development causal factor. Then the first principal component was accepted as general factor able to simultaneously and conjointly affect all variables or effected by the variables. Therefore, the first principal component was evaluated as '*development casual factor*' able to represent the socio-economic development of the provinces. The weights of variables on each principal component (principal component loadings, $a_{ij} = e_{ij}$) were given in Appendix-3.

The principal component loading matrix in Appendix-3 has an important conceptual content. The matrix is evaluated in two ways as of horizontal and vertical. Vertically, every column indicates the weight of each variable on principal components; horizontally, every row indicates the weight of the variables or significance levels on a principal component. In the first column of the table, it can be seen that in which weight and direction the variables effective in determination of development levels of the provinces.

Principal component loadings not only yield the weights of variables on principal components but also indicates direction of these weights. If the principal component loading has a negative sign, there is a relation in opposite direction; if it has a positive sign, there is a relation in the same direction. The relation is the statistical connection pattern between variables and the dimension explained by the principal component.

The weights of variables in the first principal component considered as development casual factor were given in an order of magnitude in Appendix-4. It can be seen from the table that with which items the socio-economical development was commonly represented.

Next step in model application was to obtain the development ranking of the provinces. To perform this step, in the first principal component, transpose of variable weights vector was taken and multiplied with standardized data matrix; by this way principal component scores were obtained.

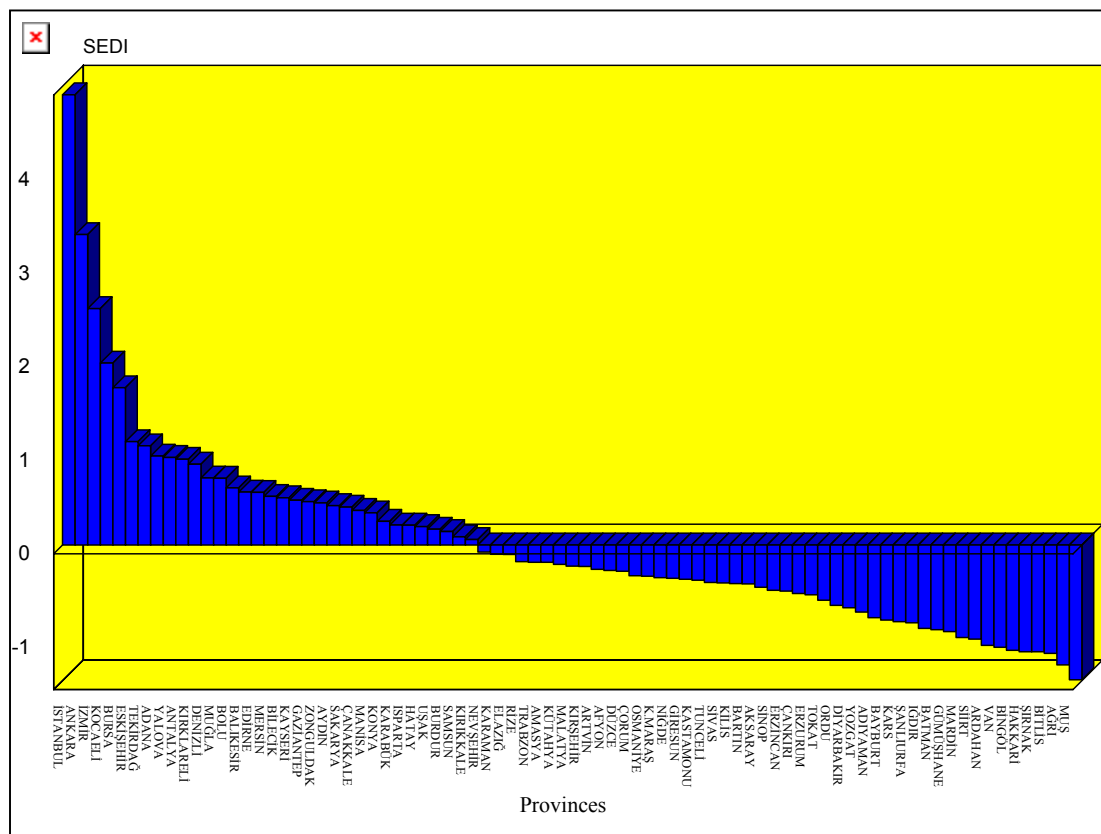
Principal component scores were accepted as SEDI for provinces. The socio-economic development ranking and index for the provinces given in the next section were formed by ranking the principal component values for provinces by their magnitudes.

As a last step, the provinces were grouped into graded homogeneous groups based on similarities among themselves and differences between each other. Besides, development ranking were obtained based on statistical regional units.

4. Results of the SEDI Ranking

At the first stage of the study, the SEDI Rankings of 81 provinces were determined (Figure 2). At the second stage, a development ranking was obtained according to 5 homogenous province groups 7 geographical regions and nomenclature units of territorial statistics (12 units according to NUTS I, 26 units according to NUTS II) having similar characteristics. In the next stage, sectoral (industry, education, health) development ranking was carried out according to different spatial levels including provinces, geographical regions and NUTS I and II regions.

Figure 2. SEDI Ranking of 81 Provinces in Turkey



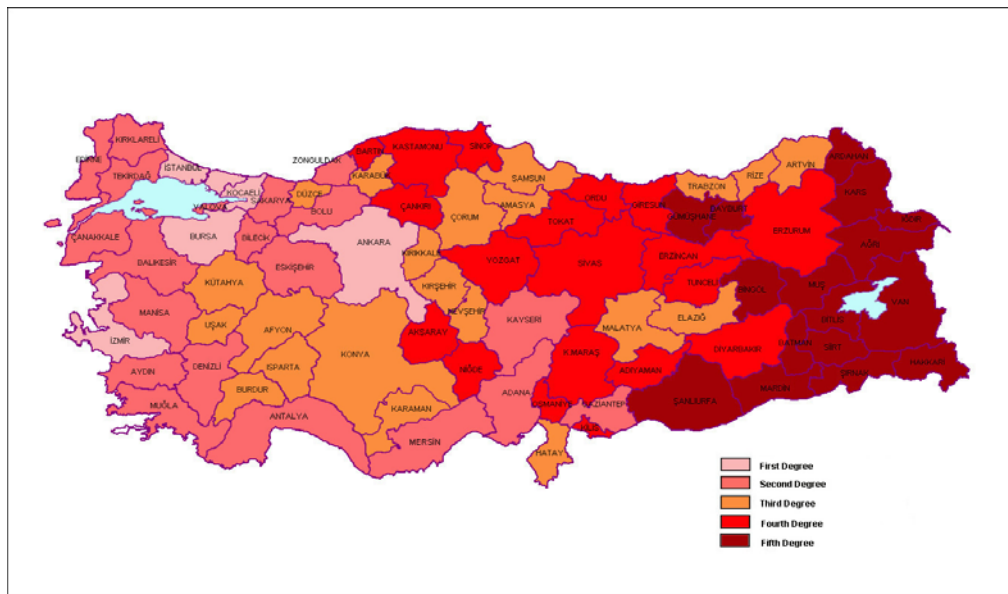
4.1. SEDI Rankings by Provinces and Ranked Province Groups

While one of the main objectives of SEDI rankings based on provinces is to determine the SEDI ranking of provinces, the other objective is to identify those provinces with an equivalent level of development according to Ranked Province Groups and in this manner to determine the homogenous areas countrywide. Because, the reflection of economic and social development on space may be determined and an important input may be provided for regional analyses by differentiating homogenous regions. In addition to this, the determination of province groups with different levels of development will render the arrangements aimed at reducing regional disparities more effective.

Further to an evaluation of the results of the survey, the country was classified in 5 separate groups with varying levels of development. The first group includes 5 provinces, the second group 20, the third group 21, the fourth group 19 and the fifth group 16 provinces.

The provinces included in the *First Degree Developed Provinces Group* are generally regional centers on national or on a lower scale. Of these provinces, İstanbul stands as the centre of both the country and the Marmara region. The province has, in the last few decades, also assumed a transboundary function and has become a global city, i.e. a city of the world where the main administrative units of international companies are located. Ankara, the capital city of the country and a trade and service centre in the Central Anatolia Region comes second after İstanbul in this group. İzmir which has, since older times, specialized as an important foreign trade centre of the country is currently the economic centre of the Aegean Region and continues to be the country's foreign trade centre of secondary importance for the surrounding provinces and regions. Kocaeli and Bursa are the remaining two provinces included in the first degree developed provinces group. While these two cities have internal characteristics specific to themselves, they are located in the hinterland of the İstanbul Metropolitan Region and are the industrial expansion or impact areas of İstanbul.

Map 1. Provincial Rankings According to SEDI Results



The first degree developed provinces group includes İstanbul, Ankara and İzmir, three major cities with the largest population, and Kocaeli and Bursa which are affected by the metropolis, İstanbul. Although the above mentioned five cities are included in this group, the homogeneity of this group within itself is lower than the homogeneity of other groups. In other words, the disparity in the extent of socio-economic development is fairly high between the provinces included in this group.

