Research Journal of Applied Sciences 9 (12): 936-940, 2014
ISSN: 1815-932X

Total Factor Productivity and Output Growth of the Services Sector in Malaysia

[1]Idris Jajri and [2]Rahmah Ismail
[1]Faculty of Economics and Administration, Universiti of Malaya,
50603 Kuala Lumpur, Malaysia
[2]Faculty of Economics and Business, Universiti Kebangsaan Malaysia,
Bangi, Selangor, Malaysia

Abstract: The role of the services sector and its contribution to economic growth in Malaysia has become increasingly important. The contribution of the services sector to Gross Domestic Product (GDP) and employment has increased continuously, since the 1990s. In this regard, the productivity of this sector, especially the growth of Total Factor Productivity (TFP), ought to be given due emphasis in order to strengthen and improve its competitiveness. This study aims to discuss the growth and the contribution of TFP to output growth of the services sector as a whole and in terms of selected services sub-sectors. The analysis in this study is based on data from the Survey of Selected Service Industries for the period 1985-2006 obtained from the Department of Statistics, Malaysia. The findings show that the real estate agents sub-sector has the highest TFP growth and the contribution of TFP growth to output growth in this sub-sector is found to be very significant.

Key words: Output growth, total factor productivity growth, services sector, sub-sector, economic growth

INTRODUCTION

This study aims to analyze the growth of Total Factor Productivity (TFP) in the services sector in Malaysia. The analysis in this research is divided into two parts; the first part is an analysis of TFP growth based on the findings by the Malaysia Productivity Corporation (MPC) and the second part, an analysis of TFP in selected services sector in accordance with data estimation by the researcher. In addition, analysis is also performed to as certain the extent TFP growth plays a role in determining output growth in selected services sector. A total of five services sub-sectors have been selected from the Survey of Services Establishments conducted by the Department of Statistics, Malaysia. The data used in this analysis is for the period 1985-2006. Nationally, the services sector can be categorized into five major sub-sectors, namely, transport, finance, utilities, commerce and trade and other services. In 2008, the services sector contributed significantly to the development of the economy, accounting for 46.3% of Gross Domestic Product (GDP) and it is the largest contributor. The largest contribution to GDP is from the finance sub-sector followed by commerce and trade sub-sector with contributions of 15.7 and 14.8%, respectively. The contribution of other sub-sectors is relatively low at <10% with the lowest contribution from the utilities sub-sector. However in terms of overall output growth, it was 6.6% and the commerce and trade sub-sector registered the highest growth in 2008 at 9.4% followed by transport at 6.7% and finance 5.6% (MPC, 2008).

Table 1 shows the contribution of the services sector to GDP in terms of sub-sectors for the period 1990-2010. It is found that the finance sub-sector, comprising insurance, real estate and business is the largest contributor to GDP with an average growth of 8.1% per year. In 2005, this sub-sector contributed a total of RM 39,568 million and was expected to increase to RM 55,385 million in 2010. The transport sub-sector, storage and communication also contributed quite significantly to national income with an average growth of 6.6% per annum in line with increased trade and travel activities. Commerce and trade sub-sector, comprising wholesale and retail business, hotels and restaurants, too achieved an average growth of 4.3% per annum due to the increase in consumer and tourism activities, particularly in the period 2004-2005. On the other hand, the utilities sub-sector, comprising the electricity, gas and water services is the smallest contributor to GDP compared to other sub-sectors during the period 1990-2005 (Govrnment of Malaysia, 1996, 2001, 2006).

With reference to the six sub-sectors, commerce and trade sub-sector, comprising wholesale and retail trade, hotels and restaurants was a major contributor to

Corresponding Author: Idris Jajri, Faculty of Economics and Administration, University of Malaya, 50603 Kuala Lumpur, Malaysia

Table 1: Gross domestic product-services sector (1990-2010) (RM million at constant 1987 prices)

Sub-sectors	1990	1995	2000	2005	2010
Electric, gas and water	1526	2823	8278	10860	14450
Transport, storage and communication	5487	8787	16858	23163	31984
Wholesale and retail trade, hotel and restaurant	8806	14568	31116	38437	53456
Finance, insurance, real estate and business services	7758	12884	26755	39568	55385
Government services	8447	11683	14332	19831	24759
Other services	1678	2436	16070	20346	28052
Total	33711	53181	113409	152205	208086

Table 2: Employment in services sector (1990-2010) ('000 persons)

