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Measuring Productivity in the Service Sector

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Introduction

This paper surveys the literatures on the difficulties of measuring productivity in the service sector in general and the tourism /hospitality industry in particular. In the service sector, the conceptual and practical problems associated with constructing appropriate indexes to measure productivity are substantial. These problems are reflected in a number of research puzzles. An understanding of these measurement issues and the factors that affect productivity growth in the service sector can help to enhance productivity growth. Section one will discuss the concept of productivity in the service sector; Section two will discuss the puzzles of productivity growth; Section three will discuss the issues of measurement of productivity in the service sector; Section four will discuss the alternatives that explain the productivity growth problem in the service sector; Section five will discuss the productivity issues in the tourism sector; and the last section is the conclusion. The paper begins with a very brief overview of the history of productivity growth in North America.

By comparing productivity across the world and across time, what we have is a divergent productivity picture. The process of industrialization which began in Britain in the eighteenth century brought an unprecedented period of productivity growth. In America, productivity growth resulted from the exploitation of natural resources and was further accelerated after the Civil War by enhancing human capital through the education system. Indeed, there was technology progress between 1929 and 2008 but the technology progress neither speeded up nor diminished. Since 1929, Americans have enjoyed relatively fast productivity growth. From the end of the 1920s to the beginning of the 1970s, the American living standard doubled. It has been suggested [reference] this is the result of the huge size of the American economy which allowed the exploitation of scale economies, investment in human capital, the removal of social barriers, and World War II which destroyed Europe but not America. The productivity of Canada actually gained 15 percent of and converged to the States' productivity during this period. After 1973, however, the growth in productivity slowed down in developed countries. The United States' labour productivity growth in 1974 fell to 1.4 from 3.5 percent the previous year, marking the beginning of a long period of stagnation that lasted two decades. This dramatic and sustained decline in productivity growth has been the subject of intense research by economists.

Productivity Measures

In the very early years of the twentieth century, Church talked about the efficiency measures with unit cost in his 1909 work, *Organisation by Production Factors*. According to Diewart (2003), Kuznets (1930) is probably the earliest work using output-over-input index. Kuznets (1930) uses the 'cost of capital and labour per pound of yarn' the inverse of which became total factor productivity (TFP) index later. The concept and issues of productivity have been considerably researched in the manufacturing sector for a long time, compared with those researches for the service sector. The current idea of productivity stems from and is a construct of the "manufacturing paradigm" developed during the Fordist period (Jones and Hall, 1996). Adam and Gravesen (1996) argue that the concept of productivity is deeply rooted in the context of manufacturing, which could be the reason for continuing to overlook the issues and concept of productivity in the service sector. As services are increasingly being industrialized while products informalised, Sigala (2002) questioned whether or not productivity should be defined differently in services and manufacturing sectors. In 2008, 69.6 percent of Canada's GDP was contributed by the service sector, and 76 percentage of its labour force concentrates in service sector. Given the huge size of the service sector in GDP it is increasingly important to find a satisfactory and widely accepted definition for the productivity of the service sector. As Mahoney (1988) has emphasized, it is inevitable that aggregate productivity measures will be plagued with difficulties unless service sector productivity is defined satisfactorily.

Section 1: The Concept of Productivity in the Service Sector

Productivity measures the efficiency and effectiveness with which resources are used in economic activity. Efficiency comprises two components: technical efficiency which reflects the ability of a firm to obtain maximal output from a given set of inputs, and allocative efficiency which is a reflection of how a firm uses the inputs in optimal proportion given their respective prices and the production

technology. Some argue that productivity needs to address both efficiency and effectiveness because an economic activity will not be productive if it is only efficient but not effective, or vice versa. Some others, however, use productivity, efficiency and effectiveness interchangeably (Farrell, 1957; Debreu, 1951; Koopmans, 1951). Unclearly defined concept and definition of productivity give rise to the difficulties in productivity measurement and vice versa. Productivity is defined as the relation between output and input, in other words, a ratio of output to input (Atkinson, Banker, Kaplan and Young 1995). Inputs are the resources used in the production, such as labour, materials and energy. A given product, service or both are the output.

Kendrick (1985) argued that the broadest measure is called total productivity (TP) or the total output(TO) -total input (TI) ratio:

$$TP = \frac{TO}{TI} = \frac{TO}{L+K+M} = \omega_l \frac{TO}{L} + \omega_k \frac{TO}{K} + \omega_m \frac{TO}{M}$$

The total inputs of the factors of production (F) consist of labour (L) and capital (K) that includes natural resources as well as structures, equipment and inventories, and intermediate products (M) that include materials, components, supplies, energy, and services purchased from other producers. Total productivity can be written as the weighted average of the partial productivity of L, K and M. Total productivity measurement is particularly useful at the company or plant level because management is concerned about saving on all cost elements and TP enables direct analysis of the savings achieved in the use of purchased goods and services as well as of factor inputs per unit of output.