The second degree developed provinces group consists of 20 provinces in total, namely Eskişehir and Kayseri in the Central Anatolia Region; Tekirdağ, Yalova, Kırklareli, Balıkesir, Edirne, Bilecik, Sakarya and Çanakkale in the Marmara Region; Denizli, Muğla, Aydın and Manisa in the Aegean Region; Adana, Antalya and Mersin in the Mediterranean Region; Bolu and Zonguldak in the Black Sea Region; and Gaziantep in the Southeast Anatolia Region.

The provinces of Eskişehir, Denizli, Bilecik, Kayseri and Gaziantep with an intensive industrialization dynamics which, in recent years, have been referred to as New Industrial Districts (NIDs) are included in this group. One of the most important characteristics of these provinces is that they initiated a rapid development process primarily in the textiles industry gaining the advantage of ample and cheap labour, as a result of the promotion of exports based on the outward oriented development strategy (OODS) after 1980s. The provinces of Tekirdağ, Yalova, Kırklareli, Edirne and Sakarya included in this group are in a rapid development process as they are located in the hinterland of the metropolis, İstanbul. These provinces have in recent years appeared as the second development and expansion axis after Kocaeli and Bursa considered as the first development axis of İstanbul-centred industry. The provinces of Antalya, Muğla, Balıkesir and Aydın are in a growth process focusing on tourism and partly, agriculture. The province of Zonguldak where development has been based on state economic enterprises (SEEs), the province of Adana that appears as a centre of the South based on Çukurova-centred agriculture and agricultural industries, and the neighbouring province Mersin are included in this group.

An examination of the socio-economic indicators of provinces included in this group would indicate that the values are above the Turkey's average and that however they have not reached the performance of first degree developed provinces. The common characteristics of provinces included in the second degree developed provinces group are their being located on the coast, the importance of agricultural production and particularly industrial crop production and the developed state of agriculture-based industry. In addition to this, particularly in Antalya, Aydın and Muğla, the tourism sector comes first among economic activities. Revenues earned from foreign tourism provide an important input for both these provinces and for the country's economy.

Although an agriculture-based economic structure is dominant in the *third degree developed provinces* group, agriculture-based industry has also made progress. Manufacturing industry has developed in Konya, Samsun, Trabzon and Afyon and mining sector in Karabük. On the other hand, agricultural production has assumed quite an immense dimension in the provinces of Konya, Samsun, Trabzon and Afyon. Konya, by itself, has a 5% share in the agricultural production of the country. Export revenues have a large share in Hatay, Artvin and Samsun. The third degree developed provinces group consists of "medium degree" developed provinces which generally have a high potential for development, where the agricultural sector carries weight in economic activities, there are industrial enterprises producing on provincial and regional scale, SMEs are extensive and the socio-economic indicator figures are close to the country's average. Major developments that have been observed in recent years in peripheral industrial development have mainly taken place in the provinces included in this group. These provinces are in a rapid process of development and most of them are newly being industrialized.

The fourth degree developed provinces group consists of 19 provinces in total, namely Niğde, Sivas, Aksaray, Çankırı and Yozgat in the Central Anatolia Region; Giresun, Bartın, Sinop, Tokat, and Ordu in the Black Sea Region; Tunceli, Erzincan and Erzurum in the Eastern Anatolia Region; Diyarbakır and Adıyaman in the Southeastern Anatolia Region; and Kahramanmaraş and Osmaniye in the Mediterranean Region. There are no provinces in this group from the Marmara and Aegean Regions in the Western part of the country. The provinces included in this group are generally located around the third degree developed provinces group. Most of the provinces included in the third group have recently entered into a rapid development process based on manufacturing industry activities. It may be said that the fourth degree developed provinces group are on the threshold of development.

The fifth degree developed provinces group includes 16 provinces all of which are situated in the East and Southeast Anatolia Regions. All provinces in the group are covered by the PDAs policy. A general evaluation of the variables which reflect the level of socio-economic development would reveal that the fifth degree developed provinces group has the lowest values among ranked province groups. In fact, there is a mass migration from this group with a relatively lower level of development to other groups. The migration event causes regression and stagnation in the group. Therefore, there is a need to reduce the developmental disparities with other groups by raising the welfare level in the provinces included in this group. The most important steps in eliminating the disparities in question would be the initiatives directed at the mobilization of endogenous potentials of these regions and policies and practices that will stop migration.

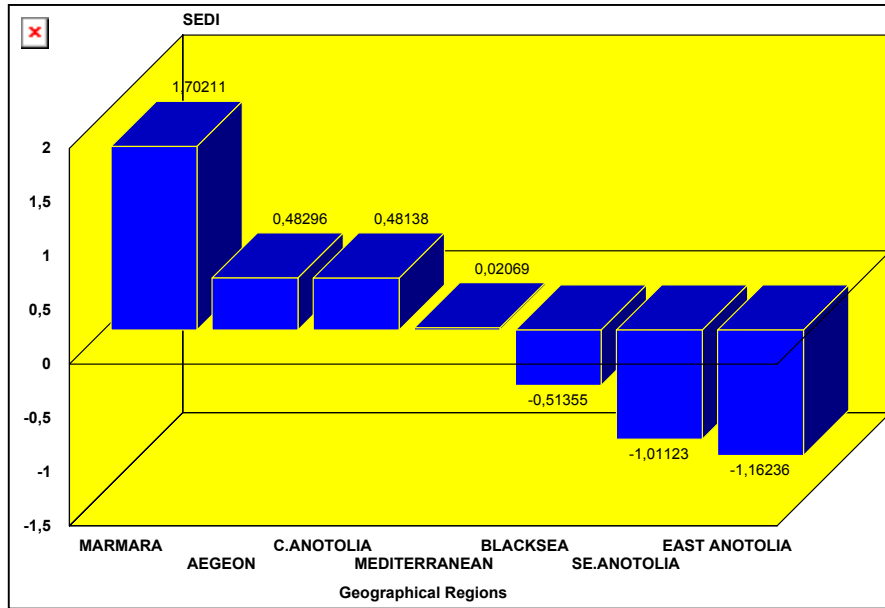
4.2. SEDI Rankings According to Geographical Regions

A development ranking by geographical regions was also carried out under the study and comparisons were made to geographical region rankings in the previous study (Figure 3). Although the comparable values of geographical regions which reflect the region's total such as the number of provinces, surface area and population differ from each other, the results of ranking produce important results about the spatial distribution of development.

Map 2: Geographical Regions in Turkey



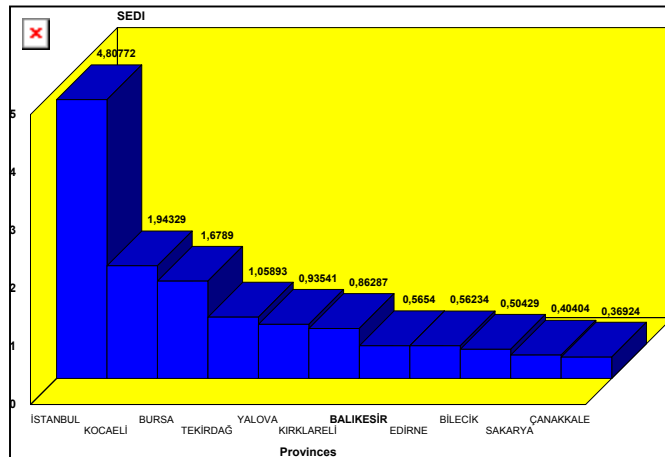
Figure 3: SEDI Ranking By Geographical Regions



The results of ranking may be summarized as follows:

The Marmara Region consisting of 11 provinces in total ranks first among 7 regions of the country. The main determinant of the region's socio-economic development is İstanbul which is the most important pole of the country and which currently remains as such. The concentration of industrial and commercial activities in İstanbul which shape the formation of the country's value added is the main reason why both the province and the Region is in a rapid development process. Industrial and commercial activities have in the past spread from İstanbul to the entire Region and made Marmara the country's most dynamic centre of development and attraction.