Sub-sectors	1990	1995	2000	2005	2010
Electric, gas and water	47.0	69.1	75.0	93.0	103.5
Transport, storage and communication	302.0	395.2	461.6	631.2	701.5
Wholesale and retail trade, hotel and restaurant	1218.0	1327.8	1584.2	1927.2	2171.0
Finance, insurance, real estate and business services	258.0	378.5	508.7	732.3	826.8
Government services	850.0	872.2	981.0	1052.8	1109.8
Other services	479.0	692.2	898.7	1118.2	1335.5
Total	3154.0	3735.0	4509.2	5554.7	11976.0

Adapted from Seventh Malaysia Plan (1996-2000), Eighth Malaysia Plan (2001-2005) and Ninth Malaysia Plan (2006-2010)

employment in Malaysia during the years 1990-2005 (Table 2). In 1990, this sub-sector generated 1.218 million jobs and this number has increased to 1.927.2 million in 2005. The other government services and other services sub-sectors have also played their role in their contribution to employment after the commerce and trade sub-sector which comprises of wholesale and retail trade, hotels and restaurants. While the sub-sector with the smallest contribution to employment is the electricity, gas and water services sub-sector.

THE GROWTH OF SELECTED SERVICES SECTOR

During the period 1986-2006, the output growth of selected services sub-sector was relatively high, reaching 9.6%. Average annual growth rate of capital was also encouraging at 8.6% but the growth rate of labor was relatively low, i.e., at only 2.5%. It shows that the services sector in the survey of selected service industries has been experiencing rather drastic technological changes and further increase in the capital-labor ratio in this sector (Department of Statistics, various years).

Services sub-sector that experienced the highest rate of output growth is the real estate followed by stock brokers, hotels and lodging. These sectors were also experiencing a capital growth rate that was higher than other sub-sectors except for advertising agencies with a low output growth but a relatively high capital growth. This situation was true for the advertising sector due to the higher advertising costs and a longer time to be effective. The annual average employment growth was also dominated by these three sectors, although at a rate much lower than the average annual growth of capital (Table 3).

Table 3: Average annual growth rate of output, capital and labour in selected services (1986-2006)

Sub-industry	Output	Capital	Labour
Advertising agencies	7.0	11.5	4.3
Hotel and lodging	10.9	10.5	6.0
Real estate agents	16.1	14.1	6.6
Road haulage	10.2	9.2	2.5
Stock, share, commodity brokers and foreign exchange services	12.3	14.9	4.9
Services sector-overall	9.6	8.6	2.5

Computed from selected services statistics, Malaysia (1985-2006)

TECHNICAL EFFICIENCY, TECHNOLOGY DEVELOPMENT, TOTAL FACTOR PRODUCTIVITY AND OUTPUT GROWTH IN THE SERVICES SECTOR

Most researchers are more inclined to analyze the level of technical efficiency of the manufacturing sector. This is because the data and variables that are available in this sector are easier to obtain and analyze compared to the services sector. However, productivity growth is vital for both sectors and is often used as a measure of the performance of firms, industries or sectors. Study conducted by Mahadevan (2002) on TFP growth in the services sector in Singapore found that the services industry in that country did not operate at a high capacity in terms of technical efficiency. Output growth in most input-focused services sub-sectors showed a negative TFP growth during the two study periods (1976-1984 and 1987-1994). One of the sources of weak TFP growth was the significant decline in technical efficiency, although, the services sector enjoyed a positive growth in technological progress during the period. According to this researcher, domestic-oriented sub-sectors were not able to operate at the margin of production. In terms of technical efficiency from the 17 services sub-sectors examined, 65.0% (13 sub-sectors) was operating below its potential output level while 35.0% below the maximum output level.

Ramakrishnan (2005) found that 50.0% of the 20 hospitals in the study was technically efficient. This study also evaluated the change in technical efficiency for the period 1999-2000 and found a decline in technical efficiency for this period and the decline was smaller than the average change in technology. Other studies that evaluated the performance of hospitals as a vital social services sector, particularly in developing countries, among others is the study by Al-Shammari (1999) in Jordan.

In the case of electricity supply services, the study by Velderpass (1994) in Sweden showed a lower level of technical efficiency, a higher scale efficiency for services in urban areas but scale efficiency was found to be low for facilities in the rural areas. This study also perform a comparison between the ownership that offer to supply the services in terms of types of service area, however, no significant difference was found in both. The study by Boame (2003) for transit services sector in urban areas in Canada showed an average technical efficiency level of 78.0% and this gave the impression that the inefficiency level was 22.0%.