Nevertheless, there are two types of productivity measurements that are mostly used to evaluate economic performance. One is called partial productivity such as labour productivity (LP) or capital productivity, relating output to a single production factor. As a partial productivity measure, labour productivity is much more often used to measure productivity compared with other partial productivity because it is significant for determining the potential growth in living standards as higher levels of per capita income or output require more output to be produced per labour (Sharpe, 2000b). Labour productivity is used to capture the efficiency with which the economic system transforms labour into output (Baldwin, Maynard, Tanguay, Wong, and Yan, 2005). Labor productivity is defined as the ratio of a volume measure of output to a volume measure of input and its identity can be written as following:

$$\frac{Y}{N} = \frac{Y}{H} * \frac{H}{N}$$

Y is output, N is number of labour and H is number of working hours. LP can be volatile in the short term due to the business cycle and changes in production. However, by treating factor inputs and intermediate inputs as external variables, most of the results from cross countries comparison can be explained (Van Ark,1996). Another is Total or multi-factor productivity measures, relating output to an index of two or more production factors, which is especially useful for measuring the efficiency of the use of resources. Multifactor productivity (MFP) or Total factor productivity (TFP) is a variable which accounts for effects in total output not caused by inputs. For example, in a Cobb-Douglas production function, $Y=AK^{\beta}L^{\alpha}$, A is the MFP or the TFP. The Bureau of Labor Statistics (BLS) in the USA defined MFP as a measure of the changes in output per unit of combined inputs, such as capital, labour, energy, materials and purchased business services. TFP is the same as MFP, both of which are a certain type of Solow residual. The TFP basic definition is the rate of transformation of total input into total output which is a ratio of output-over-input (Diewert & Nakamura, 2002). As Diewert and Nakamura noticed, it is easy to work with one input to one output or some production can easily aggregate to one input and one output. However, in a real business, there are multi-input and multi-output involved; some are tangible and measurable and some are intangible and immeasurable. Kendrick (1985) argued that GDP is the value of total output less the costs of intermediate products. As a result, the total/multi- factor productivity should be measured as following:

$$MFP = \sum \omega_i (GDP / I_i)$$

where I_i is the i'th factor input and ω_i is the weight distributed to the components (Baldwin, Maynard, Tanguay, Wong, and Yan, 2005). The input and output indexes that most of the official organizations published are very complicated and do not have consensus. For example the BLA method was different from the Bureau of Economic Analysis (BEA) Method, and consequently they got different results. Even though the ways in which they define inputs and outputs are different, both BLA and BEA use MFP to measure the productivity. In Canada, Statistics Canada also uses MFP as the measure for productivity. MFP/TFP is a more comprehensive measure of overall productivity, which combines all of the partial measures into an aggregate index (Baldwin, Maynard, Tanguay, Wong, and Yan, 2005). The benefit of using MFP/TFP for industries and sectors is that MFP/TFP for the national economy or the business sector is a weighted average of TFP/MFP in each of the component industries, the weights being the base-period proportions that each industry's value added GDP is of total gross product. The changes in TFP reflect changes in productive efficiency as a result of net savings in real factor costs per unit of final products.

By dividing the economy into different sectors, there are certainly more problems for productivity measurement in the service sector than the manufacturing sector because it is more difficult to define what productivity is in the service sector compared to the manufacturing sector. To different people, productivity means different things, which is expressed in the different or even conflicting definitions and perceptions of productivity (Pickworth, 1987). Productivity measurement in service is difficult because it is hard to standardize the inputs and outputs which are highly heterogeneous. The scope of organization in the productivity concept in the service sector is larger than that in the manufacturing sector and involves an external element from the organizational position – customer. The input elements, such as materials, machines and energy in the service sector are not as important as in the manufacturing sector. The service sector is labour-intensive relatively speaking to manufacturing. Quality in the service sector is very important because customers usually evaluate a given service by its quality. Unlike the manufacturing sector, which measures its output by quantity units and increases the amount of production by raising output, service sector output often has less interest in the quantity aspect and is normally increased by the attempt to provide higher quality services to the customer, making customer more satisfied. For this reason, service productivity can be defined as the ability of a service organization to use its inputs for providing services with quality matching the expectations of customers (Järvinen, Lehtinen, and Vuorinen, 1996). Järvinen, Lehtinen, and Vuorinen (1996) defined productivity of the service sector as:

$$\textit{Service Productivity} = \frac{\textit{Quantity of output and Quality of output}}{\textit{Quantity of input and Quality of input}}$$