Figure 4: SEDI Ranking of The Marmara Region Provinces



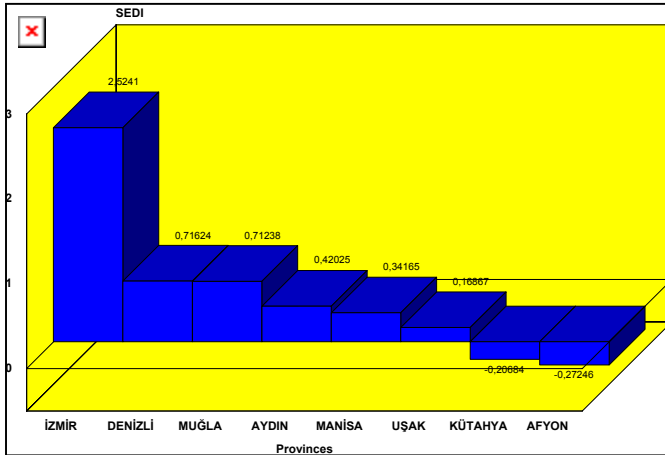
Although there are disparities between İstanbul and other provinces in the Region, Marmara as a whole tends to be homogenous. The general SEDI level which is also reflected on various welfare indicators in the Marmara Region that exhibits a diversified economic structure in industrial and commercial activities is the main factor which causes the Region to remain as a centre of attraction for migration. However much the Region's industry has reached a state of saturation, the urban threshold has been crossed and

centrifugal formations and external diseconomies have appeared which reduce the quality of life. Marmara, in its current position in regional ranking, still remains as a region attracting migration. Taking into consideration the existing and probable problems of Marmara Region, policies which will no longer make primarily İstanbul and the region a centre of attraction will direct migration to medium level developed regional centres by causing migration to have a stable dynamic still continue to assume importance.

The Marmara Region is succeeded by *the Aegean Region* composed of 8 provinces. There is approximately a two-thirds difference in the index values of Marmara and Aegean Regions. Spatial

development trends observed in Marmara are also experienced in the Aegean Region. Development activities have, in time, started to spread to the entire region from İzmir, the commercial and economic centre of the region. Major economic activities are intensive agriculture based on rich soil and water potentials, agriculture-based industries and tourism that developed particularly after 1980s. Industrial activities which initially developed on the basis of agriculture have, in time, diversified. The development process in the region is sectorally diverse and spatially balanced.

Figure 5: SEDI Ranking of the Aegean Region Provinces

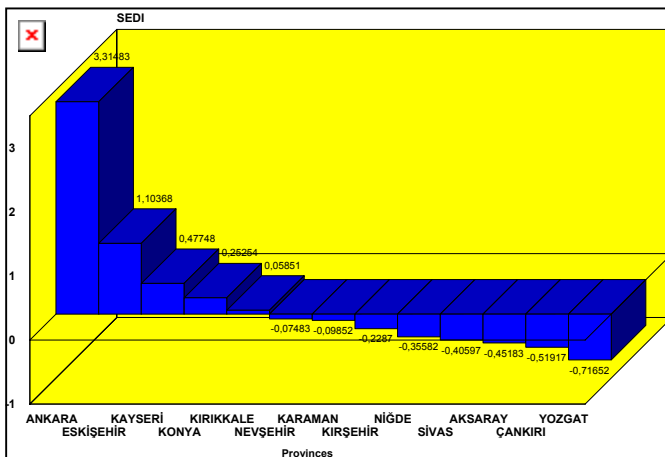


The Aegean Region exhibits a fairly balanced structure with its existing socio-economic level. The balanced development observed in economic and social sectors is also valid at spatial level. It shows a balanced regional development performance in itself from spatial distribution of population to spatial distribution of industry. Although the provinces of Afyon and Kütahya which remain below Turkey's average in terms of SEDI are located in the Region, the socio-economic development indexes of these

provinces are close to those of other provinces. All provinces located in the Aegean Region except İzmir have values close to Turkey's average.

In the Aegean Region where agriculture has been modernized, tourism has developed and industry has diversified and enriched, development continues to spread from İzmir, to neighbouring provinces. These provinces are mainly Manisa, Denizli, Aydın, Uşak and Afyon. OIEs that are successfully operating in the provinces included in this Region indicate that industrial development has been extending in the entire region integrating with urban and peripheral values.

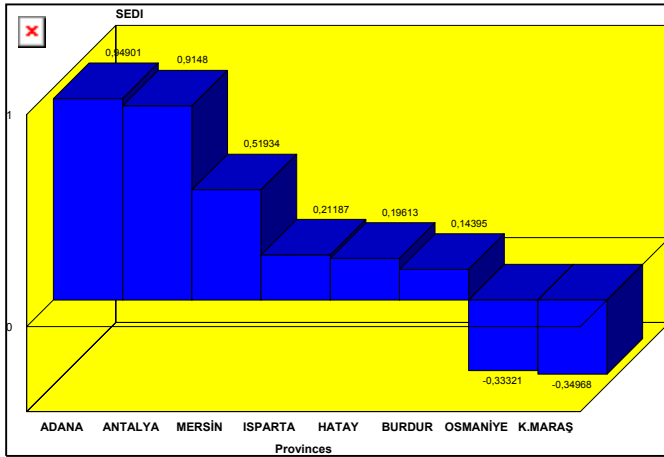
Figure 6: SEDI Ranking of The Central Anatolia Region Provinces



The Central Anatolia Region consisting of 13 provinces is ranked as the third. The index values of the Aegean Region and the Central Anatolia Region are fairly close to each other. It may in general be said that the Aegean and the Central Anatolia Regions have similar socio-economic development levels. Agricultural activities and primarily cereal production has an important place in the Central Anatolia Region. However, with NIDs such as Konya, Eskişehir and Kayseri which have entered into a rapid development process, industrial activities have also started to

extend in the region. Moreover, together with the developing industry, the capital city, Ankara which is the trade centre of the region raises all economic and social indicators of the region. All provinces in the Central Anatolia Region except Ankara have values close to Turkey's average in terms of index values.

Figure 7: SEDI Ranking of The Mediterranean Region Provinces

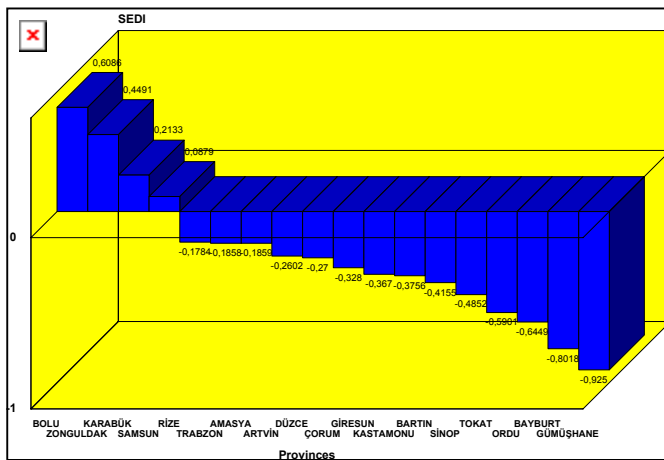


In the regional ranking, the Central Anatolia Region is followed by the *Mediterranean Region* consisting of 8 provinces which ranks as the fourth. The Mediterranean Region is the one that best reflects the country's average, with its index values. The values of the Mediterranean Region are close to the country's average in terms of all indicators. The agricultural, industrial and services sectors are in a rapid development process in this Region. Çukurova which has specialized in the production of industrial crops and greenhouse activities which are

widespread in the region occupies an important place in agriculture. In industry, in addition to agricultural industries, major industrial branches such as iron-steel and petro-chemicals occupy an important place in the Region's economy. International ports and free zones located in the region have made remarkable contributions to the development of commercial activities. Tourism activities that have developed rapidly have also diversified the economic structure of the region. Development is not based on a single pole at spatial level in the Region. Most of the provinces included in the Region have independently started to be a pole. More than one development centre has appeared in the Mediterranean with diverse economic activities. While the provinces of Kahramanmaraş and Osmaniye remain below the country's average in terms of the index value, an homogeneity is generally observed within the Mediterranean Region.

The Regions which remain below the country's average by index values indicating the level of socio-economic development are the Black Sea, Southeastern and Eastern Anatolia. Of these, the *Black Sea Region* consisting of 17 provinces is ranked as the fifth. The Black Sea Region consisting the largest number of provinces among regions is close to but remains below the country's average. The fifth rating of the Black Sea Region among interregional rankings by SEDI values is generally reflected on all of its indicators. While the region may rise to the third and fourth rank by certain indicators it may also fall to lower ranks by other indicators. The indicator values of the Region generally remain below

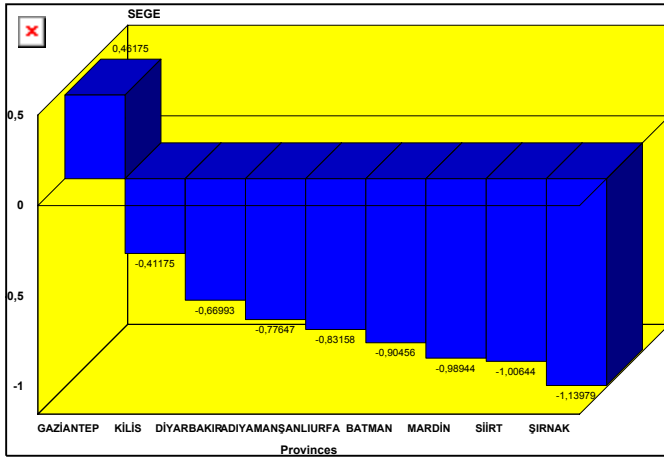
Figure 8: SEDI Ranking of The Black Sea Region Provinces



Turkey's averages. The major reason for this is the uneven structure of the terrain and the geographical conditions which do not offer a suitable environment for agriculture and industry. Although the agricultural sector still maintains its weight in the Region, the fragmented structure of agricultural land decreases agricultural efficiency. Moreover, as can be seen in the OIEs indicator, agglomeration areas appropriate for industry where efficiency will increase and industrial units will operate more rationally prove to be inadequate. As a result of all these reasons, migration from the Region which is at a

long distance from developed markets still remains as a major problem.

