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The Investigation of Productivity Changes of Total Factors Production (TFP) in Tehran Municipalities Using Malmquist Index

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Abstract: To achieve the growth and prosperity of any country is required to provide the conditions in which municipalities are responsible for most urban areas; so evaluation of the productivity of Municipalities and compare them with each other have a special place. Therefore, in this study, changes in TFP of selected Municipality of Tehran province (municipality degrees above the seven of Tehran province, Firoozkooh, Damavand, Varamin, Shahriar, Baharestan and Pardis) were investigated. The results showed that, based on the research productivity index as a selection criterion Malmquist, during 2007, 2008 and 2009 the City of Varamin, Tehran and Firoozkooh and are higher in the ranking of the municipalities and the Baharestan and pardis are in last locations. Another result of research confirms from the questionnaire survey was that the consent of the citizens of the city of Varamin was appropriate.

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Words Key: Malmquist Index, Municipalities with Degree of Seven and above, Total factors Productivity

1. Introduction

Today productivity and efficiency as a culture and landscape in all areas of human life is a source of employment and economic growth. This is the culture and vision of the organization, the best result is achieved. Productivity and total comprehensive as necessary to promote the welfare of human life and the fundamental goal for all countries and stakeholders is crucial for the economy of any country and is responsible. Productivity improvement is always desirable because it involves the public welfare, efficient use of resources, quality of goods and services other words, the economic development and social progress. The proper use of human resources and their participation, employing modern methods of scientific management, technology, education and culture in national productivity, enhancing communication and data transfer, in line with national interests and the interests of individual Summary of the behavior and decision clever, witty and clever obtained.

Productivity growth is not the only factor, but it is primarily known as a school that is constantly trying to improve the situation. In this view, humans can better perform daily activities and tasks most important guiding principle in this view, is a firm faith in human progress. General trends in productivity and raise awareness around human beings and human abilities, motivation and creativity, and improve his mental state - the physical environment and the overall quality and quantity of human resources development is creative, active and. Movement in the advanced industrial world, was launched in connection with the issue of productivity needs to tell his. To achieve growth and prosperity is the need to provide appropriate conditions that this urban area is usually the responsibility of municipalities. It is important to note that the development of any country or city at its beauty appear (such as the construction and maintenance of parks and public spaces, garbage collection and disposal, street cleaning and municipal buildings, etc.) on these tasks Municipalities are responsible. At the heart of each of the municipalities that are considered to be able to coping well carry out their duties, or insufficiencies occur in parts of the city, as well as the parts of society quickly as some other and everyday life disrupt impressionable will. Therefore, the efficiency of the municipality is a special place. Therefore, in this study, given the geographical scope of the study, changes in total productivity of production factors will be assessed in the municipality of Tehran Province.

The objectives of this research are:

Evaluation of the efficiency of each municipality of Tehran Province

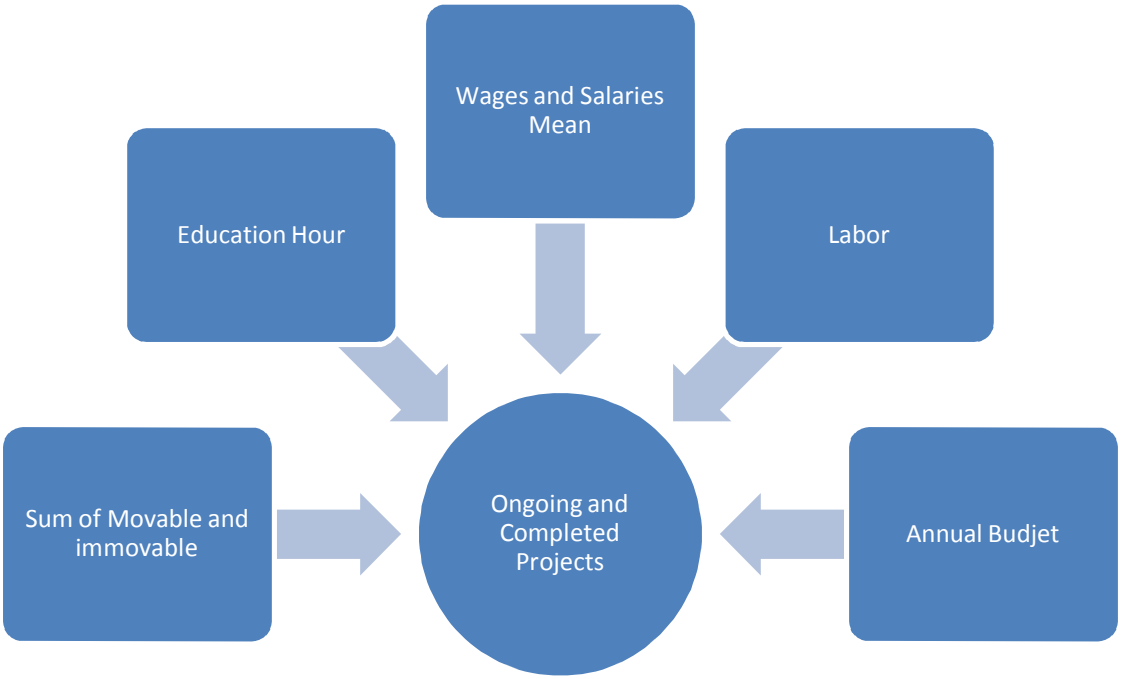
Ranking of Tehran provices municipality based on the productivity.