In this ratio, the quantity aspect of service productivity is the same as the manufacturing productivity, which consists of material, labour, and capital. The actual volume of operations, however, is determined by the variation of demand over time (McLaughlin, 1996). As a result, the productivity ratio of service operations may vary greatly from one time period to another if it is measured as a quantity ratio. Unlike the quantity for manufacturing output, the volume of the service output is not an important issue from the customer's perspective because the customer normally purchases only one unit of output or one package of service. Hershey and Blanchard (1980) suggested that effectiveness of the firm is a better productivity measurement because the effectiveness can be individualized by a firm's decision as to goals and objectives in order to avoid the problem of concentrating on increased productivity defined as output. In fact, the value added concept gives an index for monitoring the effectiveness of the effort put in by the employees in obtaining market situation (Vrat, Sardana, and Sahay, 1998). The quality of the service sector consists of humanistic and technical aspects. The output consists of a total service offered in terms of quality and the input includes both tangible and intangible elements (Järvinen, Lehtinen, and Vuorinen, 1996). A consistent weighting system should be used for outputs and for inputs. Also, the weights should be changed as the structure of production change and associate changes in relative prices (Kendrick, 1985).

Section 2: The Puzzles of the Productivity Growth

In the States, labour productivity growth in private businesses declined from an average annual rate of 2.5 percent from 1948 to 1969 to 2.0 percent from 1969 to 1973, and then to 0.5 percent from 1973 to 1979. Labour productivity growth has averaged 1.1 percent annually since 1979, which is still much lower than the high growth rates of the post-World War II period. Even though the real output had grown at an average annual rate of 4.7 percent, this growth is due to the dramatic increase in employment. As employment growth has decreased, so has growth in output. In the very early 1980's, many economists discovered the slowdown in the GDP growth, and there are many literatures being written to explain the reasons why productivity growth has dropped from its previous levels. In 1989, Baumol, Blackman and Wolff together published the book, *Productivity and American Leadership: the long view,* in which the productivity puzzles are addressed:

(1) The slump of the U.S. productivity growth after 1973.

(2) The role that savings play in the slump of productivity growth.

Sharpe (2004) summarized ten puzzles of productivity growth that he thought are important and worthy of identification and study. They are:

(1) the sources of the post-1973 productivity slowdown

(2) explanations for the post-2000 U.S. productivity growth acceleration,

(3) higher European labour productivity levels,

(4) the absence of a post-1995 productivity growth acceleration in Europe,

(5) productivity effects of the internet,

(6) productivity growth in the university sector,

(7) negative productivity growth in the construction sector,

(8) total economy versus business sector Canada-U.S. labour productivity growth comparisons,

(9) causes of the Canada-U.S. labour productivity level gap,

(10) Cause of lower M&E capital intensity in Canada.

For the puzzle of the post-2000 U.S. productivity growth acceleration in a post-1995 productivity growth boom, Gordon (2004) defined it into five puzzles:

(1) Whatever happened to the cyclical effect?

(2) Why did productivity growth accelerate after 2000 when the ICT investment boom was collapsing?

(3) The steady decline in the price of computer power implies steady technical progress, but then why did computers produce so little productivity growth before 1995 and so much afterwards?

(4) What does the collapse of the investment boom imply about the future of innovation?

(5) Why did productivity growth slowdown in Europe but accelerate in the USA

The slowdown in productivity growth post 1973 has been explained with the following reasons: the changing composition of the labour force due to the influx of teenagers and other less experienced workers; a slowing in the rate of growth of the capital-labour ratio as investment in equipment and structures failed to keep pace with the unprecedented increase in the employed labour force; a leveling-off in research and development expenditures; the maturation of some industries, with little new technology; and changes in attitude towards work (Munnell, 2000).