Figure 9: SEDI Ranking of The Southeast Anatolia Region Provinces

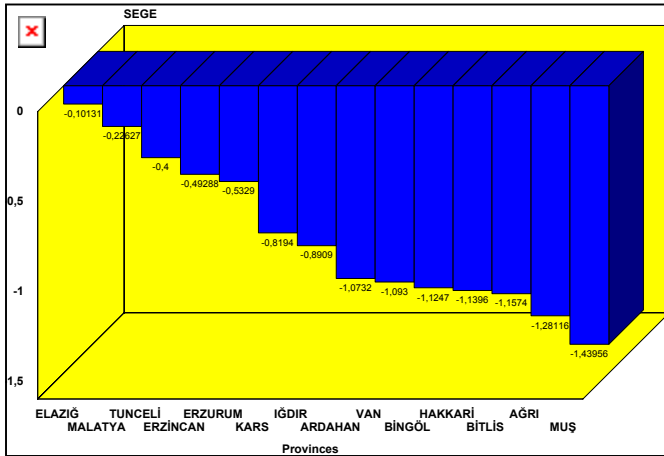


The index values of the *Southeast and East Anatolia Regions* which are ranked as the sixth and seventh respectively are close to each other as is the case with Aegean and Central Anatolia Regions. The Southeast Anatolia Region consisting of 9 provinces in total ranks as the sixth. The last ranking region is the East Anatolia Region consisting of 14 provinces.

In these three Regions with values below the country's average in regional ranking, factors such as geographical structure, climate characteristics and relative

distances to developed regional markets are the major elements of stagnation. Eastern Anatolia, the mountainous areas of the Black Sea and some areas of the Southeast Anatolia remain fairly below Turkey's averages in terms of income, employment and general welfare level. Due to these reasons, a mass migration takes place from these three regions to other regions.

Figure 10: SEDI Ranking of The Eastern Anatolia Region Provinces



Nevertheless, mass migration also has a negative impact on the spatial distribution of development, in addition to population. Because, migration arising from stagnation in these regions also means a loss of labour and capital in these regions and reinforces current stagnation. Policies and practices which will stop migration from the region and change the direction of migration to the region assume great importance for these regions.

4.3. SEDI Rankings According to NUTS

I and II Regions

A SEDI ranking was also made under this study according to NUTS I and II regions which are regional classifications of the European Union (EU). The NUTS classification is aimed at the collection and development of regional statistics, making of a socio-economic analysis of regions, identifying the framework of regional policies and establishing a data base for comparable statistics that conform to the regional statistics system of the EU. In this context, this study made a SEDI ranking according to NUTS I and NUTS II regions in NUTS classification⁴.

Map 3. NUTS Level I Regions



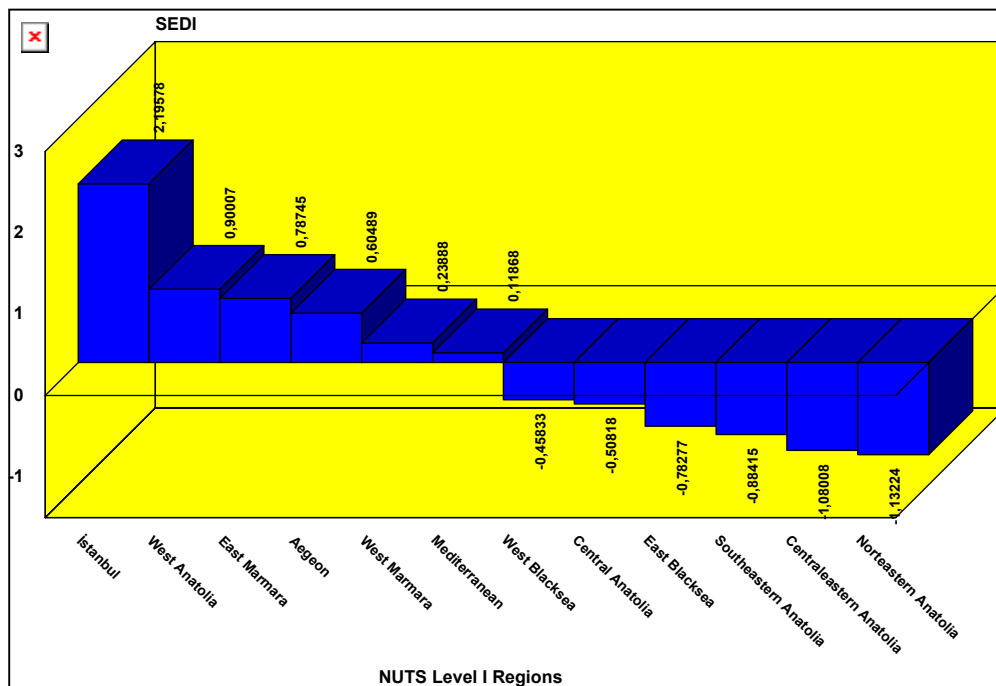
Map 4. NUTS Level II Regions



The number of NUTS I is 12 in Turkey and consists of a composition of NUTS 2 regions. The only exception to this is İstanbul as the province of İstanbul is a region by itself in terms of NUTS I, NUTS II and NUTS III units. According to the results of the ranking, 6 NUTS I units had positive and 6 NUTS I units had negative index values. The units which have positive values according to their position in ranking are as follows: İstanbul region composed of İstanbul sub-region was ranked as the 1st; the Western Anatolia Region composed of Ankara and Konya sub-regions was ranked as the 2nd; the Eastern Marmara Region composed of Bursa and Kocaeli sub-regions was ranked as the 3rd; the Aegean Region composed of Aydın and Manisa sub-regions was ranked as the 4th; the Western Marmara Region composed of Tekirdağ and Balıkesir sub-regions was ranked as the 5th; and the Mediterranean Region composed of Adana, Antalya and Hatay sub-regions was ranked as the 6th (Figure 11).

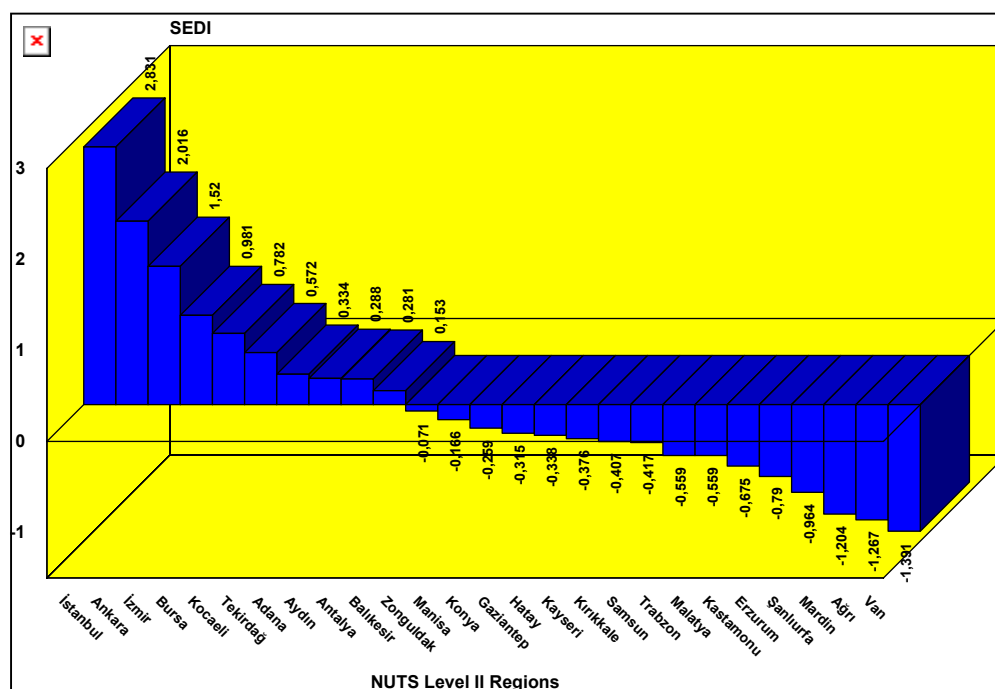
NUTS-1 units which had negative values according to their position in ranking are as follows: The Western Black Sea Region composed of Zonguldak, Samsun and Kastamonu sub-regions was ranked as the 7th; the Central Anatolia Region composed of Kayseri and Kırıkkale sub-regions was ranked as the 8th; the Eastern Black Sea Region composed of Trabzon sub-region was ranked as the 9th; the Southeast Anatolia Region composed of Gaziantep, Şanlıurfa and Mardin sub-regions was ranked as the 10th; the Central East Anatolia Region composed of Malatya and Van sub-regions was ranked as the 11th; and the Northeast Anatolia Region composed of Erzurum and Ağrı sub-regions was ranked as the 12th.

