Studying Situation of Efficiency and Productivity of the Branches affiliated to Tehran Social Security Organization (2008-2011)

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Abstract: Social Security as one of the largest insurance organizations, to cover a large part of the population and has a great staff with a broad scope of insurance, medical and investment and… Key issues in the social and economic structure of the country, thus raising the efficiency of the organization include the public interest. In this study, productivity and efficiency of resource allocation at the branches of social security methods, parameters, data envelopment analysis and the production function were analyzed in 2009-2012. For this purpose, we use panel data and input – oriented model. The dependent variable in this study, the number of insured population and the explanatory variables include the number of personnel and capital costs. It should be noted that the required information was obtained from Statistical reports the Center for Social Organization of Tehran gathered in the form of recorded information. During the study period, the mean changes in total productivity were estimated to be equal to 1.021. The results of the methods used, suggests that total productivity variation affected by technological changes, managerial and scale efficiency changes stand in the next orders. The results showed that there is the improvement in productivity over the period studied in the branches of social security. Production factors productivity improvements in a comprehensive planning can have a major role to play in reducing the cost of social security insurance branches.

Introduction

Man has always been focused on economical effort that obtained maximum results with minimal resources and factors; it can call tend to achieve higher productivity and efficiency. Comprehensive concept that includes increasing productivity performance in order to improve the quality of life, prosperity, peace and human prosperity, has been considered involved in politician and economists. Some survive and continue to be a political and economic system has been subjected to productivity [1].

Among the services that are involved most other services and promote economic and social development, distribution facilities, Insurance Services in areas are activities such as social security retirement, disability, survivor, unemployment, work-related injuries, treatment and other support services. Lack of productivity and efficiency in services such as insurance, not only reduces the quality of life, but also increased social inequity and resulted to political problems [2, 3].

Due to the improvement of the public's expectations of economic prosperity, the demand for insurance has an upward trend. However, due to limited resources and increasing promotion of insurance services, maximum utilization of existing facilities is one of the possible solutions to reduce the gap between demand and supply of health economics perspective [4].

Because of the productivity is the most common and important mechanism for evaluating and measuring the performance of an enterprise as insurance subsidiaries, so in the past few decades to evaluate the performance of different economic sectors and enterprises and economic unit at the micro level Productivity and efficiency by measuring and estimating, always attracted researchers from

different disciplines of social sciences, particularly economics and management [5].

For this purpose, various methods proposed in the literature in an overall classification of the two methods are the indicators and data envelopment analysis method. Indicators methods are based on econometric models and microeconomic theory. Also in the Kendrick method, used the panel data, at first production function with respect to the assumptions is estimated. In consideration of the foregoing function, the total and marginal productivity of the insurance subsidiaries are measured, but data envelopment analysis method based on a set is optimized using linear programming. In this method, using the index Malmquist can be calculated Productivity for individual firms and Productivity changes be divided into two parts of changes in technical and technology efficiency.

Analysis of productivity and efficiency in resource allocation has been done at different parts of our country and the mining industry, the health sector, agriculture and …. But with the state of the industry allocation of social security has not been implemented a method referred to in this research study. Because of improved productivity and efficiency is an important source of economic development, so this issue should be studied and analyzed in social security. The action (calculation of productivity) and to identify factors that increase the productivity of the branches, it is a supplement action to the qualitative and quantitative development. By removing the factors affecting lower productivity of the branches, can be increased productivity of organization without adding and enhanced factors of production, also help the branch managers to make better decisions, more realistic and efficient. At the result, expected that insurance managers and planners with knowledge of the trend and factors affecting productivity, efforts to better resource allocation and increase productivity.

We seek to answer the questions that how were technical efficiency and scale efficiency as well as social security insurance branches of Tehran productivity during the study period What are the major factors affecting the overall productivity changes?

Methods

This applicable study conducted by using panel data derived from 2008 to 2011 in the study population that included all branches of the social insurance organization of Tehran. Required information for this study was collected from Tehran center of the statistical reports of social security organization and data registered in information sheet.

Productivity of the overall concept of the relationship between the products produced by the producing or service system and inputs which used for crop production. Also the productivity can be defined the relation between the results and the time to do it. In this case, the higher productivity, mean is producing more goods with the same amount of resources or complete or achieve greater product from the size and quality of the input value [7, 6].

The exact economic meaning of productivity, the measurable function between the volume of product and volume of the consumed factor (such as land, labor and capital) are needed to produce the product. The time factor is important in measuring the productivity, that is how to generate a certain amount of a commodity or service of equivalent quality and less time consuming, it has higher productivity of the system [8].

