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Recommending a productivity model for Singapore hotels: A critical review of productivity models adopted by researchers and hotel operators

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Productivity Models Adopted by Researchers and Hotel Operators

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Abstract

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The business challenges and intensely competitive environment in today's economy make productivity a key factor for organizational survival. This paper examines what productivity means to the services industry, in particular, to the hotel industry. This is underpinned by an investigation of the fundamental differences between goods and services and the implications on productivity measurement and control in the manufacturing and services industries.

The purpose of this paper is to critically review productivity measurement and control methods used by researchers and hotel operators in order to find a model suitable for the hotel industry in Singapore, taking into consideration the local cultural expectation and legal context.

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PART ONE

Introduction

Productivity and service quality have been recognized as essential elements for driving economic growth in Singapore in the coming years (Chuang, 2010; Khamid, 2009). In fact, some believe that improving productivity is the strategic direction to national prosperity under a rising standard of living (Accel-Team, 2010). This is especially true for mature economies as deficiencies in productivity can no longer be hidden by expansion of market size. Enhancing productivity is the key to improving economic results in such developed economies (Guerrero & Rubio, 2003).

In Singapore, the onus has been placed on businesses to take the initiative to boost productivity, with support from the newly set up National Productivity and Continuing Education Council. As Singapore's economy progresses, productivity has to both address the bottom line and improve the top line for greater value added. Eight industries, including the hospitality industry, have been identified as those employing a significant proportion of the workforce and having the most potential for productivity improvements (Chuang, 2010).

The hotel industry is by nature a labour intensive industry. Studies reveal that labour costs represented almost 47% of a hotel's operating expenses (Mandelbaum, 2008). In 2008, productivity of hotels and restaurants in Singapore decreased by 9.3% and in 2009 by 6.4% (Wong, 2010). This makes effective measurement of labour productivity a prime consideration in the lodging industry. Having an effective measurement and control system in place will enable hotels to reduce labour costs by leveraging labour productivity during economic downturns. In addition, understanding how to measure and improve a hotel's labour productivity will contribute directly to the hotel's bottom line (Hu & Cai, 2004).

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<center>**Purpose**</center>

This paper intends to recommend a suitable model of labour productivity measurement and control for hotels in Singapore. As an effective labour productivity measurement and control system can contribute directly to an organization's bottom line (Hu & Cai, 2004), adoption of the proposed model should positively affect the hotels' profit margins.

Statement of Objectives

This paper begins with a discussion of the concept of productivity in general and move on to productivity within the services industry, particularly the hotel sector. It will examine what productivity means to the hotel industry. This is underpinned by an investigation of the fundamental differences between goods and services and its implications on productivity measurement and control in the services industry and the hotel sector in particular.

This will be followed by a critical examination of the key productivity models generally used in the hotel and/or services industry by researchers and/or operators to measure and control labour costs. Next, the paper will look at productivity through the context of Singapore laws and cultural expectations. Finally, the paper will propose the most suitable method of productivity measurement and control which will help hotels in Singapore effectively measure and control labour productivity within the housekeeping and residence services departments while keeping tabs on the overall performance of the hotel.

<center>**Justification**</center>

There appears to be a gap in research literature on how hotels measure and control labour productivity. Researchers believe that the hotel industry has not actively adopted management sciences used by other services sectors to improve productivity and other operational activities and have not agreed on a common definition of hotel labour

productivity (Hu & Cai, 2004; Witt & Witt, 1989). This comes as a surprise since labour costs comprise a major portion of a hotel's operating expenses.

Further investigation through personal communication with four industry practitioners reveal that hotel operators do actively monitor labour productivity as a cost control measure through a variety of means based mostly on personal experience and judgement (James Lee, 2 June, 2010; Justin Pang, 4 June, 2010; Niu Kian Hock, 01 June, 2010; Paul Lim, 7 June, 2010). There is, however, no common formal system of measuring and controlling labour productivity within the Singapore hotel industry. This is supported by findings within the European and Mediterranean hotel industries by researchers like Ingram and Fraenkel (2006), Kilic and Ojasalo (2005), and Lee-Ross and Ingold (1994).

As the popular saying goes "you cannot manage what you cannot measure". Hotel operators, therefore, need a formal system of measuring and controlling labour productivity before they can even think about how to improve productivity. Having a formal system of measurement and control will also enable the industry to make apple-to-apple comparison and to set meaningful industry standards and benchmarks.

This paper will explore popular models used to measure labour productivity and recommend one that fulfils the three criteria of "cheaper, better, faster" (Liew, M. L., personal communication, May 5, 2010). Cheaper suggests a need to minimize costs, better points to improved quality and being more effective at what we do, while faster refers to improved efficiency. Accordingly, the industry will require a model to measure and control not only labour productivity but service quality as well. The question is does such a measure exist?

Constraints

Due to time and resource constraints, the recommendations in this paper will be made based on a literature review, personal communications and observations. Further research

needs to be carried out to test the models recommended to determine applicability and industry fit. In addition, there appears to be a scarcity of recent literature on productivity in hotels. The review is, therefore, expanded to include research from earlier timeframes and other sectors in the hospitality and services industry. Moreover, there appears to be relatively few studies done recently on productivity in Singapore hotels. This paper, therefore, has been expanded to include research conducted on productivity in hotels in other parts of the world.

Glossary of Terms

Asian Tigers

> The four countries, Singapore, Hong Kong, South Korea and Taiwan, who underwent rapid economic growth for more than three decades from the mid-1960s (Nomura & Lau, 2010a).

Assumption of constant quality

> When measuring productivity in the manufacturing environment, it is always assumed that any quality problems will be resolved early on in the process before commencement of manufacturing. Therefore, the underlying assumption is that all goods produced are of the same quality (Guerrero & Rubio, 2003).

Bo Chap

> Bo chap is a hokkien (local dialect) term for being indifferent, cannot be bothered and not caring about anything (Dictionary of Singlish, 2010).

Data Envelopment Analysis

> DEA is a statistical technique using nonparametric linear programming to analyze productivity. Computation is based on maximising outputs for given amounts of inputs or minimizing inputs for required amounts of outputs. Multiple input and

output variables are used to compute relative efficiencies of homogenous business units (Talluri, 2000).

Input

Inputs are resources that are transformed by someone or a process into outputs such as goods or services (Business dictionary.com, nd).

Labour productivity

Labour productivity is the amount of goods or services created for each unit of labour input in a given period of time. Labour input can be measured in terms man-hours, number of people employed or wages per man-hour (Wikipedia, 2010).

Multi-skilling

Multi-skilling refers to the practice of cross training employees to arm them with different skill sets so that they can perform more than one job in the organization (Baker & Riley, 1994).

Output

Outputs are the end goods or services that are created by someone or a process consuming dedicated inputs in a given period of time (The Free Dictionary, 2010).

Partial factor productivity

Partial factor productivity is the function of the sum of all output measured against a single input. For example, measuring total output against labour input for labour productivity or measuring total output against capital input for capital productivity. It is a good indicator of how productive each factor of production is (Encyclopedia of Business, 2010).

Production possibility frontier

The production possibility frontier is a curve showing the maximum outputs possible with a given set of input allocated in the best way possible (Investopedia, 2010).

Productivity

Productivity is the amount of output of goods and services for each unit of input expended in a given time period. Productivity can be represented by the economic value of goods and services. This is derived by subtracting all costs of producing the good or service from the price (Encyclopedia of Business and Finance, 2010).

Simple Ratios

Simple ratios measure productivity by calculating the percentage of end-products to resources expended. It indicates the efficiency of the process of converting inputs into outputs (Encyclopedia of Business and Finance, 2010).

Staffing Guide

The staffing guide provides a "formula" for calculating the correct number of staff required based on pre-determined standards.

Total factor productivity

Total factor productivity is the ratio of total outputs measured against total inputs. It is an indicator of total productivity of all factors of production combined. It is not able to show the correlation between each separate input and output (Encyclopedia of Business, 2010).

Value Added

Value added is a general measurement of output. It is the difference between what it costs the organization to produce the goods and services and what the consumer pays (price) to consume the goods and services (EnterpriseOne, 2010).