Figure 11: SEDI Ranking of The NUTS Level I Regions



There are 26 NUTS-2 regional units which consist of a composition of NUTS-3s, i.e. of provinces. NUTS II units which are ranked as the first 3 according to SEDI rankings are at the same time those provinces which are ranked as the first eight according to a ranking by provinces. According to this, İstanbul, Ankara and İzmir sub-regions are respectively the most developed first three NUTS II units. Bursa sub-region is ranked as the fourth and Kocaeli sub-region as the fifth. A comparison to the ranking by provinces indicates that the provinces of Bursa and Kocaeli take the place of each other. The reason for this is that, although they bear the same name, Bursa NUTS II region consisting of three provinces and Kocaeli NUTS II region consisting of five provinces are ranked as regional centres and not as provinces.

Figure 12: SEDI Ranking of The NUTS Level II Regions



4.4. Sectoral SEDI Ranking

Territories of different scales (provinces, NUTS-2 regions and geographical regions) were also ranked according to the level of development in industry, health and education sectors under this study.

4.4.1. SEDI Ranking of the Industrial Sector

Eight variables were used as a data set in the ranking of the *industrial sector* which occupies an important place among economic sectors⁵. Several studies conducted previously also tried to identify the spatial development trends of industry.

Mainly four trends have been noticed in Turkey in the recent few decades about the spatial distribution of the industry. The *first* is the expansion of the industry to the surrounding provinces from traditional regional

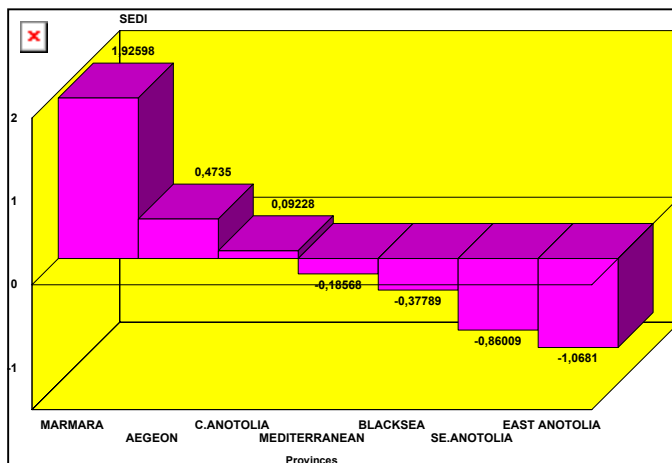
⁵ Industrial variables are as follows: Proportion of the persons employed in agricultural sector, number of plots in organized industrial estates, number of establishments in small industrial sites, number of establishments in manufacturing industry, annual average number of employees in manufacturing industry, total capacity of power equipment installed at the end of year, per capita value added in manufacturing industry, and per capita electricity consumption in manufacturing industry.

centres such as İstanbul, İzmir, Adana and Ankara and the rise in the services sector in these centres. The *second* is the concentration of decentralized industry in the hinterland provinces that are neighbours to traditional regional centres. Major examples that may be given for these provinces are Kocaeli, Sakarya, Tekirdağ, Manisa and Mersin. The *third* is the industrial decline in provinces such as Zonguldak and Kırıkkale where SEEs are concentrated. The *fourth* is that some provinces located in different regions of Anatolia appear as NIDs by specializing in certain sectors based on endogenous sources. Provinces such as Denizli, Gaziantep, Çorum and Kahramanmaraş may be cited as examples to this (Özaslan, 2003).

There are provinces other than those defined in the scope of these groups, which attract attention in terms of industrial indicators. Bilecik, Konya, Hatay, Kütahya, Tokat, Sivas and Ordu are the major provinces, the development ranking of the industrial sector of which is above the SEDI ranking and where industry relatively carries weight in terms of sectoral distribution in the province.

Major provinces which have a high rating in terms of SEDI, but which rate low in terms of industrial sector and where sectors other than industry are in a leading position in the sectoral structure within the province may be listed as follows; Eskişehir, Bolu, Balıkesir, Edirne, Antalya, Aydın, Trabzon, Nevşehir, Muğla and Osmaniye. Service sectors such as agriculture and/or tourism, and trade carry weight in the intra-city sectoral composition of these provinces. In fact, some of these provinces are known as agricultural cities, some others as tourism cities and some as regional centres.

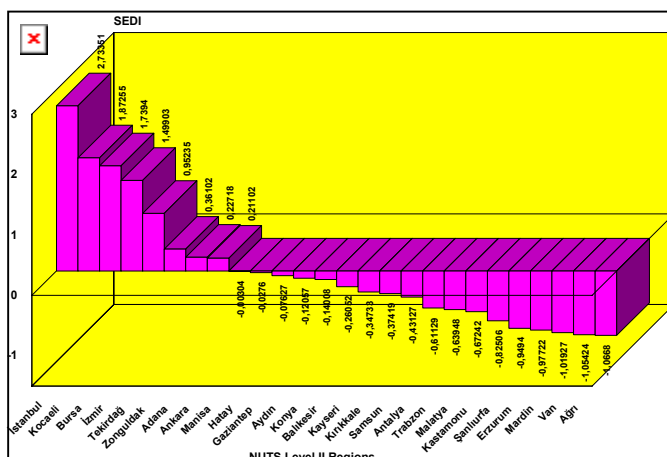
Figure 13: SEDI Ranking of Industry Sector According to Geographical Regions



The Marmara Region ranks first in the development ranking of the industrial sector by geographical regions. The Marmara Region is succeeded by the Aegean and Central Anatolia Regions. These three regions have positive values in terms of index values and are ranked above Turkey's average. Regions which are ranked below Turkey's average are the Mediterranean Region ranked as the 4th, the Black Sea Region ranked as the 5th, the Southeastern Anatolia Region ranked as the 6th and Eastern Anatolia Region ranked as the last. There is no difference

between SEDI ranking and industrial sector ranking by geographical regions. In other words, geographical regions have maintained their relative position in both rankings.

Figure 14: SEDI Ranking of Industry Sector According to NUTS II Regions



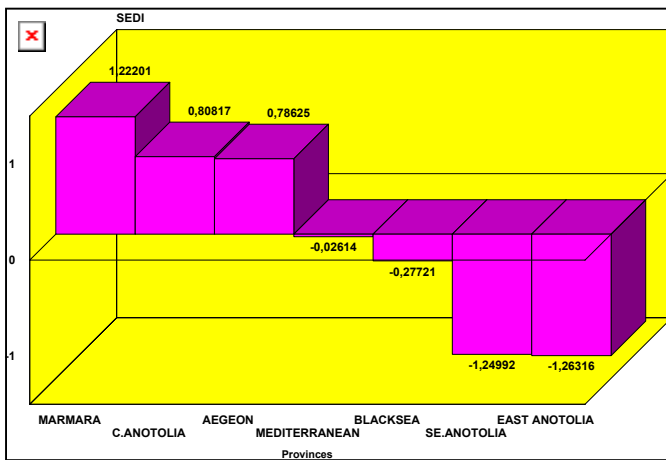
There are several differences between the industrial sector development ranking in NUTS II statistical region units and SEDI ranking. The most striking ones are the Kocaeli, Zonguldak, Ankara, Manisa, Hatay, Gaziantep, Aydın and Balıkesir NUTS-2 Regions. Of these regions, the position of Kocaeli, Zonguldak, Manisa,

Hatay and Gaziantep in the industrial sector development ranking is above that of SEDI ranking. The opposite is true in other sub-regions. This indicates that the industrial sector in the regions included in the first group is relatively developed as compared to other sectors. The sectors which raise the SEDI level of the sub-regions included in the second group are those other than the industrial sector.