Investigation of changes in the productivity of Tehran municipality for period of 3 years from 2007-2009.

2. Literature Review

In paper's regard, several studies both inside and outside have been changed for this field to refer to some of them. Harada (1995) attempted to estimate the production function based on a new idea based on labor force participation of Japanese companies in the manufacturing unit is running, in that order. He has proven that participation motivation and morale among Japanese workers to improve total factor productivity in the company. Ascari and Cosmo (2004) in this study, with the total productivity of factors of production in Northern and Southern Italy in the years 2000-1980 the total productivity of factors of production are paid. In this study, the cost of R&D and TFP researchers produce a strong positive relationship exists between the northern and southern regions, and also can be seen. Roozbehani (2003), in a study of labor productivity and capital productivity of the company Saipa Company has calculated the estimated production function. The factors affecting the efficiency of Saipa through econometric methods and DEA Have analyzed the results of both methods were identical, suggesting that the entire company is affected by changes in productivity and technological change in higher education employing specialized labor. Tahami Pour and Karbassi (2006) with Trans-Log production function estimated using the productivity index, TFP growth in the manufacturing sector for the period 1379-1345 Iran have measured. Results showed that the average productivity growth and GDP growth, productivity growth and output growth in agriculture sector during the period under review 2.6 and 4.8 percent. In this study, first using the research data and statistics about the input and output of the municipalities of the province of Tehran, productivities are ranked according.

The input variables include: the number of workers (the separation of the administrative staff and council workers), annual budget approval for civil works and beautification, the average wages of labor, and the total number of hours of specialized training items include movable and immovable municipal car machinery, equipment, buildings. The output variables are: the value of money and the monetary value of projects under Projects at the end of the year. So Malmquist productivity index calculated for each of the municipalities and rated. The trends for the years 2007, 2008 and 2009 will be. Finally, we compare the efficiency of these three years, it will be seen that the efficiency has been an uptrend or downtrend. Will also check the rankings have changed over the course of the study or not. Variables in the form of a conceptual model.



3. Methodology

Theoretical and experimental issues for the development of the documentary method (library) will be used. For data collection and data variables, the data will be used to finance municipalities of Tehran. The population in this study is the major cities of Tehran municipality.

In economic theory to determine the efficient frontier (production function) parametric and nonparametric methods are important. In the parametric approach using various methods such as Stochastic Frontier Approach (SFA), Tick Frontier Approach (FTA) and Distribution Free Approach (DFA). Basically all this means is that parametric try using different assumptions, a particular form of frontier production function (eg, Cobb-Douglas, trans-log, etc.) with a mixture of error, and it is estimated by the inefficient units Into two groups at random and the inefficiency of the (Bauer, et. Al., 1998).

Therefore, tashahryar into account various assumptions, estimates can be obtained from many different functional units which can make it difficult to compare Makes. In contrast, nonparametric methods, the first by Farrell (1957) proposed to estimate the performance required determining the specific consequential functions, there are no random factors. Farrell instead of guessing the amount of output data and to view and territorial units considered to be a measure of performance. Farrell technical efficiency performance of an economic unit consists of two Technical Efficiency and Alocative Efficiency knew. Technical efficiency is related to the processing unit. Efficiency units also related to behavioral intentions.

DEA Method is a new approach of nonparametric estimation methods for boundary functions for the first time Cooper and Rhodes (1978) was introduced. Farrell proposed and promoted the concepts then this method has been applied in numerous papers. This is partly due to lack of access to information, using these methods have serious limitations (Coelli and Rao, 2001).

One interesting feature of the method applied DEA Possible to calculate the total productivity factor and Malmquist index used to determine changes.