PART TWO

Literature Review

Introduction

The business challenges and competitive environment in today's economy makes productivity a key factor for survival. The primary objective of an organization's business strategy is to make profits and contribute to the organization's expansion (Gupta, McLaughlin, & Gomez, 2007). As economies mature, the impetuous for expansion will have to come from improving productivity of the workforce (Guerrero & Robio, 2003). Add the global labour crunch and recent fiscal meltdown to the equation and it is obvious why there is an inevitable focus on productivity (Jones & Siag, 2009). This is especially true for the labour intensive services sectors (Brown & Dev, 2000).

As "productivity is the key determinant of value" and is closely interrelated with all its different aspects (Heap, 1996, p2), managing productivity from the organization's perspective, is the key to managing financial performance. By increasing productivity, profitability should correspondingly improve (Brown & Dev, 1999; Hu & Cai, 2004). Managing productivity makes sense if it leads to better economic results. However, it does not make sense to improve productivity if an increase in productivity does not lead to improved financial performance (Guerrero & Rubio, 2003).

It is imperative to improve productivity across all industries. However, due to its labour intensive nature, particular attention should be paid to the services industry, particularly for hotels (Brown & Dev, 2000). This is due to the hotel industry being highly competitive making it more challenging to make profits. Hotels need to generate more revenue with the same amount of resources. Hence productivity is identified as the key driver of profitability and growth (Kilic & Okumus, 2005; Lane, 1976).

Increased productivity will enable service providers to reduce expenditure, allowing them to lower their prices and increase service offerings. This could lead to higher demands which results in increased profitability. New cycles of productivity improvements could then be initiated by investing in state-of-the art technologies. Hence, productivity has significant ramifications on an organization's marketing and pricing strategies, costing composition and financial performance (Brown & Dev, 2000).

Defining Productivity

Productivity, in general terms, deals with the correlation of the utilization of resources (inputs) for a fabrication procedure and the end products (outputs) created from the procedure. The correlation is usually expressed as a function of the ratio of output to input (Davies, 1993) and is illustrated in Figure 1.

$$Productivity = \frac{Output}{Input}$$

Figure 1. Adapted from "Concepts and methods of measuring productivity at the organization level," by Davis, M. Y., (1993), *Defense Technical Information Center*, p. 4. Copyright by the Naval Postgraduate School.
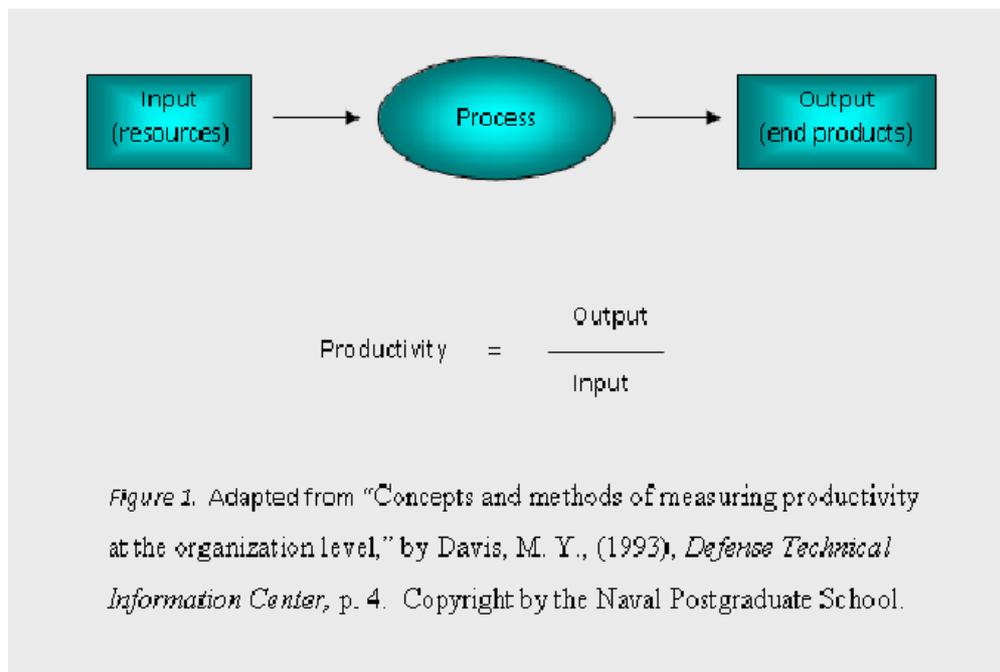
This has led many researchers to conclude that productivity is the effective conversion of resources into end products (Guerrero & Rubio, 2003; Hu & Cai, 2004; Jones & Siag, 2009).

Productivity, basically, measures the proportion of tangible amount of goods and services produced in relation to the amount of tangible resources consumed (Davies, 1993).

Productivity as a concept can take two dimensions, namely, total factor productivity or partial productivity factor. Total or multi-factor productivity refers to the relationship between output and the sum total of all inputs like labour, capital goods and natural resources. Partial factor productivity refers to relationship between an output and its associated input. For example, labour productivity will measure the relationship between units of production and units of labour (Lecture notes, 2010).

Fundamental Differences Between Goods and Services

A fundamental difference between physical goods and services is that the production and consumption of a service occurs at the same time (Anderson, Fornell, & Rust, 1997). Unlike physical goods, there is nothing tangible to hold on to and consume at a later date. The production and consumption of a service takes place simultaneously and the service is perishable if not consumed at the point of production (Baker & Riley, 1994). The perishable and inconsistent nature of services causes complexity in its quantification and control (Anderson et al., 1997; Baker & Riley, 1994; Johnston & Jones, 2004; Sigala, Jones, Lockwood & Airey, 2005).

Baker and Riley (1994) also points out that demand for services has a similar perishability. It is impossible to generate and keep a stock of services in expectation of demand (Sahay, 2005). The nature of the service business, therefore, is one where a service has to be produced when it is required. Resources are prompted by demand indicating the need to generate production (Baker & Riley, 1994). Demand lower than available resources lead to lowered productivity, demand in equilibrium with resources improves productivity but when demand exceeds available resources, perception of service quality could be negatively impacted. This makes demand a critical influence on productivity (Gronroos & Ojasalo,

2004). Sahay (2005) and Sigala et al. (2005) further pointed out that even if the conventional productivity measurements are used, it is difficult to decide on what the inputs and outputs should be.

In the manufacturing industry, labour is one of many inputs in the production process. In the services sector, however, labour is the production process itself (Baumol, 1967 cited in Wölfl, 2005). This results in a limited amount of and variability of services being produced in each instance by each individual service provider, causing the services industry to be labour intensive. This also contributes to the difficulty in using conventional means to manage productivity (Anderson et al., 1997).

Where physical goods are concerned, customers derive satisfaction from consumption of the goods itself, whereas in services, customer satisfaction arises from the frontline employee fulfilling customer wishes according to or exceeding his or her expectations. This makes customer satisfaction an important factor when considering quality of service (Anderson et al., 1997; Johnston & Jones, 2004; Sahay, 2005).

Some researchers see the conventional definition of productivity as stemming from the manufacturing era (Gronroos & Ojasalo, 2004; Hu & Cai, 2004) and as a Fordist construct (Jones & Siag, 2009). It was formulated for physical goods manufacturers to measure production efficiency and assumes constant quality of outputs (Anderson et al., 1997; Guerrero & Rubio, 2003; Jones & Siag, 2009). Many researchers feel that this definition may be too narrow to encompass productivity in the services industry (Guerrero & Rubio, 2003; Kilic & Okumus, 2005; Lee-Ross & Ingold, 1994; Reynolds, 1998).

The assumption of constant quality generally accepted in the manufacturing industry is also not applicable to the services industry as quality is based on the interaction between customers and the service provider (Johnston & Jones, 2004; Sigala et al, 2005). Different customers can perceive it differently or the same customers can even perceive it different

under different situations (Gronroos & Ojasalo, 2005). Basically, superior quality in the

manufacturing industry means that goods produced must be uniform and meet specifications

precisely whereas in the services industry superior quality means being flexible enough to be

able to fulfil customer demands according to or exceeding customers' expectations. This

distinction between goods and services makes it difficult to measure and manage productivity

in the traditional sense and suggests that a multi-dimensional analysis is required (Anderson

et al., 1997).