In recent studies, people argued that the slow productivity growth of the service sector plays an important role in industry and aggregate productivity growth. In fact, productivity in manufacturing has grown strongly. The data of the States showed that the growth in output per hour during 1987-1994 was 2.9 percent, which is more rapid than the 2.6 percent growth record during the productivity's golden age of 1950-1973 and much more rapid than the rate growth rate during the Dark Age of 1973-1987 at the 2.2 percent. The aggregate productivity growth of the service sector, however, is stagnant but the heterogeneous industries in the service sector which are difficult to define, differentiate and categorize have productivity growth rates ranging from low or negative rates to growth rates higher than those of high-growth manufacturing industries (Wölfl, 2000). The problem of slow productivity growth and the post-1973 growth slowdown is concentrated in the service sector. The private non-farm non-manufacturing non-mining sector had labour productivity growth of 2.38 percent in the period from 1960-1973, 1.81 percent in the period of 1973-1979, and 1.35 percent in the period of 1979-1992. The private non-farm non-manufacturing sector's MFP and LP growth has been hardly positive since 1973 (Gordon, 1996). Baumol, Blackman and Wolff (1989), however, perceived the slowdown of post 1973 productivity growth differently. They thought the productivity growth during the period of post World War II and pre-1973 is unusually high which was due to the high output, short labour, enormous backlog of technological innovations and savings available for productive investment. The productivity growth in the post-1973 period was just a slowdown from unrealistically high levels, which is a return to normality rather than a long-term fall in the rate of productivity growth. Baumol, et al. thought that the deindustrialization theory does not explain a slowdown of productivity growth well. They argued that the share of real output constituted by services has not changed at all, but they did acknowledge that the tertiarization might impose a cost to the productivity. The lagging service sector produces poorly paid jobs with little opportunity for advancement and obstructs overall productivity growth in the country. In fact, the growth of the service sector has resulted in less desirable jobs.

The puzzle of post-1995 productivity growth acceleration may be just reflecting the normal cyclical correlation between productivity and output growth. Also, after the ICT investment boom was collapsing, the corporations have fiercely cut its cost and the hidden intangible investments in the late 1990s, which positively affected productivity growth after 2000. In the 1990s, the combination of computer and communications technology with software which created the internet, the WWW and the cell phones was a significant development for computer so the productivity can benefit from this technology (Gordon, 1996).

The slowdown in productivity post-1973 may also be explained by the decline in the level of investment and saving rates. The statistical data, however, showed that the technological change accounts for nearly two-thirds of productivity growth, which means the capital accumulation does not play a big role in productivity growth. If savings can be treated as the residual of income, the sticky consumption patterns and a decrease in income growth resulting from a decrease in productivity growth actually lead to a low savings rate (Baumol, at al., 1989).

The question of why Europe failed to exhibit post-1995 productivity growth acceleration has been around for many years. In fact, like their counter parts in the U.S., European firms have invested in ICTs. However, the U.S. institutions foster creative destruction and financial markets that encourage innovation, while Europe remains under the control of corporatist institutions that dampen competition and inhibit new entry. Moreover, Europe's youth culture does not nourish independence as the U.S. youth culture, which led to the lack of the development of ambition (Sharpe, 2004; Gordon, 2004).

Section 3: Measurement Problems of Productivity in the Service Sector

The concept and definition problems within productivity create measurement problems for the productivity of the service sector and its growth. In Canada, the service sector has been growing quickly as a share of total output but the sector's aggregate productivity growth has been lower than that of the goods sector. This phenomenon does not only appear in Canada, the service sector in other leading industrial countries, such as the US, Japan, France and UK, suffers low growth in productivity as well. Many scholars suspect that the productivity of the service sector has been underestimated. There is empirical evidence suggesting that low or negative productivity growth in some service industries is

connected to measurement problems. It, however, cannot identify which service industries are the main problem areas (Wölfl, 2003). Measurement problems are more serious in the service sector than in the goods sector. That the mis-measurement of output contributes to the productivity slowdown is a widely accepted hypothesis, which is due to an increasing portion of output not being captured in the basic statistics (Triplett and Bosworth, 2000). A measurement error has greater impact in a slowdown period than it does in a non-slowdown period. If the measurement errors mostly occur in the industries which partly or wholly produce intermediate goods, the measurement errors have little impact on the slowdown of productivity (Gordon, 1998).

One of the measurement problems concerns prices. Standard price data fails to capture the improvement in the quality of many outputs and thus leads to an understatement of real output. While the index numbers are used to deflate the GDP, they are facing weighting schemes problems. Using a single base year or fixed weighting scheme leads to measurement error of the true productivity and economic performance, so the weights of index numbers should be changed frequently (Diewert, 1987; Gordon, 1996). If the consumer price index (CPI) has an upward bias, the growth rate of output and productivity must be downward biased. The causation of the CPI's upward bias can be identified as traditional substitution bias, quality change, outlet substitution bias and logarithm bias. Due to the traditional substitution bias and outlet substitution bias, the officially recorded productivity growth in manufacturing and trade has been much lower than the actual productivity growth. Many consumer purchase sectors, such as services like banking, insurance, and health care have quality change bias. Due to this CPI upward bias problem, Gordon (1996) argued that the US productivity growth might have been substantially understated both before and after 1972.