The analysis in this study is not limited to technical efficiency but to changes in technology which are the two components of TFP growth. The analysis of the extent TFP growth played a role in increasing services output growth is very important, especially in identifying the direction of change and the role of technology. Failure of TFP growth to contribute significantly to output growth reflects the inefficiency of technology and wastage of resources in financing the technology. It has implications for the National Technology Policy and action plan in the future.

OVERALL TFP AND OUTPUT GROWTH IN THE SERVICES SECTOR

Malaysia Productivity Corporation (MPC) has computed the overall TFP growth of the services sector in Malaysia using the residual method by means of an estimation of Cobb-Douglas Production Model and 1999-2008 data. Furthermore, the MPC computed the contribution of TFP to overall output growth of the services sector and by sub-sector. The results of the study are shown in Table 4.

Table 4: TFP growth and contribution toward output growth

		Contribution toward output growth		
Sub-sector	TFP growth (%)	TFP (%)	Capital (%)	Labour (%)
Trade	2.12	33.79	32.32	33.89
Finance	1.87	23.30	40.16	36.54
Utilities	1.63	33.66	35.74	30.41
Transport	1.36	20.70	44.62	34.68
Total	1.33	20.56	44.62	38.63

MPC (2008)

On the whole TFP growth of the services sector for the period 1999-2008 was 1.3%. The sub-sectors that recorded the highest TFP growth were trade with a total percentage of 2.1% followed by finance at 1.9%, utilities 1.6% and transport 1.4%. The contribution of TFP to the overall output growth of the services sector was 20.6% which was lower than the contribution of capital and labor. For the trade sub-sector, the contribution of TFP growth to output growth was 33.8% and for utilities sub-sector, the contribution of TFP growth was 33.7%. Contribution of TFP growth to output growth of utilities sub-sector was the lowest at 20.7% and finance sub-sector at 23.3%. Capital factor played the most important role in its contribution to the output growth of services sub-sectors except for trade sub-sector with the contribution of labor higher by 2% points. These results showed that the services sector in Malaysia is still very much dependent on capital in determining its output growth.

TFP AND OUTPUT GROWTH OF SELECTED SERVICES SECTOR

To obtain the value of technical efficiency, technological change and TFP growth in selected services sector, the Data Envelopment Analysis (DEA) approach, developed by Coelli (1996) and Coelli *et al.* (1998) is used. Data Envelopment Analysis (DEA) has been developed by subsequent researchers such as Fare *et al.* (1994), Cabanda (2002) and Squires and Reid (2004).

The advantages of this approach compared with growth accounting as conducted (MPC) is that it can calculate the value of technical efficiency, technological change and TFP growth for each sub-sector. In contrast, the growth accounting approach generates TFP growth only. Researcher used data for selected services sub-sector which was collected by the Department of Statistics, through the Survey of Service Industries (Table 5).

After a TFP index is obtained through the DEA approach, it is matched by output growth for the sector to show its contribution to output growth. The model used in analyzing the impact of TFP growth on output growth in selected services sector is as follows:

Table 5: Total factor productivity-selected sub-sector

Sub-industry	Efficiency change	Technological change	TFP change
Advertising agencies	0.741	0.886	0.656
Hotel and lodging	0.713	0.821	0.585
Real estate agents	1.166	0.902	1.052
Road haulage	0.908	0.934	0.848
Stock, share, commodity brokers and foreign exchange services	0.704	0.887	0.624
Services sector-overall	1.087	0.956	1.039

Computed using DEA approach

Table 6: Contribution of TFP towards output growth

Sub-sectors	Constant	Capital (K)	Labour (L)	TFP	R^2	DW
Advertising agencies	3.874 (2.361)**	0.629 (6.824)***	0.089 (0.372)	0.038 (0.596)	0.944	1.754
Hotel and lodging	-7.496 (-3.10)**	0.258 (1.899)*	1.662 (6.370)***	0.0009 (0.138)	0.997	-
Real estate agents	3.967 (1.044)	0.421 (4.976)***	0.110 (0.619)	0.436 (5.670)***	0.984	-
Road haulage	3.111 (1.263)	0.331 (3.346)***	0.416 (3.789)***	0.004 (0.436)	0.994	-
Stock, share, commodity brokers and foreign exchange services	-18.11 (-5.698)***	0.285 (1.998)*	3.007 (6.923)***	0.041 (0.479)	0.950	1.955
Services sector-overall	-9.043 (-3.585)***	0.736 (8.436)***	0.956 (3.708)***	0.052 (1.280)	0.970	1.878

Estimation results of Eq. 1

$$\ln Y_{it} = \beta_0 + \beta_1 \ln CAPITAL_{it} + \beta_2 \ln LABOR_{it} + \beta_3 TFPG + \mu_o \quad (1)$$