Some researchers pointed out that productivity pertaining to the service industries

should take a more holistic approach by including efficiency, effectiveness, quality,

predictability and other performance dimensions (Johnston & Jones, 2004; Kilic & Okumus,

2005; Sigala, 2004). This is supported by Anderson et al. (1997) who stress the importance

of including quality dimensions as a crucial productivity attribute and Gronroos and Ojasalo

(2004) and Sahay (2005) who advocate incorporating a consumer-oriented dimension. Biel

(2005) perceives that his research offers experimental verification for including qualitative

statistics when analyzing productivity.

Productivity in the Services Industry

The services sector amounts to the biggest and most rapidly-growing sector of the

global financial system (Anderson et al., 1997; Sahay; 2005). However, in spite of the

significance of productivity to the services industry, there are surprisingly few experiential

studies done on the subject (Johnston & Jones, 2004).

The traditional concept of productivity as the quantification of production with the

proportion of output to input as tangible units (Kilic & Okumus, 2005) gives the impression

that the notion of productivity is not complex (Ingram & Fraenkel, 2006). However, it has

also been highlighted that there is no consensus on a common definition of productivity and

that productivity is complicated and mean "different things to different people" (Prokopenko,

1997 cited in Kilic & Okumus, 2005, p316). In addition people may offer somewhat diverse or even contradictory descriptions and understanding of productivity (Jones & Siag, 2009).

According to Johnston and Jones (2004) and Gronroos and Ojasalo (2004) quality and productivity should not be considered independently in relation to the service industry. There is a need for a thorough analysis of productivity theory in relation to services (Vuorinen et al., 1998 cited in Sahay 2005). According to Parasuraman (2002), many services are not tangible in nature and include a combination of the customer's perception of the service and the effect of the service encounter.

Some researchers have found that productivity in the services industry is dependent on employee satisfaction. This could be due to satisfied employees serving customers better keeping them happy and coming back. This leads to a growth in the relationship which, in turn, results in customer loyalty (Corporate Executive Board [CEB], 2003). This is supported by Biel (2005) who found in his research that employee satisfaction is one of the major drivers of customer satisfaction.

Customers are usually involved in the encounter and provide some input by way of time, effort and money (Gronroos & Ojasalo, 2004). Furthermore, consumers usually take the part of both patron and co- creator of service and can exert considerable influence on quality of service and overall productivity (Johnston & Jones, 2004). As such, service organizations must widen their concept of productivity from the traditionally organization-based perspective to a dual perspective which includes the consumer perspective. This extended view may assist in resolving conflicts between enhancing service quality and improving productivity (Sahay, 2005).

Gronroos and Ojasalo (2004) proposes that productivity for service organizations be defined as the ability to effectively and efficiently utilize inputs to generate services of a quality that matches the expectations of customers. This takes into consideration the

disparity in quality resulting from the inconsistency of the service process and the outcome of perception of quality due to consumer involvement in the service process. In addition, the only hypothetically correct and pragmatically appropriate way of service productivity measurement appears to be basing computation on monetary measures.

Service productivity according to Gronroos & Ojasalo (2004), therefore, is a function of internal efficiency and the cost effectiveness of input utilization, external efficiency (customer perception of quality) and input ability to generate revenue, and equilibrium between demand and supply (capacity efficiency) as illustrated in Figure 2.

Figure 2. Service Productivity Calculation

$$\text{Service Productivity} = \frac{\text{Revenues from a given service}}{\text{Costs of producing this service}}$$

$$\text{Service Productivity} = \frac{\text{Total revenues}}{\text{Total costs}}$$

Figure 2. The first equation can be used to measure the productivity of a given functional area or department (single factor productivity), while, the second equation can be used to measure the overall operational productivity (or total factor productivity) of service organizations. A given level of resource inputs will create a perception of a particular level of service quality which generates a certain level of sales. Any changes in the resource structure will create a corresponding change in costs, perception of service quality and, ultimately, the income generation capacity of the organization. Hence, the true measurement of service productivity can be expressed as a function between revenues and costs. Adapted from Service productivity: Towards a conceptualization of the transformation of inputs into economic results in services by Grönroos, C., & Ojasalo, K. (2004), *Journal of Business Research,* p.421. Copyright 2002 Elsevier Inc.

In this equation, productivity is presented as the best possible matrix of internal efficiency, external efficiency and capacity efficiency using financial figures as they are generally accepted proxies.

Productivity in the Hotel Industry

The hotel industry has experienced lower productivity growth compared to other businesses (Kilic & Okumus, 2005; Lee-Ross & Ingold, 1994, Triplett & Bosworth, 2000). This is due partially to the distinctive attributes of the lodging sector, like high dependence on labour, excessive building and fixed costs, problems in automation, and fluctuating demand (Kilic & Okumus, 2005). Therefore, trying to improve productivity is still one of the major challenges for many hotels (Brown & Dev, 2000).

In addition, researchers found that the hotel industry have not proactively employed scientific methods to measure and improve productivity (Baker & Riley, 1994; Hu & Cai, 2004) and that hotel operators have little or sketchy understanding of this area (Ingram & Fraenkel, 2006; Kilic & Okumus, 2005; Witt & Witt, 1989). Moreover, productivity jargon are frequently misunderstood and discrepancies in available data hamper measurement (Davies, 1993).

The intangible nature of a hotel's services makes it difficult to measure outputs in the conventional way. Take for example, the length of stay compared with the number of satisfied guests (Baker & Riley, 1994). Furthermore, guest perception of quality is not confined to the tangible qualities of the hotel or the quality of service but on the totality of the hotel stay experience (Guerrero & Rubio, 2003; Jones & Siag, 2009; Sahay, 2005). While it is possible to improve productivity through reducing labour cost, it may result in an in erosion of service standards, which might in turn affect guest satisfaction (Anderson et al., 1997; Reynolds, 2003).

Defining productivity is made even more difficult by the existence of more than one form of productivity (Lecture notes, 2010). Some researchers note that productivity is confined to labour (Cooper, Seiford & Tone, 2007; Kaufman & Hotchkiss, 2006 cited in Lecture notes, 2010). Some perceive productivity to be an amalgamation of labour, capital, materials and other resources (Lecture notes, 2010).

Through the years, research in the lodging sector has revealed that productivity can be influenced by many factors (Jones & Siag, 2000) like hotel size, category, location, service orientation, ownership and management arrangement, human resource management practices, demand patterns and variability (Barros & Alves, 2004; Brown & Dev, 1999; Hoeven & Thurik, 1984; Kilic & Okumus, 2005). All these factors make measuring productivity complicated as they involve a variety of broad and elusive concepts (Jones & Siag, 2000). Nevertheless, the core purpose of measuring productivity is to improve productivity and suitable measurement models offer prognostic tools towards this purpose (Sahay, 2005).

The appropriate productivity measures will assist in determining which crucial service features require a boost in productivity. The merit of productivity measures is in their performance management and control abilities in moving the organization towards a more efficient and effective use of resources (Sahay, 2005). Thus it is important that hotels select the appropriate productivity measurements in order to help them identify areas that require improvements and to monitor and manage operational productivity.

Productivity Measurement Methods

While finding an appropriate definition of productivity for the service industry is complicated, measuring it is even more so (Lecture notes, 2010). This section of the paper will critically examine three productivity measurement methods used to analyse hotel productivity – one is popular with researchers while the other two are generally used in the

industry. Finally, it will give a description of one measurement method emphasized by the government of Singapore.

Data envelopment analysis.

Data Envelopment Analysis (DEA) is an increasing popular method of measuring productivity for researchers in recent years. It is a statistical technique using linear programming to analyse productivity. DEA is a nonparametric approach so it does not require assumptions to be made about the structure of the underlying distribution (Sigala et al., 2005).

It works on the basis of either producing the maximum quantity of outputs for given amounts of labour input or the minimum use of labour inputs for given amounts of outputs (Barros, 2005; Reynolds, 2003). It is able to convert more than one input and output of numerous hotels into a singular measurement of performance, in the form of a comparative efficiency (Hu & Cai, 2004).