To measure the productivity of a industry or a sector, we have to have the information on the outputs produced by the production unit for every time period in the sample along with the average price received by the production unit in every time period for each of the outputs. Many of the outputs in service sector industries, however, are difficult to measure theoretically, such as the output in insurance, gambling, banking, options trading, etc (Diewert, 2008). The problems in defining service-sector outputs have caused underestimation of service-sector output growth. It is hard to find equivalent output unit in physical terms for most of the service sector outputs (Sink, 1989). Defining a unit of service output is considered to be difficult because of the facts such as its greater intangibility and that quality depends on the inputs provided by the user of the service (MacLean, 1997). The quality of service output has more variation than the non-service sector outputs but the average quality should not vary much over time (Kendrick, 1985). Normally, output information is presented as revenues received by the industry with either an output index or a price index for each output. The output of the service sector consists of a total service offering in terms of quality, which is what the customer in fact pays for and which is mostly intangible and difficult to quantify (Adam, 1995). Adam (1995) suggested that the service sector output should be treated as the value for the customer and from the perspective of the customer and defined by its quality level.

Measurement of inputs in the service sector production also poses a problem for service sector productivity measurement. The inputs include both intangible and tangible elements (Rutkauskas and Paulavičienė, 2005). For example, service culture is considered as one important intangible element for service sector production, but it is extremely difficult to put a value on it. Labour input is generally measured in terms of hours worked by all persons engaged in production (Kendrick, 1985). Such a measurement, however, is not accurate. Highly skilled workers contribute more to production than unskilled workers if both of them work for the same number of hours (Diewert, 2008). To solve this problem, some analysts weight labour hours by the average hourly compensation by industry, occupation, and other significant classifications, including levels of education and experience.

Moreover, in the service sector, a high proportion of certain service outputs are used as intermediate inputs elsewhere, which makes the measurement even more difficult because the data on intermediate inputs are harder to obtain compared with the data on final outputs (MacLean, 1997). Many industries in the service sector have more than half of their outputs used as intermediate inputs. For example, over 75 percent of transportation output is used as intermediate inputs, and more than four-fifth of business services output is used as intermediate input in other industries and sectors.

Measurement errors cannot explain all the slowdown and low productivity growth in the service sector, but correcting these errors indeed helps to significantly improve the productivity growth picture in the service sector. Gordon (1996) states that the corrections of the measurement errors could easily double the officially recorded rate of private non-farm non-manufacturing sector productivity growth in the US.

Section 4: Alternative Explanations

When comparing productivity across time, it is apparent that there was a long period of low growth in most of the developed countries between 1973 and 1995. Clearly there was a larger proportion of the workforce being educated at a higher level, and more labour and capital allocated to research and development than in the past. However, productivity growth neither accelerated nor slowed down. Is this evidence of the diminishing return of technological progress? The same additional technological progress needs more and more capital and labour. Gordon (1996) suggested that the technological depletion or "running out of ideas" could be one explanation for the productivity slowdown. As the above sections argued, measurement error explains only 15% to 40% of the variation in productivity, which is not good enough to fully explain why the productivity growth is low in most of the developed countries for so long a period (Sichel, 1997). There were four alternative explanations: oil shock, cultural shift, baby boom, and substantial decrease in technological and infrastructural investment at the industry level.

Oil shock and productivity

The idea that the increasing oil price is responsible for the productivity slow down has been discussed for many years. As the oil price is getting higher and higher, firms will try to promote the technology or production involving more people and capital but less oil rather than the technology or production allowing more output with less people or less capital. The consequence was that both the labour productivity and the total factor productivity slowed down. As Table 1 shows, the TFP growth rate was negatively correlated with the oil price, this may suggest that a productivity slowdown can be attributed to the oil shock.

Table 1 - Growth in Total Factor Productivity and the Real Price of Oil Imports

	1950–1959	**1960–1973**	**1974–1985**	**1986–2001**
Real price of oil	20.47	17.72	43.42	20.82
TFP growth (percent)	1.99	1.18	0.31	1.34

Source: FRED

The critical issue for oil shock based explanations is how the mechanism works. One possibility is the substitution away from oil as in the above discussion. However, as Olson (1988) suggested, the cost of oil is too small to explain the productivity slowdown, and the possibilities for substitution are also very limited for the 1973 oil shock. Another possibility is that the oil-infected capital was made obsolete by the higher oil price, resulting in an unmeasured decline in the capital stock, which would look like a decline in productivity in the data (Barsky & Kilian, 2004). Again, this hypothesis is not clearly supported by the empirical data. Barsky and Kilian suggested that there is reverse causality from productivity and oil price, which means that the increase (decrease) in productivity causes the increase (decrease) in oil price. There is no consensus among economists whether there is solid empirical evidence to support the negative relationship between oil price and productivity. Mork and Hall (1980) used the States' data to demonstrate that US real output was depressed by the oil shock about two percent in 1974 and five percent in 1975. This negative relationship between the oil price and productivity is consistent with the results in Hamilton (1983, 2003) and Hamilton and Herrera (2004). Bernanke, Gertler, and Watson (1997, 2004) dismissed the negative relationship between oil price and productivity because there is no statistically significant result to support this kind of correlation. Bernanke et al. noted that distinction between the expected oil shock and unexpected oil shock on productivity was very important. The unexpected oil shock is more profound than the expected one. Along with Bernanke et al. (1997, 2004),