Where:

Y = The nominal annual output value
CAPITAL = The annual nominal value of fixed assets
LABOR = The number of employment
TFPG = TFP index
ln = Natural logarithm
i = A sub-sector

The result of the estimation of the model shows that technical efficiency grew at a rate of 8.7% for the whole of the services sector selected. However, only the real estate sub-sector experienced positive growth in technical efficiency. Other sub-sectors experienced negative rates of change in technical efficiency for the period 1985-2006. For changes in technological advancement, it was found that all the services sub-sectors selected experienced negative change in the period of study. This showed that there was no advancement in technology but a decline instead. The decline in high technology occurred in the advertising, hotels and lodging, stock-broker, commodities and currency sub-sectors.

As a whole the selected service industries as examined by the Survey of Services Establishments experienced a positive growth in TFP at 3.9%. However, among the five sectors selected for this analysis, only one sub-sector experienced positive TFP growth that is real estate with a growth rate of 5.2%. This indicates that the real estate sector has been operating efficiently was in line with high output growth and high capital utilization and has the potential to become the leader in the services sector in Malaysia. Negative TFP growth in the other sub-sectors is a reflection of their inefficiency in the production processes and input that can be reduced to achieve the same level of output.

CONTRIBUTION OF TFP TO THE GROWTH OF OUTPUT SECTOR-SELECTED SERVICES

To analyze the extent of the contribution of TFP growth to output growth in selected services sector, Multiple Regression Models was estimated with the inclusion of TFP growth as one of the independent variables. Other independent variables were capital and labor. Initially, there was the problem of autocorrelation in hotels, real estate and freight transport sub-sectors. To overcome this problem, the auto-regression approach was used. On the other hand, estimation model for other sub-sectors did not have the auto-correlation problem. The result of this estimation showed that TFP growth was a significant determinant of output growth in the real estate sub-sector only. In the output growth of other sub-sectors, the role of capital and labor was more dominant (Table 6).

CONCLUSION

The services sector is becoming increasingly important to economic growth in Malaysia. This sector's contribution to national output and employment has exceeded that of the manufacturing sector in the decades after the 1990s. Sustainability of this sector is very much dependent on TFP because it reflects the efficiency and competitiveness of this sector. Analysis of TFP growth conducted by MPC showed that all sub-sectors experienced positive TFP growth, however, the growth rate was very low, i.e., <2%. Besides, output growth of the sector was still dominated by the input of capital through technology transfer and technological change which were certain to involve a high cost.

Analysis of selected services sub-sector finds that most sub-sectors experienced negative TFP growth and only one sub-sector, namely real estate was experiencing positive growth, driven by positive change in technical efficiency. In fact, the contribution of TFP to output growth in the sector was also not significant. On the contrary, output growth was more driven by the growth of capital and labor. These two basic factors are still the most important contributing factors. The findings are consistent with the study conducted by MPC. It shows that the service sector has not experienced a paradigm shift that emphasizes the role of quality inputs.

To enhance the growth of TFP, the aspect of the determinants of TFP needs to be identified. TFP represents the overall quality of inputs driven by several factors such as the human quality that can be generated

by human capital and capital investment through the selection of appropriate technology by means of Research and Development (R&D). Identification of the determinants of TFP growth requires a detailed study of company data and taking into account all related factors.

The analysis in this study shows that TFP growth is determined by two important factors, namely change in technical efficiency and technological change acquired by means of the DEA approach. To improve the technical efficiency of the services sector, it must be based on the quality of inputs such as capital and labor as well as efficiency in managing these two inputs. The quality of capital factor is closely related to the use of appropriate technology. Technology should be selected according to the availability of supporting inputs such as skilled labor. In this context, technological development through R&D is more important than technology transfer because it could generate the technologies such as technologies necessary in the production process.

Quality of labor depends on the performance of the human capital. In this context, education and training is very important in cultivating human quality. The aspect of in-house training is important because the suitability of training program can be controlled and at the same time controls the workers from leaving. In-house training is usually more specific and workers can not change work easily.

Technological change is highly dependent on the suitability of R&D in a country. Although, technological changes can be determined by the transfer of technology but a country cannot be over-dependent on technology transfer because it is difficult to happen. Besides, the transfer of technology that occurred may not be suitable with the endowment factor in a country. The best alternative is to carry out R&D that is effective in identifying the best technology. If both technical efficiency and technology can be improved then technological growth and advancement will all at once increase the contribution of TFP to growth in the services sector.

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