DEA facilitates the comparison of homogenous units known as decision making units or DMUs and identifies the units with the best performance (Lecture notes, 2010) of 100% productivity based on actual results, not compared with an average or ideal model (Sigala et al., 2005). It creates what is commonly known as an efficiency frontier with the most productive units in the given sample set located on the frontier (Barros, 2005; Hu & Cai, 2004), while the rest of the units are "enveloped" behind the frontier (Reynolds, 2003). DEA uses DMUs located on the frontier as the reference set or benchmark for comparing the other less productive units in establishing a productivity index (Lecture notes, 2010; Hu & Cai, 2005; Reynolds, 2003). Please refer to Figure 3 for an illustration of the productivity frontier and the other hotels within the envelope. Table 1 shows the productivity index of all the hotels in the dataset.

Figure 3. Labor Productivity of Full Service Hotels Table 1. Productivity Index
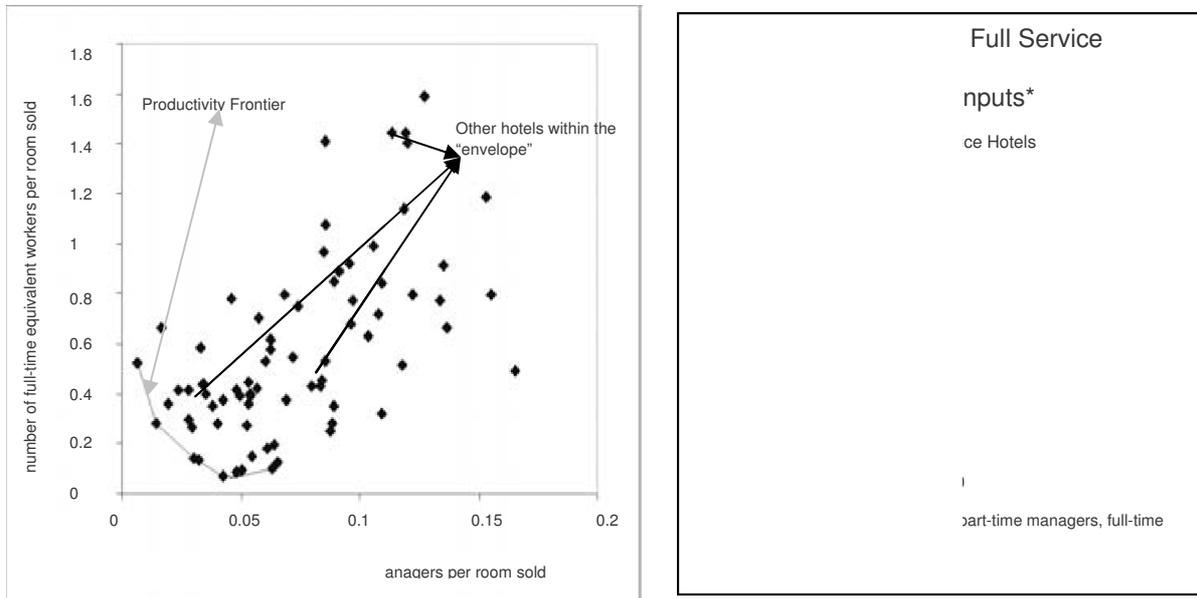
Figure 3 / Table 1. The diagram and table above shows the results of a DEA analysis by Hu and Cai (2004). On the frontier are 15 of the best of class hotels with a productivity score of 1 and the rest are ranked accordingly with the best performers as the benchmark. Adapted from "Hotel labor productivity assessment: A data envelopment analysis," by Hu, B. A. and Cai, L. A. (2004), *The Haworth Press*, p. 32. Copyright 2004 by The Haworth Press, Inc.

According to Barros (2005), DEA's strength lies in its ability to produce a proxy score for the overall proficiency and competency of the DMUs. It is also useful for producing a snapshot of the hotel's productivity at a specific point in time and is more comprehensive since it includes multiple dimensions in evaluating the total operational efficiency (Sigala et a.l, 2005).

Although DEA is popular with researchers, it is not without its drawbacks. It has been noted that even though DEA is able to identify best performing units from the given sample set, it is not able to establish actual levels of productivity (Jones & Siag, 2009) and

why these "best of class" units are productive (Barros, 2005; Lecture notes, 2010; Hu & Cai, 2004; Reynolds, 2003).

In addition, DEA is only able to measure relative productivity. It does not make a distinction between which DMU is productive and which is not, only how productive they are compared with each other. This could lead to a case of the best of the worst since all the DMUs in the sample set could be unproductive (Anderson, Fish, Xia & Michello, 1999; Barros, 2005). Sigala et al. (2005) also points out that DEA results are only as good as the dataset that is used, this is supported by the "garbage in garbage out" theory generally accepted in the IT industry.

Simple ratios.

Despite the efforts of DEA proponents, the hotel industry practice is to make use of simple ratios or percentages to measure payroll and other factors of production separately (Lecture notes, 2010). Such percentages are a rudimentary measure of workforce productivity, present a splintered view (Hu & Cai, 2004) and cannot be used to manage labour cost on its own (Pavesic, 1983).

According to Pavesic (1983), labour-cost ratio is an inadequate measure of productivity as it can be easily distorted by changes in wages, revenue and prices, and the need to maintain a minimum staffing level. This is supported by Brown and Dev (1999) who found in their study that labour productivity fluctuate when there are changes in the price and/or cost structures. In addition, labour-cost percentage is a combined, inexplicit figure which does not reflect workforce productivity appropriately (Anderson et al., 1999). Finally, some researchers advocate that the industry should look beyond single aggregate measures and adopt a multi-dimensional perspective with a range of measurements for a more holistic approach (Ball, Johnson & Slattery, 1986; Guerrero & Rubio, 2003; Sigala et al., 2005).

Staffing guide.

The staffing guide is another popular technique used by restaurants to manage productivity. However, it has not received much attention from researchers or hoteliers (Lecture notes, 2010). One advantage of the staffing guide is that it allows a desired level of service quality to be built into it (Choi, Hwang, & Park, 2009). It will also ensure that there is always the appropriate number of employees on duty so there is no overstaffing which leads to lower productivity or understaffing which may lead to an unacceptable service level (Thompson, 1998).

The staffing guide, when used appropriately, will provide the appropriate staffing level daily as it will ensure the right number of workers with suitable skill sets on duty to provide the quality of service expected by the company (Thompson, 2003). This will enable hotels do things right the first time round in addition to doing the right things. Researchers like Pavesic (1983) advocate the use of staffing guide in conjunction with ratios as it provides a better insight into and enables better workforce management and cost control. Although staffing guide studies is currently more popular in food and beverage operations, hotels can easily use it to schedule all levels of staff to meet the hotel's service standards (Lecture notes, 2010).

Some researchers find that using the staffing guide method helps to reduce labour costs as it enables more efficient deployment of labour, ensuring that the right people are doing the right job at the right time (Choi et al., 2009; Kuo & Nelson, 2009). Moreover, it enables "multi-skilling" by scheduling multi-skilled employees to different job functions at different times as dictated by demand (Thompson, 2003). Thompson (2003) further points out that the staffing guide will lead to work schedules that meet staff wishes, leading to better employee and, ultimately, customer satisfaction. In addition, staffing guides, once created can be used daily, week, monthly or even yearly to monitor labour productivity and costs.

Conducting customer satisfaction surveys in conjunction with staffing guides, can ensure that the required service standards are achieved effectively. Moreover, the use of staffing guides can help hoteliers to balance keeping customers satisfied while minimizing labour costs and attempting to maximize long term profitability (Lecture notes, 2010).

Building a good staffing guide require five steps. Firstly, service standards must be set (Gamoran, 1966). Secondly, customer demand must be forecasted, thirdly, determine the size of workforce necessary to meet forecasted requirement.   Fourthly, employee schedule must be worked out considering individual skills, preferences and requests and finally, managing the schedule according to actual demand to make sure service quality standards are maintained (Gamoran 1966; Thompson, 2003). To ensure that the staffing guide work as planned, data integrity must be ensured (Thompson, 2003).

Value Added.