In calculating the productivity index is called Malmquist distance functions are defined according to the degree of vulnerability indicators were introduced and does not require price information. The first index in 1953 on the theory of states within the framework of this theory, and in 1982 produced was introduced. Later in 1992, the functions of the distance (Malmquist Index) by Farh et al using DEA Based on minimization with fixed output scale factor was used and it was observed that the production of distance functions financial indicators, reversing the values of efficiency Farrell (1957), and the efficiency changes Total productivity into technical efficiency change and technological change divided in two parts. Namely:

$$M_i^{t+1}(q^{t+1},x^{t+1},q^t,x^t)=\frac{D_i^t(q^{t+1},x^{t+1})}{D_i^t(q^t,x^t)}\left[\frac{D_i^t(q^{t+1},x^{t+1})}{D_i^{t+1}(q^{t+1},x^{t+1})}\times\frac{D_i^t(q^t,x^t)}{D_i^{t+1}(q^t,x^t)}\right]$$

In this regard, the left side of the equation represents the change in productivity and a change in technical efficiency represents the fraction out of the bracket and the bracket indicates the fraction of technological change. So we have:

TFP = Change in technical efficiency × technological change

But then again in 1994, overall productivity by Farh et al (1992) with the assumption of variable returns to scale its performance with other titles of management changes, changes in resolution performance scale and technological developments.

Basically Malmquist index can be established based on the minimization or maximization and thus Stand Plan to determine if the information about the inputs and outputs of the unit for a period is available with it can be easily DEA achieved due to its distinct characteristics compared to other techniques such as distance estimation functions indicators and econometric methods, especially when the quantitative data available, and the reason most and efficiency of the two levels of any these are used to macro and procedure (Fare et. al., 1992).

4. Results

Due to the output SPSS, significance value (Sig) is less than 0.01 01/0 or close to zero and is less than the standard significance level (5%), So null hypothesis is rejected.

Table (1) Friedman test mean scores in order to evaluate the efficiency of Municipalities (2007)

	ranking based on Productivity	Malmquist Index	ranking based on Friedman
Varamin	1	1.000000	5.50
Firoozkooh	2	0.968561	5.46
Tehran	3	0.948064	5.43
Pardis	4	0.820697	4.25
Shahryar	5	0.819882	3.50
Damavand	6	0.757224	1.92
Baharestan	7	0.749895	1.83

Table (2) Friedman test mean scores in order to evaluate the efficiency of Municipalities (2008)

	ranking based on Productivity	Malmquist Index	ranking based on Friedman
Firoozkooh	1	1.000000	4.76
Varamin	2	0.841499	4.34
Tehran	3	0.782297	4.10
Damavand	4	0.734187	3.88
Baharestan	5	0.715602	3.50
Pardis	6	0.666280	2.92
Shahryar	7	0.604895	2.83

Table (3) Friedman test mean scores in order to evaluate the efficiency of Municipalities (2009)

	ranking based on Productivity	Malmquist Index	ranking based on Friedman
Varamin	1	1.000000	5.36
Damavand	2	0.760166	3.21
Tehran	3	0.731600	3.10
Firoozkooh	4	0.673148	2.88
Shahryar	5	0.672060	2.81
Pardis	6	0.637653	2.12
Baharestan	7	0.599010	1.83

The first assumption was that it raised productivity in comparison with other cities of Tehran Municipality, the rank is higher. According to the results of the Friedman test, it was observed that none of the three years Tehran Municipality has been studied in the first place, and the first research hypothesis is not confirmed.

The second hypothesis of the study was to rank the efficiency of Municipalities of the province of West Azerbaijan, has not changed in the years 2009-2007. According to the table, it is observed that the ranking of municipalities has changed in different years, so the second hypothesis is not confirmed.

Numbers obtained from the output of the test determines the lowest productivity and Municipal Municipal Baharestan Varamin, Tehran province has the highest productivity among selected municipalities.

5. Conclusion

With Given the important differences in culture, business and municipal strategies to increase productivity in their situation, they may be said to be different. From Methods to increase productivity, reduce waste can, engage the staff, the staff efficient use of talent, motivate staff, according to the changes. Degree of influence of each of these solutions increase productivity in the context of the current situation and the need for municipalities to address each of these depends on the need and decided to identify and prioritize sophisticated form of the basis of the. For example, the organization may be the first priority of waste reduction and the creation of an alternative organization to motivate employees is a top priority. Lack sufficient knowledge of the situation and given priority opposite effects on productivity levels created. Hence, before any action

in increasing the emphasis on sufficient knowledge of the situation and prioritize solutions is correct.

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