To achieve a desired level of productivity in an enterprise, requires to determine the current level of productivity, And If you want to obtain accurate results and productivity analysis the first it is necessary to select the correct measurement method, the method chosen in such a way that all inputs and outputs of a firm to establish a good relationship [9].

Professionals and researchers, in various ways such as index method, the method of production function, data envelopment analysis method, the method of input - output and….. apply to measurement productivity at the firm [10].

Productivity Measure by Indicators

In this way the volume or value of output of goods and services relative to the volume or value of one or more input factors for which the output is intended to be measured. By definition, a definition of the overall, productivity analysts are always trying their end of the industry and the level of productivity required. In other words, the purpose of productivity is measurement, assessment of progress or decline of an enterprise than the past [11].

Production Function (Kendrick Method)

Kendrick method for estimating changes in total productivity, the production function defined as an implicitly production function. Total productivity Indicator in this method is based on the weighted average of the actual product production factors labor and capital is calculated based on the following equation:

$$TFP_k = \frac{V_t}{(rK_t + wL_t)}$$

In this equation r and w in relation to the income generated by the elasticity of capital and labor, L_1 workforce, V_1 value added

and K_1 value the capital stock is based on the fixed price [12, 13].

To measure the total productivity by Kendrick indicator's is needed to estimate the production function. In this research, primarily to estimate elasticity's of labor, capital and production function used from Cobb - Douglas production function.

Data Envelopment Analysis

In calculating the productivity by Malmquist index (distance function) has been used from the data envelopment analysis method. Malmquist index, allows total productivity divided into two major components, namely technical change and efficiency change.

Distance function of production factor identifies production technology by minimizing the vector of product factor and taking the product vector and the distance function product attention to the optimization by maximizing vector product based on vector production factor given. In this subject we only pay to analysis products distance function, because product factors of distance function as well as the same analysis [14, 15].

Malmquist index using distance functions can be expressed as follows:

$$m_0(Y_s, X_s, Y_t, X_t) = \left[\frac{d_0^s(Y_t, X_t)}{d_0^s(Y_s, X_s)} \times \frac{d_0^t(Y_t, X_t)}{d_0^t(Y_s, X_s)} \right]^{1/2}$$

Here $d_0^s(Y_t, X_t)$ denotes the observation interval t to s. If m_0 is much greater than one indicates positive total factor productivity growth over time t to s and when a smaller than one shows decline in total factor productivity. Upon function can be presented with simple math operations as follows:

$$m_0(Y_s, X_s, Y_t, X_t) = \frac{d_0^t(Y_t, X_t)}{d_0^s(Y_t, X_t)} \left[\frac{d_0^s(Y_t, X_t)}{d_0^t(Y_t, X_t)} \times \frac{d_0^s(Y_s, X_s)}{d_0^t(Y_s, X_s)} \right]^{1/2}$$

In this equation, the fraction out of the bracket, measures the changes of efficiency at times t and   s, The changes in efficiency, indicating the efficiency at the time t to efficiency at the time s. Inside the brackets, measures technological changes and is equal the geometrical mean technological changes in period s and t. Technological changes means that at time (t+1)with the same amount of production factor compared in period t can be produced with more product and the transfer function frontier is calculated over the period t to (t+ 1).

To obtain answers to the above equations, Four distance functions are calculated $D_t(Y_t, X_t)$, $D_s(Y_s, X_s)$, $D_s(Y_t, X_t)$ and $D_t(Y_s, X_s)$.Thus, for every distance function is solved a linear programming model and to the Decomposed efficiency changes into two components, managerial efficiency and scale efficiency, Technological constraints condition of variable returns to scale is added to the model. At the end, the index is calculated for each firm as follows:

TFPCH=PECH×TECH×SECH

If Malmquist index is based on minimization of production factor, less than one, the function refers to improvement the performance, whereas if it is larger than one 1 in time will reduce the performance. On the other hand, if based on the maximization of product, Malmquist index value or it's any component will be less than unity, meaning the firm's performance is getting worse, however, if the index is greater than one, indicates the firm will improve its performance. [16, 17]

In this study, the dependent variable or production, selected number of the insurance subsidiaries was insured and the explanatory variables include work force factors and capital expenditures factor of the social security branches in Tehran.