Value added can be defined as the difference between an organization's total sales revenue and the variable costs that can be directly attributed to the production of the outputs used to generate that sales revenue (Lieberman & Kang, 2008). It can also be defined as the difference between what the organization charges the consumers (sale price) and the cost of producing the service or product (cost price) (EnterpriseOne, 2010). By transforming unprocessed resources into a product or service through its workforce, an organization adds value to the resources and is therefore able to charge a higher price than it pays for the unprocessed resources (Lieberman & Kang, 2008).

Value added can be calculated using two different methods, the subtraction or addition method. The subtraction method is basically subtracting variable cost (capital goods, purchased services and utilities) from sales revenue. The addition method is the sum total of operating profit or loss after tax, labour cost, interest incurred from loans, depreciation and taxes (Lieberman & Kang, 2008). Figures 4 and 5 give an illustration of the

subtraction method of value added calculation and Figures 6 and 7, the addition method.

Figure 8 gives an overall pictographic view of value added creation and distribution.

Figure 4. Value Added Subtraction Method

Formula:

Value Added	=	Sales Revenue	-	Capital Goods, Purchased Services, Utilities

Figure 4. Adapted from EnterpriseOne
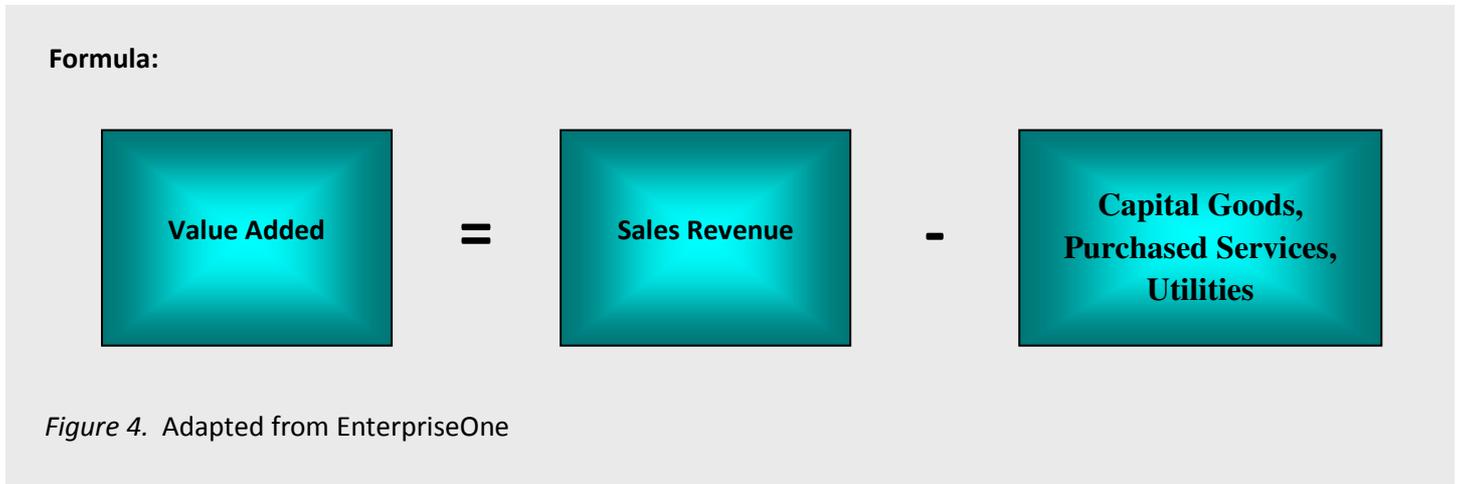
Figure 5. Value Added Subtraction Method Calculation Example

Rental:	$200,000
Utilities & raw materials:	$160,000
Wages & training expenses for 4 workers:	$180,000
Fixed assets:	$60,000
Sales revenue:	$740,000
Operating profit:	$200,000

Value Added Calculation:

Sales	$740,000
- Rental	$200,000
- Utilities & raw materials	$160,000
Value Added	*$380,000*

Productivity Calculation:

Value Added	$380,000
÷ No of workers	4
Labour productivity	*$95,000*

Value Added	$380,000
÷ Labour cost	$180,000
Labour cost competitiveness	*2.11*

Value Added	$380,000
÷ Fixed assets	$60,000
Capital productivity	*6.33*

Operating profit	$200,000
÷ Value Added	$380,000
Profit-to-value added ratio	*52.63%*

Figure 5. Adapted from EnterpriseOne

Figure 6. Value Added Addition Method

Formula:

| Value Added | = | After tax profit / | + | Labour cost | + | Interest from loans | + | Depre-ciation | + | Taxes |

Figure 6. Adapted from EnterpriseOne

Figure 7. Value Added Addition Method Calculation Example

Wages & training
expenses for 20 workers: $600,000
Operating profit: $226,000
Net profit: $200,000
Bank loan interest: $10,000
Taxes: $16,000
Depreciation: $18,000
Fixed Assets: $40,000

Value Added Calculation:

Net Profit	$200,000
+ Labour costs	$600,000
+ Interest	$10,000
+ Depreciation	$18,000
+ Taxes	$16,000
Value Added	*$844,000*

Productivity Calculation:

Value Added	$844,000
÷ No of workers	20
Labour productivity	*$42,200*

Value Added	$844,000
÷ Labour cost	$600,000
Labour cost competitiveness	*1.41*

Value Added	$844,000
÷ Fixed assets	$40,000
Capital productivity	*21.1*

Operating profit	$226,000
÷ Value Added	$844,000
Profit-to-value added ratio	*0.2677*

Figure 7. Adapted from EnterpriseOne

Figure 8. Overall View of Value Added Computation
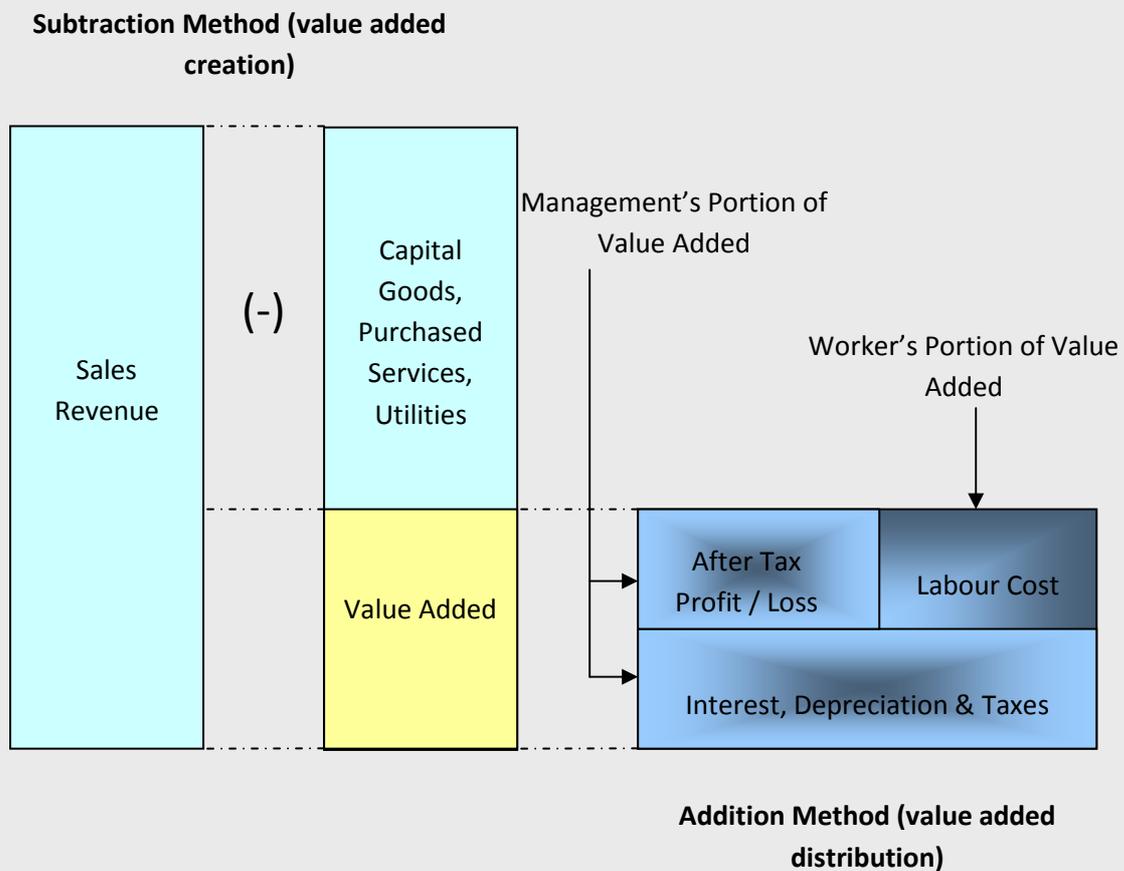
Figure 8. Adapted from "Productivity assessment survey featuring value-added productivity measurement," by Avedillo-Cruz, (2010), Asian Productivity Organization (APO). Copyright 2010 by APO.