Bohi (1989, 1991), Hooker (1996), Barsky and Kilian (2001), and Kilian (2005) also found no negative relationship between oil price and productivity growth. Most recent researches, such as Blanchard and Gali (2007), found that the macroeconomic effect of oil shocks in the 2000s is different from the 1970s. This is because of a) random effects, (good luck or bad luck), b) a smaller share of oil in production, c) more flexible labour markets, and d) improvements in monetary policy. These may imply the relationship between productivity growth and oil shocks is dependent on time, which implies a non-stationary process.

Cultural shifts and productivity slowdown

The standard long run growth models such as Solow (1970), Dixit (1976) and Romer (1986) have neglected the choice between work and labour. The reason for this omission is that in the long run the labour market will be in equilibrium, and there is no real effect for fluctuations in employment. Becker and Gordon (2008) in comparing the US and EU-15 during the 1990s and 2000s, found that post-1995 employment increased for females only in the EU-15, which suggests a shift in culture and social norms toward a greater acceptance of females in the labour force. Is the increasing entry of women the cause of the productivity slowdown? This is certainly not the case. There are some physical differences between men and women. Even if men are physically stronger than women, the slowdown should be in the manufacturing sector which is more physically demanding, not the service sector. Could men be smarter than women? Evidence from academia shows that single woman performs better than single man. There is no empirical evidence to support the gender difference in terms of productivity. Ginther and Kahn (2006), however, in terms of wages and the chance to be promoted there is a huge gap between man and women especially in science and engineering. This is due to discrimination, not productivity (Graham & Smith, 2004). Besides, labour market changes should have little impact on the productivity growth.

Role of changing demographics in productivity

Another aspect comes from the baby boom. When investigating the history of productivity growth in the US, it must be noted that productivity growth fell about one percent during the 1970s, and growth returned to the 1960s level until 1995. This corresponds to the baby boom entering and leaving the labour force. Feyrer (2008) found a statistically significant and robust correlation between the cohort sizes and total factor productivity, and determined that the baby boom could explain about 20 percent of the productivity slowdown. Standard labour theory can also easily explain this phenomenon. When the baby boomers entered the education system, the education system could not accommodate so many people at a time, and a lower quality education was the result. Especially in higher education the effect was much more significant with the result that a smaller percentage entered higher education, which was of poor quality. From a human capital perspective, the baby boom will cause less human capital accumulation, which induces less productivity through the production function. Even if education were irrelevant to productivity, based on Mincer's framework, more experience results in higher productivity and wages. So in the 1970s, the entry of baby boomers into the workforce would lower the average experience in Canada and consquently lower productivity. However, Baily, Gordon and Solow (1981) argued that the adjustment of productivity growth resulting from the demographic change is relatively small.

The weak bargaining position of labour may contribute to the slow productivity growth in the service sector as well. The weak unions in the service sector, a substantially decline in real minimum wage, and substantial immigration, both legal and illegal, encourage employers to overstaff particular service occupations, which leads to low productivity and so as the slow productivity growth.

Substantial decrease in technological and infrastructural investment at the industry level

This argument is based on the coincidence of the substantial decreases in investment, especially from the private sector, in research and development (R&D) and the productivity slow down. As Baumol, Blackman, and Wolff (1988) argued, the technological change accounts for two-thirds of productivity growth, the decrease in investment in R&D will result in less technological progress which will certainly slow down productivity growth. However, this model is soon dismissed by the economists because it is too simple to capture the reality, as Krugman (2008) affirmed that the investment in R&D is too small to explain the productivity slow down. Recently, many researchers found that increasing spending in private R&D caused an increase in productivity growth in 1990s. For example, Anderson and Kliesen (2006) and

Duggal, Saltzman, and Klein (2008) found that the rapid growth in productivity in the US during the 1990s is mainly due to intensive investment, both private and public in R&D. Martinez, Rodriguez, and Torres (2008), however, found a so called productivity paradox, after differentiating the investment of R&D into information and communication technology (ICT) and non ICT, the net effect of the non ICT on productivity is negative in Spain. This productivity paradox has occurred in some developed countries. What causes it and how the mechanism works are still a mystery. There is no evidence or finding to suggest that a decreasing in spending in R&D should be responsible for a slowdown of productivity.