4.4.2. SEDI Rankings of the Health Sector

The development level and spatial distribution results of the *health sector*⁶ based on provinces, NUTS II regions and geographical regions, where development is ranked using a data set consisting of five health variables may be summarised as follows:

Figure 15: SEDI Ranking of Health Sector According to Geographical Regions



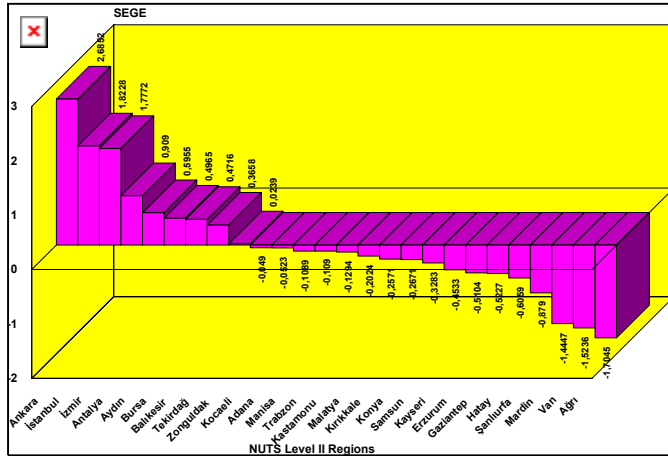
The development ranking of the health sector by geographical regions is respectively as follows according to the level of development: Marmara Region ranks the first. Other regions are ranked as Central Anatolia, Aegea, Mediterranean, Black Sea, Southeastern Anatolia and Eastern Anatolia Regions. A comparison of the health sector development ranking to the SEDI of regions would reveal that Central Anatolia and Aegean Regions take the place of each other. While according to the SEDI ranking based on 58 social and economic variables, the Aegean Region is ranked as the second and

the Central Anatolia Region as the third, according to the health sector ranking based on five health variables, the Central Anatolia Region rises to the second rank and the Aegean Region falls to the third rank. The reason why the Central Anatolia Region rises to the second rank in terms of the health sector is that the capital city Ankara as the most important health centre of Turkey is located in this region. In fact, Ankara rates as the first in the development ranking of health sector on the basis of provinces.

There are differences between health sector development rankings of NUTS-2 regions and the SEDI rankings of the same regions. İstanbul and Ankara sub-regions have taken the place of one another in both rankings. While in the SEDI ranking İstanbul Region ranks 1st and Ankara Region ranks 2nd, the two regions take the place of one another in health sector ranking. Major regions which have a low rating in SEDI ranking and a high rating in health sector ranking are Antalya, Aydın, Trabzon, Kastamonu and Malatya. The regions in question had a notable performance previously in terms of health sector investments and preferences of health personnel such as physicians, dentists and pharmacists.

Figure 16: SEDI Rankings of Health Sector According to NUTS II Regions

⁶ The variables used in the health sector ranking are as follows: Infant mortality rate, number of medical doctors per 10000 person, number of dentists per 10000 person, number of pharmacies per 10000 person, and number of hospital beds per 10000 person.



On the other hand, major regions which rated high in SEDI ranking and rated low in health sector development ranking are Kocaeli, Konya, Gaziantep and Hatay. The development in industry and agriculture in these regions has not been reflected at the same rate upon the health sector. These regions had a relatively low performance previously in terms of health sector investments and preferences of health personnel such as physicians, dentists and pharmacists.

The results of ranking at provincial level may be outlined as follows: Major provinces which had a low rating in SEDI ranking and a high rating in health sector development ranking are Isparta, Bolu, Edirne, Aydın, Elazığ, Burdur, Trabzon, Samsun, Kastamonu, Kırşehir and Malatya. These provinces had a notable performance previously in terms of health sector investments and preferences of health personnel such as physicians, dentists and pharmacists.

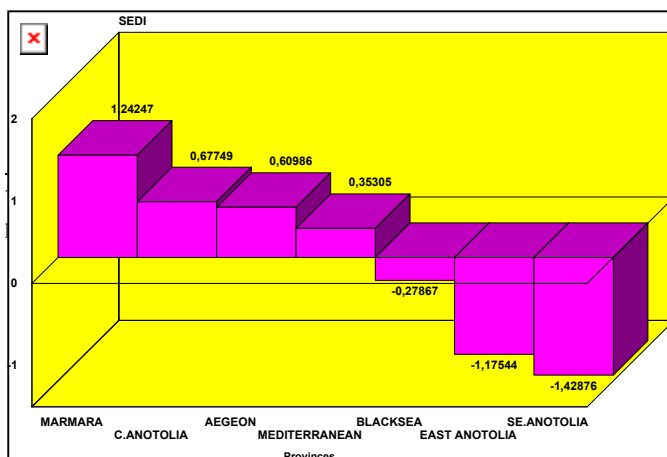
Major provinces which rated high in SEDI ranking and rated low in health sector development ranking are Bursa, Adana, Kocaeli, Yalova, Kayseri, Tekirdağ, Gaziantep, Bilecik, Karabük and İçel. The development in industry and agriculture in these provinces has not been reflected at the same rate on the health sector. Moreover, the provinces in question had a relatively poor performance previously in terms of health sector investments and preferences of health personnel such as physicians, dentists and pharmacists.

4.4.3. SEDI Ranking of the Education Sector

A data set consisting of six education variables was used in the development ranking of the education sector⁷. The results of the development level and spatial distribution of the education sector based on provinces, NUTS-2 regions and geographical regions may be summarised as follows:

In the development ranking of the education sector by geographical regions, Marmara Region rates as the first and is followed by the Central Anatolia, Aegea, Mediterranean, Black Sea, East Anatolia and Southeast Anatolia regions. A comparison of the development ranking of the education sector to the SEDI ranking of regions would reveal that Central Anatolia and Aegean Regions take the place of one another in ranking as is the case in health sector ranking. While according to the general development ranking based on 58 social and economic variables, the Aegean Region rates as the second and the Central Anatolia Region as the third, according to the education sector ranking, the Central Anatolia Region rises to second in rank and the Aegean Region falls to third in rank.

Figure 17: SEDI Ranking of Education Sector According to Geographical Regions

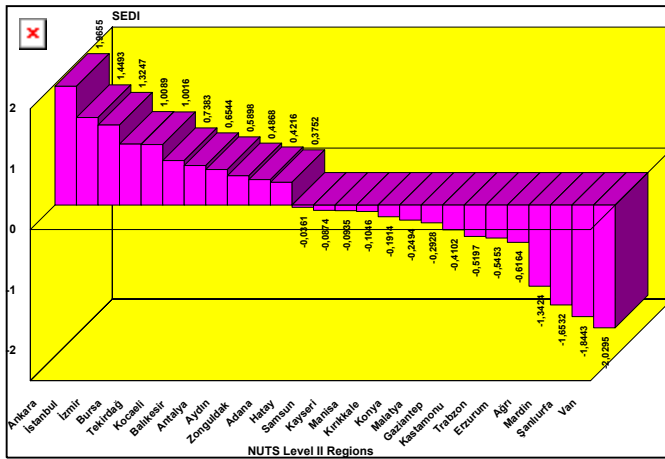


The reason why the Central Anatolia Region rises to the second rank in terms of the education sector is that the capital city

woman literate rate, proportion of higher education graduate

Ankara as the most important education centre of Turkey is located in this region, as is the case in the health sector. In fact, Ankara, the capital city rates as the first in the development ranking of the education sector on the basis of provinces. Ankara is the most developed centre of Turkey in both health and education sectors. Other two regions which take the place of one another are the Eastern and Southeastern Anatolia regions. While Southeastern Anatolia Region rates as the 6th and Eastern Anatolia Region as the 7th according to the SEDI ranking, the two regions take the place of one another in the education sector ranking.

Figure 18: SEDI Ranking of Education Sector According to NUTS II Regions



There are differences between the education sector development ranking by NUTS-II regions and the SEDI ranking of the same regions. İstanbul and Ankara regions have taken the place of one another in both rankings. While in the SEDI ranking İstanbul Region rates as the 1st and Ankara Region as the 2nd, the two regions take the place of one another in education sector ranking. Major regions which are rated low in SEDI ranking and are rated high in education sector ranking are Balıkesir, Hatay, Samsun, Kayseri, Malatya and Ağrı. It may be said that the regions in

question had a notable performance previously in terms of education sector investments and general level of education.

On the other hand, major regions which rate high in SEDI ranking and rate low in education sector development ranking are Adana, Manisa, Konya, Gaziantep, Trabzon and Şanlıurfa NUTS-2 regions. The development in industry and agriculture in these regions has not been reflected at the same rate on the education sector. It is observed that these regions had a relatively poor performance previously in terms of education sector investments and general level of education.

The results of ranking at provincial level is summarized below. Provinces which rate low in SEDI ranking and high in education sector development ranking are included in the first group. These provinces are mainly Muğla, Karabük, Çanakkale, Burdur, Artvin, Tunceli, Düzce, Amasya, Kırşehir, Osmaniye, Bartın, Erzincan, Bayburt and Ardahan. These provinces had a notable performance previously in terms of education sector investments and general level of education. Provinces which rate high in SEDI ranking and low in education sector development ranking are included in the second group. Provinces included in this group are mainly Adana, Denizli, İçel, Aydın, Manisa, Nevşehir, Elazığ, Konya, Gaziantep, Afyon, Kastamonu and Diyarbakır. The development in other sectors such as industry and agriculture in these provinces has not been reflected at the same rate on the education sector. Moreover, the provinces in question had a relatively poor performance previously in terms of education sector investments and general level of education.

In conclusion, it should be noted that further to a comparison of the development level of the education sector to the general development level on the basis of provinces and NUTS-II Regions, wide developmental disparities are observed between regions in terms of the performance of the education sector. A comparison with other sectors in the same region would reveal that the education sector has reached a relative state of saturation in some regions, but that in other regions the education sector proves to be highly inadequate. The formulation of education policies including education sector investments and personnel appointments by taking into account the existing results would be an

important step in eliminating the disparities between regions in the development level of the education sector.