According to Sasse and Harwood-Richardson (1996), the strength in the value added method lies in its ability to take into consideration costs and not just sales revenue. Although value added measurement enables different organizations and even economies to be compared against each other, it does so only at the financial level and does not address quality or consumer satisfaction issues (Lieberman & Kang, 2008; Sasse & Harwood-Richardson, 1996).

Conclusion

A good level of productivity is important as the effects of productivity touches all levels of society. A stable productivity growth rate provides non-inflationary wage increases, creates employment for the population and ensures a balance of trade and stable currency at the national level. At the organizational level, it could result in a competitive advantage which increases profits and shareholder value. For the working population, improved productivity could mean shorter working hours, improved working conditions and higher wages, and the population in general should enjoy an improved standard of living (Oyeranti, 2000).

Productivity in the services industry is difficult to define due to consumption and production taking place simultaneously causing inseparability and perishability. In addition, the variability and heterogeneity makes it difficult to define the inputs and outputs. Nevertheless, we have to find a ways to measure it so that we can effectively manage productivity.

Due to the involvement of the customer in the production process, it is deemed that some customer dimensions need to be included in productivity measurement. Customer satisfaction is dependent not only on the physical environment of the hotel property and service levels but on the customer's overall experience during the duration of his or her stay as well.

There is argument that due to the heterogeneity of hotel services, increasing employee productivity might conversely lead to an erosion of service standards and with it, customer satisfaction. Hoteliers, therefore, need to ensure a robust, well rounded productivity measurement that will take into account not only the organization's perspective of productivity but that of the customer's as well.

While DEA is a valuable tool in identifying benchmarks and establishing an accompanying productivity index comprising other DMUs in the dataset, it is not an appropriate tool for dynamic management of operational activities on a daily or even monthly basis. It is useful for large hotel chains to benchmark all the homogenous hotels in their group to identify those that need improvements and in providing management with a quick snapshot of performance at a specific point in time.

Of all the methods commonly used to measure and manage productivity, the staffing guide seems to be the only one that is able to take into account both quantitative and qualitative measures and also allow managers to keep an eye on profitability at the same time. It seems, too, to be able to ensure a certain degree of employee satisfaction which could lead, ultimately, to customer loyalty and an improved bottom-line. However, it focuses on labour and largely ignores other factors of productivity. Thus, it does not give an overall picture of how the organization is performing.

Value added is the difference between what an organization pays to produce a product or service and what it charges the customers. It is the value an organization adds to resources in the process of transforming them into a product or service and is therefore able to charge a premium for it. While it measures multiple factors of productivity, it largely ignores the quality and customer aspects.

As we can see from this review of the literature, there is no single model currently in use that is able to help us dynamically manage operational activities and keep an eye on the bottom line while taking into consideration the quality, employee and customer aspects of the equation.

Introduction

According to Cahyadi, Kursten, and Guang (2004), Singapore, one of the four "Asian Tigers" to have achieved phenomenal economic growth in the past few decades, has received a lot of attention from government planners and economist around the world. Average GDP growth rate in Singapore from the 1960s to the 1990s was about 8.5% per annum, three times as fast as the US growth rate. Considering that Singapore is a small country with a landmass of approximately 685 sq km and no natural resources, it is not surprising that there should be both scepticism and praise with regards to its amazing economic growth over the past forty years (Cahyadi et al., 2004).

Productivity analysis as a major indicator of economic performance is helpful in highlighting underlying issues. Substantial productivity growth is a crucial factor when a country is trying to attain per capita GDP levels of developed nations. Hence, it is essential to have an in-depth knowledge of the major propellants of productivity growth to support progress (Nomura & Lau, 2010).

Productivity in Singapore

Putting the spotlight on productivity is nothing new in Singapore. In the 1970s and 1980s, there were national productivity campaigns and the National Productivity Board (NPB) was set up in 1972 to improve productivity in Singapore. The focus on productivity and the NPB was laid to rest in 1996 when the government of Singapore made the decision to rely on foreign talent to fuel economic expansion (Wijaya, 2010). After more than a decade, we have come full circle. As Li (2010) says, "productivity is Singapore's latest holy grail..." and this begs the question "...but how to attain it, and is Singapore on the right track?"

Background

Singapore has always been an export-oriented economy friendly to business and foreign direct investment in order to create jobs and maintain a low unemployment rate. As it is not endowed with any natural resources, Singapore has to rely mostly on its human capital and expanding the infrastructure left behind by the British. Singapore's key strategies can be distilled into three basic features, namely, the government's strategic role, mobilization of human capital and continuous development of infrastructure (Cahyadi et al., 2004).

Young (1994) pointed out that Singapore's economic expansion is based on factor accumulation and sectorial redistribution of resources, and empirical evidence indicates that Singapore's phenomenal growth rate is due to increases in inputs rather than increases in human productivity (Nomura & Lau, 2010a). According to Krugman (1994), the key driver of Singapore's growth was "an astonishing mobilization of resources". He further pointed out that Singapore's economic growth was driven by exceptional increases in inputs like labour and capital rather than by gains in efficiency. For example, the proportion of working population swelled from 27% to 51%, there was a remarkable improvement in the population's education levels between the 1960s and the 1990s, and, most significantly, Singapore made an astounding investment in physical capital which increased from 11% to more than 40%. All these factors led to the conclusion that Singapore's phenomenal growth rates during that era were founded on "one-time changes" which would be impossible to repeat (Krugman, 1994).

Krugman's conclusion is also supported by Lim's (2008) explanation of the production possibility frontier in her paper examining Singapore's growth model. It is further demonstrated by the fact that the government of Singapore started wooing highly skilled foreign talent to work in Singapore in 1996 as the economy was being restructured towards value added services. The floodgates were eventually opened in 2000 to allow foreign

workers of all skill levels into Singapore to resolve the tight labour situation and fuel further economic expansion (Yeoh, 2007).

Issues and Challenges

Although these policies did wonders for economic growth, they brought about social issues like depressed wages and higher cost of living. Most importantly, it masked the virtually stagnant productivity growth (Young, 1992) and low achievement of technological capability (Ermish & Huff, 1999). With a ready pool of cheap labour available, employers were not motivated to innovate or improve productivity (Lim, 2008). Young (1992, p38) suggested that "the days in which Singapore can continue to sustain accumulation driven growth are clearly numbered." Faced with these challenges, where does Singapore go from here? The conclusion drawn by the Economic Restructuring Committee (ERC) is that the path to sustainable long term growth "is clearly to increase labour productivity" (Ketels, Lall, & Neo, 2010, p.33).

Government Intervention

Today, Singapore is investing in its economy and upgrading its labour force in order to transition from a labour driven economy to a productivity-innovation led one (Lee, 2010; Ramayandi, 2010). The government of Singapore has recognised that we cannot continue to rely on a foreign workforce to drive our economic growth, and that we need to focus on industries with high demand levels which will create jobs for the people. The tourism industry is one of the targeted industries as it has high growth potential with the ability to provide numerous jobs (Hussain, 2010).

The government aims to increase productivity by two to three percent per year for the next ten years through investment, training, research and development, reengineering and automation (Chuang, 2010; Teo, 2009). In addition to the quota system and increases in

foreign worker levies, measures will be taken to ensure that only "higher quality" foreign workers who are able to add value to the economy will be employed (Teo, 2009).