Data envelopment analysis method has been designed based on the maximizing input premise of variable returns to scale (VRS). The main reasons for choosing this method is that it can determine the output (insured), the same level of inputs can be increased to the extent and also it is possible in the data envelopment analysis method separation of technical efficiency to scale efficiency and managerial efficiency in this model. DeaP$_{2,1}$ software is used to get the productivity Malmquist index.

Results

The results are based on the below methods:

Productivity measured by indicators

The results of the calculation of the productivity labor and capital factors in the Tehran social security branches in during the study period showed that the highest rate of labor productivity were equal 1271 related to branch of number 22 and the lowest labor productivity equal 242 related to branch of number 23.

The results of the calculation of the capital productivity in Tehran branch of social security during the study showed that the highest capital productivity is equal to 0.0003 related to branch of number 29 and the lowest capital productivity equal 0.000001 related to branch of number 30.

The results of the estimation of the production function (Kendrick method)

Results are based on estimated Cobb-Douglas production function suggests that the elasticity of labor factor relative to capital factor were more important in the study years. (Table 1)

As a result, the form of production function was estimated for Tehran branches of social insurance as follows:

LnY =5.35+0.932LnL+0.082

The results of total estimating productivity factor show that the average total productivity from 0.0004 in 2008 during fluctuation is reached to 0.0002 in 2011. This means that all of the insurance subsidiaries in 2011, average output per unit of labor and capital has been able to create the equivalent of 0.0002.

The results of the data analysis method

The results of estimating total productivity factor measured by Malmquist index and analysis changes based on the affecting factors are listed in Tables 2 and 3.

Total productivity changes are resulting from the changes in scale, managerial and technological efficiency. As the tables' calculation shows that in the period study, the average change in total productivity was equal to 1.021. According to the results, kinds of the efficiency and total productivity during the study period have changed frequently and don't have specific trend. Results show that during the study period, status of management efficiency was better than compare with the scale efficiency.

Analysis of factors affecting the total productivity changes revealed by the results of the Malmquist index in the data envelopment analysis method, The average productivity 1.021, the average output change in all of branches by technological changes (degree of mechanization branches) during the study, was equal to 1.092, The average technical efficiency of branches was equivalent to 93.5% during the study, the average managerial efficiency of branches was 98.8% and the average scale efficiency of branches was 94.7%. During the study period, an average of 23.3% of the branches was fully technical efficiency, 46.6% was perfect managerial efficiency, and 23.3% of the full-scale efficiency. While during the study productivity changes were closely 1.

In order to identify the factors affecting labor productivity (LP_{it}) in the insurance branches of social security organization, personnel dummy variables x1, degree of mechanization x2 and job group x3 was considered that Education and employment are both implicit in the job group. In this model, labor productivity is as a linear function of the above variables and the results estimation are as follows:

$$LP_{it}=2.6 - 0.23(x_1) +2.12(x_2) + 0.72(x_3)$$

t-statistic	(3.22)	(2.21)	(2.32)	(4.1)
Standard Deviation	(1.7)	(0.07)	(1.05)	(0.19)
MLE=42		,		LR=171

The estimation results show that the number of labor coefficient is -0.23, the mechanization coefficient is + 2.12, and the occupational group variable coefficient is +0.72. In fact, the degree of mechanization compare with other factors is important to improve the labor productivity.

Discussion

According to the measuring method of the productivity by the indicators, the results suggest that the workforce was more importance and dramatic impact on the productivity of social security branches. In other words, according to this method can be stated that the most important factor in improving the productivity of the branches in study are related to human resource and any investment in our human resources such as training, increased specialization and expertise, motivation, recruiting competent, Turn and rotate jobs between them and can improve its performance and consequently has an impact on organizational productivity. (18)

Estimation results of the Cobb - Douglas production function, results showed that Production elasticity of the labor and capital factors respectively, 0.932 and 0.082 and the test results confirmed the coefficients are statistically. Increasing 1 percent in labor and capital factor respectively will be 93% and 8% increase in the number of admissions insured in the insurance branches. The results show outcomes of the branches depends on social security relies more on labor than capital. Because of important impact workforce on organizational productivity, results confirm previous methods.

Estimation results of the production function show the production function coefficients larger than one but slightly significant. This subject shows in the branches there is increasing returns to scale (19).In other words, simultaneously increased production with a certain ratio, output of branches will be more increase,although the size of the function coefficient suggests that there isn't a significant increase in production or output, but with regard to the employment of labor input in the second area of production or economic efficient regional and

importance of marginal product of this factor, could reduce in the average production costs with employ efficient labor and productivity improvement efforts on the labor and put this industry in the long-run average cost or decline push curve. The issue for this industry will have economy in the long terms.