A general evaluation would indicate that the provinces that are in the Western part of the line connecting Zonguldak to Gaziantep are generally included in the developed provinces group. Relatively less developed provinces are located in the Eastern part of this line. The level of development relatively decreases in general as one goes from the West to the East of the country. Nevertheless, development that starts in the West and extends to the periphery speeds up homogeneity tendencies throughout the country.

Intensive public investments and expansion of the domestic market are among the reasons why development and particularly industrialization has recently shifted to peripheral regions. Considerable developments particularly in transportation and communications infrastructure, OIEs and SISs practices and the PDAs policy have had an impact on the expansion and localization of development activities. As a result of this process, local capital has accumulated and a culture of industrialization and entrepreneurship has started to develop in Anatolia. It is observed that industrial activities in provinces defined as NIDs have particularly recently become widespread in a dynamic structure and developments have taking place in a production process based on SMEs and even exportation. The industrial growth that has taken place in these provinces is also reflected on SEDI rankings. On the other hand, a relative regression is observed in provinces traditionally known to have an agricultural structure. The recent development trends of several provinces particularly in the Central Aegean and Central Anatolia regions have taken a regressive course.

In conclusion, in spite of all the positive developments in regional development, it is not possible, at this stage, to speak well of a balanced distribution of economic and social development throughout the country as is the case in almost every country. The incentive measures and practices are not adequate to mobilize the private sector in reducing territorial disparities and interregional migration remains as a major problem. In this respect, there is still a need for regional development policies to be formulated taking into account the effective utilization of capital as the most scarce resource of the economy.

5. Conclusion

58 variables that have a direct or indirect impact on the economic and social structure of provinces were used in this study that covers 81 provinces based on the administrative division of 2000. The analysis made use of PCA, a multi-variable statistical technique. Numerical values that may be defined as SEDI were obtained in this manner for each province and the provinces were ranked according to these values. Apart from this, major differences in SEDI values were identified and the provinces were classified in five groups according to different levels of development. These groups have a 5-rated structure extending from the first to the fifth rate, i.e. from the most developed to the least developed provinces group. A general evaluation of these rates would indicate that the provinces in the first and second rates are above and the other 3 groups are below the averages of the country. A SEDI ranking was also carried out based on geographical regions and NUTS-2 regions using the same data set. The distribution of industrial, health and education sectors by territories of different scales was examined at the last stage using selected indicators.

A general evaluation based on variables would reveal that the value of basic indicators such as demographic structure, labour demand, the quality of education and health services, industrial structure, production level and physical infrastructure remains below the average of Turkey in underdeveloped territorial units. On the other hand, it is observed that territories that are

underdeveloped in terms of certain indicators such as population dependency rate, average household size and infant mortality rate are fairly above the average of Turkey.

The common and basic characteristic of underdeveloped territories which rate low is that they exhibit such a structure specific to less developed regions where agricultural sector carries weight. In spite of this, agricultural efficiency is low and hidden unemployment in agricultural sector is high in these regions. On account of these reasons, a mass migration including capital and young labour force takes place from such settlement units to developed regions and migration sort of nourishes the vicious circle of underdevelopment. It seems impossible for these territories to break the existing vicious circle with their internal dynamics without external interventions by effective public policies. In this context, there is a need to increase the territorial competitiveness of underdeveloped territories by mobilizing their endogenous potentials and in this manner to establish a balanced regional structure throughout the country by approximating their development indicators to the country's average. Additionally, the main objective in directing national resources should be to improve the internal potentials and increase the competitive power of these regions thereby causing them to have a sustainable regional development structure.

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APPENDIX 1. SOCIAL AND ECONOMIC VARIABLES USED IN SEDI

<u>YEAR</u>	<u>VARIABLES</u>
	DEMOGRAPHIC
2000	1Total Population
2000	2Proportion of the Population living in the city
1990-00	3Annual Growth Rate of Population
2000	4Population Density
2000	5Fertility Rate
2000	6Average household size
	EMPLOYMENT
2000	7Proportion of the persons employed in agricultural sector
2000	8Proportion of the persons employed in industrial sector
2000	9Proportion of the persons employed in commercial sector
2000	10Proportion of the persons employed in financial sector
2000	11Proportion of regular or casual employee
2000	12Proportion of regular or casual woman employee
2000	13Proportion of employer
	EDUCATION
2000	14Literacy rate
2000	15Woman literate rate
2000	16Proportion of higher education graduate population
2000-01	17Schooling rates in primary education
2000-01	18Schooling rates in high school
2000-01	19Schooling rates in vocational and technical high school
	HEALTH
2000	20Infant mortality rate
2000	21Number of medical doctors per 10000 person
2000	22Number of dentists per 10000 person
2000	23Number of pharmacies per 10000 person
2000	24Number of hospital beds per 10000 person
	MADDE I. INDUSTRY
2000	25Number of plots in organized industrial estates
2000	26Number of establishments in small industrial sites
2000	27Number of establishments in manufacturing industry
2000	28Annual average number of employees in manufacturing industry
2000	29Total capacity of power equipment installed at the end of year
2000	30Per capita value added in manufacturing industry
2000	31Per capita electricity consumption in manufacturing industry
	MADDE II. AGRICULTURE
2000	32Agricultural production value per rural population
2000	33Share of agricultural production value in national production
	CONSTRUCTION
2000	34Total number of housing units
2000	35Proportion of housing unit with piped water
	FINANCIAL
2000	36Share in total gross domestic product
2000	37Per capita gross domestic product
2000	38Number of bank branches
2000	39Bank deposits per capita
2000	40Share in total bank deposits
2000	41Share in total bank credits
2000	42Agricultural credits per rural population
2000	43Amount of industrial, commercial and tourism credits per capita
2000	44Municipal expenditures per capita
2000	45Consolidated budgeted revenues per capita
2000	46Amount of income and corporation tax per capita
1995-00	47Total public expenditures per capita
1995-00	48Per capita amount of investments with incentive certificates
1995-00	49Total exports per capita
1995-00	50Total imports per capita
	MADDE III. INFRASTRUCTURE
2000	51Proportion of asphalt road in rural settlements
2000	52Proportion of total asphalt road
2000	53Proportion of population in rural settlements with adequate drinking water supply

OTHER WEALTH INDICATORS	
2000	54Number of private cars per 10000 population
2000	55Number of motor vehicles per 10000 population
2000	56Total electricity consumption per capita
2000	57Total telephone counters per person
2000	58Proportion of population having a card for free health services

APPENDIX 2. THE PROPORTION OF THE TOTAL VARIANCE EXPLAINED BY EACH COMPONENT

Principle Component	Eigenvalue (Variance)	Proportion of Total Variance Explained	Cumulative Proportion of Total Variance Explained
1	26.90000	46.3790	46.3790
2	7.55300	13.0230	59.4010
3	4.04000	6.9650	66.3670
4	2.69900	4.6530	71.0200
5	2.26500	3.9040	74.9240
6	1.69300	2.9190	77.8430
7	1.38400	2.3860	80.2290
8	1.26600	2.1820	82.4110
9	1.08000	1.8610	84.2730
10	1.04500	1.8010	86.0740
11	1.01800	1.7550	87.8290
12	0.80700	1.3920	89.2210
13	0.70500	1.2150	90.4360
14	0.57800	0.9970	91.4330
15	0.54200	0.9350	92.3680
16	0.50000	0.8630	93.2300
17	0.48000	0.8280	94.0580
18	0.43500	0.7490	94.8080
19	0.39700	0.6850	95.4930
20	0.32600	0.5620	96.0540
21	0.27700	0.4770	96.5310
22	0.24800	0.4280	96.9590
23	0.21100	0.3640	97.3230
24	0.20500	0.3530	97.6760
25	0.17500	0.3020	97.9770
26	0.15400	0.2650	98.2420
27	0.13500	0.2320	98.4740
28	0.11500	0.1970	98.6720
29	0.10600	0.1820	98.8540
30	0.09829	0.1690	99.0240
31	0.07994	0.1380	99.1620
32	0.07342	0.1270	99.2880
33	0.06231	0.1070	99.3960
34	0.05812	0.1000	99.4960
35	0.05499	0.0948	99.5910
36	0.03645	0.0629	99.6530
37	0.03307	0.0570	99.7110
38	0.02827	0.0487	99.7590
39	0.02322	0.0400	99.7990
40	0.02145	0.0370	99.8360
41	0.01857	0.0320	99.8680
42	0.01467	0.0253	99.8940
43	0.01255	0.0216	99.9150
44	0.00986	0.0170	99.9320
45	0.00955	0.0165	99.9490
46	0.00858	0.0148	99.9630
47	0.00547	0.0094	99.9730
48	0.00432	0.0074	99.9800
49	0.00344	0.0059	99.9860