Thus the causes of the long term productivity slowdown in most developed countries are still unsolved. There is no single explanation that can stand alone. However, there is a possibility that not one but several factors happened simultaneously caused the productivity slow down.

Section 5: The Productivity Issues in the Tourism Sector

The tourism sector is a very important part of the service sector. The growth of international tourism has exceeded the growth of world GDP since 1950s. The expenditure on tourist goods and services is around 8 percent of total world export receipts and 5 percent of world GDP, which makes international tourism become one of the most important tradable sectors (Lanza and Pigliaru, 2000). Tourism is an important driver of globalization. Also, it is one of the major employers in the economy. Tourism in OECD countries contributes between 2 and 12 percent of GDP and provides 3 to 11 percent of employment and on average about 30 percent of service exports. As one of the most interconnected service sectors, tourism generates important economic activities through linkages with other industries including agriculture, manufacturing and service. Backward linkages refers to tourism demands goods and services inputs from other sectors, while forward linkages occur when tourism is a supplier of goods and services to other sectors (Tourism in OECD Countries, 2008). Backward linkages are actually weak due to the expensive or lack of inputs needed for tourism activity. Some authors consider tourism as only being defined in terms of demand. There are two types of tourism demand, one is tailor-made tourism services, and the other is industrially produced tourism services packaged for the mass market. The earnings from tourists in fact go to a variety of different companies and industries.

The Tourism Sector in Canada

Tourism sector price adjusted GDP was about $28.6 billion and increased 5.9% from 2006, and accounts for 2% of Canada's GDP in 2007. (Canadian Tourism Commission, 2008) In Canada, unlike some countries that have tourism ministries, the tourism portfolio is attached to Economy, Industry, Trade or SME ministries. The workers being employed in this sector had increased about 2% from 2006 to 2007, which suggests the increased GDP was due to the improvement in productivity. Even though Canada's tourism sector has enjoyed productivity growth for these years, it is not enough to change Canada's tourism trade deficit position. In 2008, the five year growth of tourism expenditure ended because of the financial crisis and economic recession. One way to ease the worsening economic situation for firms in the tourism sector is to improve productivity which helps to bring up the profit margin.

The accurate measurement of productivity is very import for managing and monitoring. The measurement issues, however, always exist in the tourism sector. Heterogeneity in terms of the industry's characteristics and non-availability of reliable input price and output price data are two major challenges for Canadian economists and statisticians. There are two tourism statistics widely used in Canada: the Tourism Satellite Account and the National Tourism Indicators. The Tourism Satellite Account (TSA) is a set of statistics which measure structure and scope of tourism in terms of output, expenditures and employment. The National Tourism Indicators (NTI) offers the current figures on and analysis of the tourism and hospitality sector within Canada. The establishment of the TSA and the NTI are meant to solve the measurement problem in the Canadian tourism sector. The TSA is more complex and allows for more complete analysis than the NTI, however the TSA is less current and less frequently available compared to the NTI. The NTI relies on the TSA and is regarded as an extension of the TSA in Canada. (Delise, 1999)

Productivity of the tourism sector

Tourism related industries in developed countries are not only facing global competition but also competing in factor markets with other sectors with higher productivity. Tourism as a service and a self-service industry, which suffers comparatively low productivity, should increase its productivity, and its related industries must increase their competitiveness in the market.

Tourism industries are labour-intensive, so the magnitude of the differences in wage levels between developed and developing countries plays a significant role. Developed countries' tourism faces high wages and hard currency while earning more per visitor and achieving higher added value per employee. The ratio of value added to GDP in the tourism sectors of industrialized nations is in a downward spiral. In fact, the research found that a country's level of development has a considerable influence on tourism growth. The strongest tourism growth in recent years actually appear in the largest emerging economies, even though the developments in world tourism has led to dynamic and lasting growth in all countries. Developing countries' tourism-related industries have a competitive advantage because of the countries' plentiful resources to offer and lower cost on producing the services. As a matter of fact, tourism is the most productive sector in developing countries, compared with the rest of the economy (Todd, 2008).

Measurement problems in the tourism sector

As a part of the service sector, the measurement problems exist in the tourism sector as well. Some scholars believe the measurement problems play a role in the low productivity within the industry because without accurately measuring the productivity it is hard to manage and monitor the production procedures well. There are three difficulties in measuring productivity: identification of the appropriate inputs and outputs; appropriate measures of those inputs and outputs; the appropriate ways of measuring the relationship between inputs and outputs (Anderson, 1996). The intangible service nature, simultaneous production and consumption of the hospitality and the perishability and heterogeneity of services cause those difficulties. The inputs of tourism-dependent industries can be defined in terms of units of human resources, capital and natural resources required for the provision of a service. As a result, the value of a tourism service is measured by the price that can be charged, which depends both on efficient marketing in tourism markets and the efficient application of the factors of production.