Kendrick method of calculating the total productivity showed, the total productivity of the industry has been reducing during the period of study. To solve this problem the organization must be relied and efforts to make its skilled human resources. Because this subject, consideration to steady increase in wages and running and the construction cost, the cost of service compared with past be rise and non optimal allocation of resources.

Based on the results of the Malmquist index and data envelopment analysis method, average change in total output of branches in effect of technological change (degree of mechanization branches) was equal to 1.092 during the period of study, it means, the annual average total output 1.092 has increased to branches in effect of technological changes, without will be create any changes in the use of labor inputs and capital factor of industry. The average technical efficiency of branches is 93.5% during the years of study. Branches without increasing the average cost of production inputs and cost to this industry, its output will rise 6.5 percent. In other words an increase in production capacity in the industry, there is no increase in inputs. It can be stated there is in the form of hidden unemployment in the industry in the factors, but not as dramatic and critical. Average managerial efficiency in subsidiaries is 98.8 percent.

This means that no rise in the level of inputs and only with management good insight and their employee efforts can be provided to increase production to 1.2 percent. The average scale efficiency of branches is 94.7 percent. The most reason of full inefficiency in all the branches over time is related to weaknesses in scale efficiency not in management. Thus, branches are active in the increasing returns to scale should be increase their level of service, thus, assuming constant all factors of production, increasing output will rise further than input. Therefore, will be reduced the long-term marginal cost (LRMC), followed by long-term total cost (LRTC), so increasing the service, have economic justification. As the results show the kinds of efficiency of branches constantly changed during the study period and did not follow any particular trend.

The third method results showed that mean changes in total productivity of this industry was equal to 1.021. This would imply acceptance productivity during the period being studied. During the study, changes in the productivity are more from the technological changes area (mechanization branches of social security organization) and technical efficiency changes (managerial and scale) are in the next rank. Therefore, in order to its' promote should also be considered importance of technology.

Analysis in total productivity changes by using two methods of Kendrick and Malmquist, The results show that the total productivity takes influence changes from technological changes and capital in addition to labor.

Analysis of factors that affecting on the labor productivity by an econometric model and considering to the limitations In particular unavailability of the necessary data and non-quantitative nature of some of the factors was measured the importance and role of some factors affecting on labor productivity and its effect was found. With respect to the estimated model can be seen that whatever the number of branches manpower is greater, Labor productivity is reduced. The reason for this can be seen as a lack of proper employment of labor in the branches, In other words, people with skills and education are not in the commensurate position and consequently, labor productivity will be reduced in the branches. In calculating the labor productivity used both output and labor, if increase in labor does not increase in proportion the output productivity will decrease and this is the law of diminishing returns.

Results showed that whatever increases the degree of mechanization, the labor productivity increases in the branches. Creation a mechanization system in the branches of insurance system is the indisputable necessity in order to speed up the workflow and create convenient and clear in order to avoid wasting time. Also, it can be stated that increasing the degree of mechanization in branches, the manpower will be more released. So should this be done the principal measures, due to the labor will be reduced productivity in branches.

The results also showed that whatever the manpower have higher education and job experience, the productivity of labor increases. In order to optimize using resources in any organization and in order to develop and flourish in a variety and related to its objectives, it is necessary that consider to education and the history of human occupation as a primary infrastructure. There is no doubt that the workforce can maintain a dynamic organization and have tried to promote it.

In the field of research was being realized the low staff motivation. To creation Job satisfaction that makes employees interest to their work and thereupon will be increase the efficiency of the organization, It

is necessary to consider their spiritual and physical incentives.

It should be noted that although the income is one of the most important factors to meet the needs of the life, but the other factors also contribute to this subject that summarized these factors under titles such as motivation, practical aspirations, being interested in the job competition and…. Either to create to job satisfaction must consider to, occupational prestige, adequate independence and freedom, sense of employee commitment, job suitability with individual demands and favorable environmental conditions.

In the branches that have high level of productivity. Working directly with clients and this factor have great impact on satisfaction and number of Insured. For example, the right advice of insured, personnel behavior with insured (because they are associated with client who act as representatives of the organization) and also provides insurance services information by counselors and staff that have a strong connection can be effective in propagation of social security services by The insured. Also, the availability and location of branch in the region have been effective in increasing insured satisfaction and it would provide immediate service to clients and perhaps led to one of the reasons for the delay in the payment of premiums by insured.