Productivity in Singapore Hotels

Background.

Visitor arrivals to Singapore grew by 30.3% in May this year compared against 2009 (Singapore Tourism Board [STB], 2010). The government is, at the same time, limiting the number of foreign worker permits and increasing foreign worker levies to wean the industry off its high dependency on foreign labour. This will push costs up and force hotel companies to improve productivity.

Implications of Cultural Influences.

Other than the foreign worker issue, there are also some local cultural influences that add to the challenges of measuring and managing productivity. The following paragraphs highlight a few of these cultural traits that exert greater influences on management issues.

Historically, Singaporeans prefer permanent full time employment as it offers a stable income and the security of long term employment (Niu Kian Hock, personal communication, 01 June, 2010). This makes it difficult for hotels to staff according to daily needs as there is no ready pool of casual labourers that can be hired by the hour on a daily basis. Hotel operators also have to grapple with the situation of over- or under-staffing. Is it advisable to staff according to peak period requirements and have too many employees with nothing to do during the off-peak hours or is it better to staff according to low peak and risk not meeting customer expectations during peak periods?

The other major problem is that Singaporeans shun what is viewed as low class jobs. A more highly educated workforce comes with higher expectations. Diploma holders expect executive jobs and undergraduates want nothing less than a managerial job (personal communication with interns and recruiters)!

In addition, the younger generation has been brought up in an environment of affluence and most are used to a cushy life and being served by grandparents and/or domestic maids. They are not used to getting "their hands dirty" and do not like doing shift work (personal observation and communication). This adds to the hotel's difficulty in filling unskilled and low skilled back of the house positions.

The younger generation of Singaporeans seem to suffer from a certain apathy. This "bo chap" attitude as it is termed locally and the unwillingness to take ownership means that any improvement must be driven from the top.

Operational Practices.

A series of personal communication was conducted with directors of human resources, sales and finance from 5 hotels, a service residences group and a hotel consultant with regards to labour productivity measurement and control in the hotel industry in Singapore. Two home grown international brands were included in the exercise. One is established internationally and offers various services ranging from 5-star to luxury to high security in different wings of its property and the other is going international with iconic buildings around the globe. The other hotels included are two 5-star international chain hotels and a boutique hotel. Names are not divulged and findings aggregated to protect confidentiality of the hotels.

Generally, hotels in Singapore use headcount to define productivity as the majority of employees are full-time and paid on a monthly basis. Hotels included in the personal communication exercise are either using or in the process of transitioning to the factor productivity method to measure productivity. It is apparent that all the hotels are trying to improve productivity by tying manpower requirements to occupancy rates and covers served. The service residences group and boutique hotel are still following the traditional method of

basing manpower requirement on available units. This is due to the longer term trends of service residence occupancy resulting in a more stable manpower configuration.

Manpower requirements are forecasted based on historical trends across the board. Labour productivity and labour cost are analysed as a trend at the end of the month but not dynamically managed on a daily basis. Most hotels do not seem to make use of a manpower management system sorftware. Staff strength is scheduled according to forecasted number of check-ins and check-outs by managers on a monthly basis. This is done manually with the help of a spreadsheet based on the manager's experience. In the international chain hotels, the schedule is further entered in a computer system for tracking purposes.

Hotel managers included in the personal communication exercise agree that a staffing guide in conjunction with a computerised manpower management system would help hotels to optimise manpower allocation and maximise resource utilisation as it takes a lot of guesswork out of manpower allocation and scheduling. In addition, it is generally agreed that cross-training employees will lead to more satisfaction for employees who are motivated and engaged and maximise manpower utilisation for the hotel. There is also general agreement that employee satisfaction will have a positive effect on both productivity and customer satisfaction which will lead ultimately to better performance for the hotel.

Most managers feel that DEA is too complicated a tool to use for benchmarking and indicate a preference for the value added method to be used in this respect. It is also agreed that the value added method will give management a snapshot view of overall performance at any point in time. Moreover, it is believed that the provision of an upward communication channel will facilitate productivity growth as frontline employees will be able to communicate upward what the guests really want and how they think their job processes can be improved.

Best Demonstrated Practices (BDPs).

A piece of advice from our ministers is the need to redesign jobs with low pay to make them more productive and more attractive, higher paying jobs (Hussain, 2010; Teo, 2009) and to invest in technology and maximise workforce utilisation (Lee, 2010). Some BDPs shared by our ministers to address challenges faced by the hotel industry are:

Automation.

- Swissotel The Stamford has deployed automated bed frames and lifting systems that make it easier for room attendants to clean and make the beds. The hotel has noticed a reduction in the number of sick leave since deploying the systems (Hussain, 2010).

- The Orchard Hotel had deployed an electronic rostering system known as "Workforce Optimisation System". Besides maximising resource utilization by assigning employees to areas where they are most needed, it increases efficiency by integrating annual leave and payroll systems to calculate allowances automatically (Lee, 2010).

Cross-training.

- Swissotel The Stamford has tried to broaden employees' job scope by cross-training them so that they can smoothen manpower requirement peaks and troughs easily. The hotel has found that there is greater job satisfaction as it offers employees flexibility, opportunities and variety making their job more interesting which leads to higher job satisfaction (Hussain, 2010).

- Holiday Inn Atrium Singapore found that cross training employees and allocating them to different outlets during peak periods resulted in a 7% reduction in service time per guest. This has resulted in more flexible working

arrangements, expanded skill set for employees and greater guest satisfaction (Lee, 2010).

However, before we can even think about how to improve productivity in Singapore hotels, we need to grapple with the issue of how to effectively measure and manage productivity.

Recommendations for the Hotel Industry in Singapore

This paper has not been able to find a single productivity measurement and control model that is suitable for hotels in Singapore. It is, therefore, recommending a multi-prong approach for productivity measurement and management.

Staffing Guide / Workforce Management System.

A staffing guide can be utilised to make decisions on basic manpower requirements and a workforce management system to schedule employees with the right skills to work where they are most required. Workforce requirements can be worked out based on quality standards desired by the hotel and forecasted occupancy levels.

For example, manpower requirement for the housekeeping department can be based on number of rooms to be cleaned per room attendant per day. In setting the standards for the number of rooms to be cleaned, the quality of cleaning standards can be taken into consideration. A good forecasting tool is necessary to ensure that the right number of employees is budgeted to meet requirements. Manpower requirements can be balanced with quality standard requirements to ensure that costs do not spiral out of control.

A time and motion study could be used to determine the amount of time required to perform a job, for example clean a room, up to the hotel's quality requirements. This will help the hotel to determine how much work a person can complete in a day within quality requirements and standards can be set accordingly. For example, once it has been determined how long it will take a room attendant to clean a room according to quality requirements, standards can be set based on how many rooms each attendant should clean each day. While

it is tedious and time consuming to do a time and motion study, its results can be used for many years to come and would be well worth the effort.

Rigorous inspections should be conducted by supervisors daily to ensure quality standards are maintained and incentive schemes can be used to motivate staff and improve productivity.

Single Factor Productivity Measurement.

While the front office manpower requirements can also be worked out using the staffing guide based on forecasted occupancy levels, determining quality standards is not as easy. As guests play active roles in the service process, the interaction between a guest and the frontline employee cannot be standardized. Each service encounter must be customized to guest requirements to ensure guest satisfaction. Hence, employees need to be flexible in meeting or exceeding guest expectations. As such, empowerment of employees is essential to increase productivity (Drucker, 1991) through improved service quality to ensure guest satisfaction.

The single or partial factor productivity measurement (service productivity = revenues from a given service ÷ costs of producing the service) as proposed by Gronroos and Ojasalo (2004) could be appropriately used to measure productivity of this area as it takes into account both the hotel's and customer's perspectives. Coupling this with guest and employee satisfaction surveys and a good scheduling system should enable optimisation of manpower utilisation, and guest and employee satisfaction.

Value Added Method.

The value added method will give management a good snapshot view of the hotel's overall performance at any point in time. In addition, it can be used as a benchmarking tool to compare the hotel against competitors or hotels within the same chain.

While it has uncovered some sound advice and shared some best demonstrated practices in the industry, this paper has not been able to find a productivity measurement and control model that will help us work "cheaper, better, faster".