50	0.00237	0.0041	99.9900
51	0.00202	0.0035	99.9940
52	0.00101	0.0017	99.9960
53	0.00094	0.0016	99.9970
54	0.00072	0.0012	99.9980
55	0.00040	0.0007	99.9990
56	0.00027	0.0005	100.0000
57	0.00020	0.0003	100.0000
58	0.00003	0.0001	100.0000

Appendix 3. Principle Component Coefficient Matrix

Variable No	Principle Comp. 1	Principle Comp. 2	Principle Comp. 3	Principle Comp. 4	Principle Comp. 5	Principle Comp. 6	Principle Comp. 7	Principle Comp. 8
X1	0.028	0.079	-0.031	0.043	-0.068	0.003	0.037	-0.073
X2	0.023	0.026	0.013	0.062	0.164	-0.100	-0.155	-0.276
X3	0.009	0.043	0.047	0.251	0.099	0.099	-0.166	-0.050
X4	0.024	0.079	0.023	-0.021	-0.165	-0.075	-0.036	0.001
X5	-0.022	0.078	0.049	0.102	0.150	-0.038	0.033	0.054
X6	-0.025	0.080	0.040	0.054	0.103	0.035	-0.003	-0.013
X7	-0.031	-0.008	-0.045	0.024	-0.149	0.130	0.064	0.117
X8	0.030	-0.019	0.081	0.037	-0.049	-0.120	-0.075	-0.086
X9	0.032	-0.001	-0.022	0.080	0.042	-0.067	-0.018	-0.026
X10	0.034	0.027	-0.048	-0.032	0.072	0.021	-0.088	0.011
X11	0.030	0.008	0.050	-0.033	0.169	-0.131	-0.040	-0.124
X12	0.035	-0.005	0.003	0.019	0.044	-0.052	-0.013	-0.009
X13	0.033	0.013	-0.024	0.069	0.000	-0.083	-0.030	-0.036
X14	0.025	-0.074	-0.033	-0.037	-0.134	0.040	-0.108	-0.025
X15	0.025	-0.075	-0.036	-0.028	-0.143	0.039	-0.100	-0.013
X16	0.030	-0.001	-0.064	-0.031	0.150	0.044	-0.066	-0.032
X17	0.018	0.000	0.062	-0.033	0.109	-0.304	0.216	0.212
X18	0.025	-0.051	-0.023	-0.035	0.086	-0.135	-0.022	0.027
X19	0.021	-0.070	0.031	-0.155	-0.055	-0.050	-0.001	-0.062
X20	-0.016	0.049	0.036	-0.026	0.050	-0.095	0.265	0.251
X21	0.030	-0.011	-0.080	-0.061	0.102	0.030	0.007	-0.025
X22	0.031	-0.007	-0.067	-0.013	0.057	0.006	-0.016	0.164
X23	0.027	-0.037	-0.063	0.057	0.000	0.019	0.207	0.035
X24	0.018	-0.032	-0.094	-0.109	-0.019	0.018	0.095	-0.170
X25	0.017	0.016	-0.092	-0.033	0.234	0.147	-0.105	0.135
X26	0.021	0.006	-0.055	0.190	-0.017	0.082	0.199	-0.223
X27	0.029	0.074	0.004	-0.009	-0.113	-0.043	0.010	-0.035
X28	0.030	0.065	0.027	0.002	-0.113	-0.045	0.021	-0.067
X29	0.029	0.028	0.076	0.039	-0.061	0.083	0.165	-0.024
X30	0.019	-0.051	0.155	0.007	0.025	0.001	-0.020	0.066
X31	0.020	-0.035	0.168	-0.004	0.015	0.119	-0.052	-0.022
X32	0.008	-0.073	-0.072	0.064	0.038	-0.096	0.170	0.015
X33	0.016	-0.018	-0.076	0.217	0.040	0.119	0.293	-0.131
X34	0.029	0.073	-0.024	0.019	-0.087	-0.025	0.026	-0.048
X35	0.018	-0.058	-0.026	-0.049	-0.076	-0.043	-0.035	-0.165
X36	0.030	0.072	-0.013	0.000	-0.073	0.009	0.036	-0.014
X37	0.029	-0.049	0.061	-0.028	0.019	0.075	0.111	0.086
X38	0.028	0.078	-0.027	-0.014	-0.101	-0.045	0.003	-0.016
X39	0.033	0.031	-0.044	-0.069	0.057	0.055	-0.040	0.141
X40	0.027	0.081	-0.036	-0.049	-0.064	-0.030	-0.058	0.046
X41	0.027	0.082	-0.030	-0.050	-0.074	-0.017	-0.061	0.037
X42	0.005	-0.002	-0.053	-0.066	0.051	0.206	-0.145	0.030
X43	0.031	0.044	-0.011	-0.064	0.039	0.141	-0.062	0.104
X44	0.031	-0.010	0.010	-0.015	0.028	0.105	0.065	0.000
X45	0.023	0.020	0.108	-0.057	0.023	0.263	0.081	0.127
X46	0.034	0.035	0.007	-0.066	0.033	0.073	-0.023	0.085
X47	0.000	-0.004	0.003	-0.215	0.064	0.002	0.283	-0.336
X48	0.016	-0.045	0.115	0.049	0.014	-0.093	-0.068	-0.175

	X49	0.023	0.012	0.093	0.029	-0.073	0.084	0.164	-0.033
	X50	0.021	-0.006	0.154	-0.023	-0.011	0.218	0.111	0.050
	X51	0.022	-0.041	0.032	0.140	-0.070	-0.077	-0.071	0.181
	X52	0.006	-0.065	-0.035	0.066	-0.027	0.216	-0.084	-0.086
	X53	0.017	-0.052	-0.058	0.116	-0.145	-0.094	-0.086	0.262
	X54	0.031	-0.040	-0.071	0.023	0.037	0.015	0.085	0.126
	X55	0.026	-0.052	-0.072	0.072	0.027	-0.018	0.137	0.132
	X56	0.020	-0.051	0.139	0.008	0.016	-0.020	-0.025	0.053
	X57	0.032	-0.015	0.012	-0.065	0.050	-0.067	0.028	0.086
	X58	-0.026	0.037	-0.033	-0.081	-0.023	0.046	0.154	0.029

Appendix 4. The Weights of Variables in the First Principle Component

	Variables	Weights in PC 1
1	Proportion of regular or casual woman employee	0.035
2	The proportion of the persons employed in financial sector	0.034
3	Amount of income and corporation tax per capita	0.034
4	Proportion of employer	0.033
5	Bank deposits per capita	0.033
6	The proportion of the persons employed in commercial sector	0.032
7	Total telephone counters per person	0.032
8	Number of dentists per 10000 person	0.031
9	Amount of industrial, commercial and tourism credits per capita	0.031
10	Municipal expenditures per capita	0.031
11	Number of private cars per 10000 population	0.031
12	The proportion of the persons employed in industrial sector	0.030
13	Proportion of regular or casual employee	0.030
14	Proportion of higher education graduate population	0.030
15	Number of medical doctors per 10000 person	0.030
16	Annual average number of employees in manufacturing industry	0.030
17	Share in total gross domestic product	0.030
18	Number of establishments in manufacturing industry	0.029
19	Per capita gross domestic product	0.029
20	Total capacity of power equipment installed at the end of year	0.029
21	Total number of housing units	0.029
22	Number of bank branches	0.028
23	Total Population	0.028
24	Number of pharmacies per 10000 person	0.027
25	Share in total bank deposits	0.027
26	Share in total bank credits	0.027
27	Number of motor vehicles per 10000 population	0.026
28	Literacy rate	0.025
29	Woman literate rate	0.025
30	Schooling rates in high school	0.025
31	Population Density	0.024
32	Consolidated budgeted revenues per capita	0.023
33	Urbanization rate	0.023
34	Total exports per capita	0.023
35	Proportion of asphalt road in rural settlements	0.022
36	Number of establishments in small industrial sites	0.021
37	Total imports per capita	0.021
38	Schooling rates in vocational and technical high school	0.021
39	Per capita value added in manufacturing industry	0.020
40	Total electricity consumption per capita	0.020
41	Per capita electricity consumption in manufacturing industry	0.019
42	Proportion of housing unit with piped water	0.018
43	Schooling rates in primary education	0.018
44	Number of hospital beds per 10000 person	0.018

45	Proportion of total asphalt road	0.017
46	Number of plots in organized industrial estates	0.017
47	Agricultural production value per rural population	0.016
48	Per capita amount of investments with incentive certificates	0.016
49	Annual Growth Rate of Population	0.009
50	Share of agricultural production value in national production	0.008
51	Proportion of population in rural settlements with adequate drinking water supply	0.006
52	Agricultural credits per rural population	0.005
53	Total public expenditures per capita	0.000
54	Infant mortality rate	-0.016
55	Fertility Rate	-0.022
56	Average household size	-0.025
57	Proportion of population having a card for free health services	-0.026
58	The proportion of the persons employed in agricultural sector	-0.031