The certain reasons for low capital productivity in insurance subsidiaries for doing speed up the clients work are: not reform the old system, bureaucracy and paperwork to provide faster service to customers, and therefore unsatisfactory insured and also the don't use of mechanized equipment in insurance subsidiaries In order to fast achieve to accurate information for planning, monitoring and control of legal obligations.

There are numerous other qualitative and quantitative problems in branches of insurance can be as follows:
- Shortage of skilled and professionals manpower

- Lack of optimum advantages of automation
- The rusty and outdated office equipment and supplies
- Insufficient space with non-normative the physical structure
- Inappropriate structure and the ambiguity of the job description and organizational chart
- Instability of the constituent units of the executive branch
- The establishment of branches in some locations unsuitable buildings
- Low levels of personnel education and lack of adequate and suitable in-service training

Conclusions

Due to the improvements in productivity and efficiency is an important source of economic development. Therefore, this issue should be analyzed in social security. This action (calculation of productivity) and to identify affective factors that increase the productivity of the branches, it is a supplement to the qualitative and quantitative development. By removing the affecting factors in the lower productivity of branches can be increased productivity without adding production factors and productivity and can help the branches managers to make better decisions, be more realistic and efficient. Thereupon expected managers and planners of insurance sections take steps with knowledge of the productivity trend and factors affecting on the efficiency and productivity, In order to increase the productivity and efficiency of resource allocation. Our study showed that there is increased productivity capacity without incurring the branches of social security established new industry. Productivity of the industry was most affected by labor productivity so pay attention to this important issue recommended to policy makers and planners.

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Table1: The results of estimating the production function of Tehran social insurance branches

	In depended COEFFICIENT	Elasticity of production, work force	Capital factor, Elasticity of production
production variable Y	5.35	0.932	0.082
T-statistic value	(2.71)	(4.63)	(5.54)
Standard Deviation	(0.965)	(0.201)	(0.062)
LR=178 , MLE=39.6			

Table 2: Changes in total productivity and efficiency of insurance branches during the years using data envelopment analysis

Year	Technical Efficiency	Technological Efficiency	Managerial Efficiency	Scale Efficiency	Total productivity changes
2008	1.013	1.015	1.029	0.984	1.028
2009	0.989	1.059	0.920	1.075	1.047
2010	0.867	1.226	1.006	0.861	1.062
2011	0.882	1.077	1.000	0.882	0.021
Average	0.935	1.092	0.988	0.947	1.021

Table 3: changes in total productivity and efficiency of insurance branches during the **study** using data envelopment analysis

Branches	Technical Efficiency	Technological Efficiency	Managerial Efficiency	Scale Efficiency	Total productivity changes
1	0.943	1.114	0.944	1.000	1.050
2	0.916	1.080	1.053	0.870	0.990
3	0.876	1.127	0.973	0.900	0.987
4	0.878	1.077	0.928	0.946	0.946
5	0.935	1.116	0.994	0.941	1.043
6	1.000	1.076	1.026	0.974	1.076
7	0.886	1.094	0.935	0.948	0.969
8	1.020	1.089	0.985	1.036	1.110
9	0.979	1.099	0.995	0.984	1.076
10	0.924	1.142	0.994	0.930	1.056
11	0.854	1.105	0.986	0.865	0.943
12	0.967	1.076	1.012	0.956	1.040
13	0.839	1.098	0.968	0.867	0.922
14	1.078	1.015	1.040	1.037	1.094
15	0.969	1.079	1.013	0.957	1.045
16	0.965	1.129	0.976	0.988	1.089
17	0.905	1.134	0.996	0.908	1.026
18	0.863	1.110	0.977	0.884	0.958
19	0.872	1.123	0.957	0.911	0.979
20	0.882	1.076	1.004	0.879	0.949
21	0.924	1.077	1.004	0.921	0.996
22	1.002	1.116	1.000	1.002	1.118
23	0.949	1.099	1.006	0.943	1.042
24	0.950	1.114	1.001	0.950	1.059
25	0.859	1.078	0.909	0.945	0.926
26	1.086	1.077	1.011	1.074	1.169
27	1.072	1.104	1.014	1.057	1.184
28	0.882	1.138	0.956	0.922	1.003
29	1.000	0.928	1.000	1.000	0.928
30	0.860	1.081	1.000	0.860	0.929
Average	**0.935**	**1.092**	**0.988**	**0.947**	**1.021**

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