Improving productivity of the tourism sector

Tourism is the sector in which the manufactured experience requires high quality levels. The quality of the experience is the base of productivity in tourism, which is reflected in the subjectively perceived satisfaction of the visitor. Also, the quality of the services is the basic element to compete between destinations. As a result, anything that contributes to the efficient production and marketing of quality experiences helps to improve productivity in tourism. To improve productivity, it needs not only to produce efficiently but also sell the products efficiently to the markets.

The dual structure of the tourism related industries, as shown in Table 2, determines the existence of two types of corporate organizations in the tourism sector, small-to-medium-sized enterprises (SMEs) and large companies. SMEs can tailor and personalize its services to the needs of the individual visitor and rapidly adapt the changing market requirement but such personalized tourism is very expensive. In fact, the competition on price and cutting cost have become more and more important for succeeding in the tourism industry, which means improving productivity. The big corporations are able to massively provide standardized products which allow them to cut the cost and adapt a lower price.

Table 2. Dual structure of the tourism related industries

Characteristics	Tourism Sector (outgoing)	Destination oriented SME's (incoming)
Functions	Organization, Information, Transport	Welcome, Hospitality, Leisure
Related industries	Travel agency, Airline industry, Other	Accommodation, Catering, Cable cars, other
Corporate Organization	Large companies	SMEs

Source: Tourism in OECD Countries, 2008

The studies on SMEs performance found that SMEs lack the skills or feel powerless in front wish multinational enterprises. SMEs, however, can actually benefit from globalization by means such as the exploitation of networks and clusters, and by the adoption of new technologies. The use of the internet for marketing purposes and getting in touch directly with their client base can greatly improve the SMEs' performance. The studies suggested that not only SMEs themselves need to improve their performance but the government can create a supportive environment for SMEs to improve their productivity. The government can provide support in area such as training, marketing, financial support and ICT skills, and encourage a culture of innovation and establish accreditation standards and quality norms that can be met by SMEs in the tourism sector. The largest item in terms of public budgetary support for tourism tends to be the marketing budgets allocated to national tourist offices or their equivalents for international marketing purposes.

As a labour-intensive industry, the human resources are one of the most important components for improving productivity in the tourism sector. Blake, Sinclair and Soria (2006) examined the ways in which productivity in tourism businesses can be increased by studying the roles of changes in physical capital, human capital, innovation, and the competitive environment. Comprehensive results are obtained by using questionnaire-based interviews, business survey data analysis, and computable general equilibrium modeling. The results demonstrate the positive contribution that each of the productivity drivers can make to improving efficiency and welfare, notably increases in human capital and innovation. They also indicate that a combined strategy incorporating all of the drivers is more effective than independently formulated policies. Georgiadis and Pitelis (2008) also found the empirical evidence of the relationship between human resources practices and the effectiveness of a firm to capitalize on investment in knowledge as measured by the returns to innovation and business development expenditure. Their findings suggest that businesses that receive support in the area of staff training and development, in HR planning and in staff recruitment and retention generate 100%, 86% and 134% more revenue per unit of money spent on innovation and business development compared to firms that do not receive such services. Pigliaru (2003) showed that the tourism countries grow significantly faster than all the other sub-groups considered in our analysis (OECD, Oil, LDC, Small). That smallness goes together with a specialization in tourism can be good for growth. Government organizations can collaborate to assist productivity increases, with specifically tailored measures for small businesses (Blake, Sinclair and Soria, 2006).

Besides the factors mentioned above which help to improve productivity, deregulation and an increase in the minimum wage may also help to improve productivity in the tourism sector.

Conclusion

There are many reasons presented to explain the low productivity and productivity growth slowdown in the service sector. The unsatisfactory service productivity definition and measurement errors of productivity in the service sector are mostly to blame. The lack of accuracy of the measurement of productivity in the service sector makes the management and monitoring of productivity in the service sector much more difficult. As a result, improvement of the measurement of productivity in the service sector is helpful for increasing productivity growth. The cost and price of the factors that directly influence the productivity growth are still implausible. Therefore, the implicit assumption of low growth productivity in the service sector is the drastic slowdown of capital accumulation or technological progress. If there is a possibility to greatly increase productivity in the services sector, then capital expansion and an increase in investment in R&D are predominantly extensive forms of growth. They depend on growing capital stock and the improvement of the quality of the labour, but these are constrained by declining available capital due to the recent deep recession and diminishing possibilities for obtaining quality researchers from other industries. The coordination between government and the private sector becomes critical in terms of the source of the productivity growth. It may suggest that more funding is needed to focus on R&D and to subsidize training and education for the service sector.

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