Upward Communication Channel.

It is essential that upward communications channels be provided to enable frontline employees to communicate to management what the guests really want. As they are frequently in contact with guests, they should be encouraged to engage the guests so that they can find out how to personalise and customise services according to guests' expectations. They should also be encouraged to think about and communicate upwards how their job processes can be improved. Employees will be motivated to think up ways of improving productivity if they are convinced that it will help to improve their job environment and working conditions.

<div align="center">

Recommendations for Future Research

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Due to time and resource constraints, this paper is unable to conduct an in-depth study of productivity in Singapore Hotels. Hence, it recommends that a baseline in-depth survey be conducted to gain an insight of the state of productivity in Singapore hotels for future comparative studies. Further on, a case study could be conducted on how Singapore hoteliers responded to the government's latest productivity push to gauge the consequences of such governmental intervention.

Another interesting area of study would be to examine if the existing system of full time salaried employees create excessive slack and if cross-training or reducing the number of full-time staff would be better for resource optimisation. In addition, there has been some empirical evidence that productivity is higher in Hong Kong, Korea and Taiwan compared to Singapore. It would be beneficial to do an inter-country comparative study specifically in the productivity of the hotel industry taking into account the differences in wages. This will

throw some light on what causes the differences in productivity and, most importantly, whether paying higher wages to employees really motivate employers to become more productive.

Finally, there has been a lot of pressure on the hotel industry to automate in order to increase productivity. Does automation really save costs and improve the bottom-line? Or does the cost just get shifted elsewhere? How long does it take a hotel to recover its capitalisation costs? In-depth research in this area will definitely help hotels make informed decisions.

Conclusion

A stable productivity growth rate is essential as the effects of productivity touches all levels of society. A good level of productivity provides the economy with a competitive edge in the international arena. This translates into more and better business opportunities for all industries within the economy which leads to domestic growth, better working environments and job opportunities for the people. The society as a whole should enjoy a wider selection of goods and services at lower costs. This brings about an increase in business volume which in turn increases profits and shareholder value. Overall, a respectable level of productivity growth leads ultimately to an improved standard of living for the general population.

It is essential that productivity measurement enables effective monitoring and control, leading to the correction of deviations and resulting ultimately in improved productivity. A decreasing proportion of input to output at unchanged or improved quality indicates increased productivity. So far, measuring productivity in the hotel sector has proved challenging. Nevertheless, it must be done to analyse the effectiveness of deployed measures and identify opportunities for further improvements.

Although this paper has not been able to find a single model of productivity measurement and control that will help us to work "cheaper, better, faster", it has reviewed

and recommended a combination of methods that will help hotels in Singapore measure and manage labour productivity. It is not an ideal solution, but it will suffice in the interim until such time that a suitable single model of productivity measurement and control is developed.

References

Accel-Team (2010). Productivity improvement. Retrieved from

    http://www.accel-team.com/techniques/index.html

Anderson, E. W., Fornell, C., & Rust, R. T. (1997). Customer satisfaction, productivity and

    profitability: Differences between goods and services. *Marketing Science 16*(2),

    129-145.

Anderson, R. I., Fish, M., Xia, Y., & Michello, F. (1999). Measuring efficiency in the hotel

    industry: A stochastic frontier approach. *International Journal of Hospitality*

    Management 18, 45-57.

Aveillo-Cruz, E. (2010). Productivity assessment survey featuring value-added productivity

    measurement. Retrieved from http://www.apo-tokyo.org/productivity/pmtt_015.htm

Baker, M., & Riley, M. (1994). New perspectives on productivity in hotels: Some advances

    and new directions. *International Journal of Hospitality Management, 13*(4), 297-

    311. doi:DOI: 10.1016/0278-4319(94)90068-X

Ball, S. D., Johnson, K., & Slattery, P. (1986). Labour productivity in hotels: An empirical

    analysis. *International Journal of Hospitality Management, 5*(3), 141-147. doi:DOI:

    10.1016/0278-4319(86)90007-1

Barros, C. P. (2005). Measuring efficiency in the hotel sector. *Annals of Tourism Research,*

    32(2), 456-477. doi:DOI: 10.1016/j.annals.2004.07.011

Barros, C. P. & Alves, F. P. (2004). Productivity in the tourism industry. *International*

    Advances in Economic Research, 10(3), 215-225. doi:DOI: 10.1007/BF02296216

Biel, D. (2005). Multiunit restaurant productivity analysis: Integrating satisfaction into a

    holistic model. Retrieved from

    http://www.hotelschool.cornell.edu/chr/pdf/showpdf/chr/research/casestudies/multiu

    nitrestaurant.pdf?my_path_info=chr/research/casestudies/multiunitrestaurant.pdf

Bo chap. (2010). In *Dictionary of Singlish*. Retrieved from

http://www.singlishdictionary.com/singlish_B.htm

Brown, J. R. & Dev, C. S. (1999). Looking beyond RevPAR: Productivity consequences of

hotel strategies. *Cornell Hotel and Restaurant Administration Quarterly, 40*, 23-33.

doi:DOI: 10.1177/001088049904000213

Brown, J. R. & Dev, C. S. (2000). Improving productivity in a service business: Evidence

from the hotel industry. *Journal of Service Research, 2(4), 339-354. doi:*DOI:

10.1177/109467050024003

Cahyadi, G., Kursten, B., & Guang, Y. (2004). Singapore's economic transformation.

Retrieved from

http://www.globalurban.org/GUD%20Singapore%20MES%20Report.pdf

Choi, K., Hwang, J., & Park, M. (2009). Scheduling restaurant workers to minimize labor

cost and meet service standards. *Cornell Hotel and Restaurant Administration*

Quarterly, 50, 155-167. doi:DOI: 10.1177/1938965509333557

Corporate Executive Board (CEB) (2003). Linking employee satisfaction with productivity,

performance, and customer satisfaction. Retrieved from

http://www.corporateleadershipcouncil.com

Chuang, P. M. (2010, March 4). Businesses to lead push for productivity. Retrieved from

http://www.spring.gov.sg/NewsEvents/ITN/Pages/Businesses-to-lead-push-for-

productivity-20100304.aspx

Davis, M. Y. (1993). Concepts and methods of measuring productivity at the organization

level. Retrieved from http://www.dtic.mil/cgi-

bin/GetTRDoc?AD=ADA273126&Location=U2&doc=GetTRDoc.pdf

EnterpriseOne (2010). Productivity at work. Retrieved from:

http://productivity.business.gov.sg/en/index.aspx

Drucker, P. (1991). Knowledge-worker productivity: The biggest challenge. *California Managment Reivew 41*(2), 79-94.

Ermisch, J. F., & Huff, W. G. (1999). Hypergrowth in an east Asian NIC: Public policy and capital accumulation in Singapore. *World Development, 27*(1), 21-38. doi:DOI: 10.1016/S0305-750X(98)00101-6

Gamoran, A.C. (1966). Personnel planning and control in hotels, restaurants, institutions. *Cornell Hotel and Restaurant Administration Quarterly, 6,* 9-14, doi:DOI: 10.1177/001088046600600403

Grönroos, C., & Ojasalo, K. (2004). Service productivity: Towards a conceptualization of the transformation of inputs into economic results in services. *Journal of Business Research, 57*(4), 414-423. doi:DOI: 10.1016/S0148-2963(02)00275-8

Guerrero, E. I. G. & Rubio, J. L. (August, 2003). *Tourism and productivity: Case study of the hotel and catering industry in the Andalusian region.* Paper presented at the 43rd European Congress of the Regional Science Association, Jyväskylä, Finland. August 27-30, 2003. Retrieved from Hospitality & Tourism Complete database.

Gupta, S., McLaughlin, E., & Gomez, M. (2007). Guest satisfaction and restaurant performance. *Cornell Hotel and Restaurant Administration Quarterly, 48*(3), 284-298.

Heap, J. (1996). Top-line productivity: A model for the hospitality and tourism industry. In Johns, N. (Ed), *Productivity management in hospitality and tourism* (pp. 2-18). London: Cassell.

Hu, B. A. & Cai, L. A. (2004). Hotel labor productivity assessment: A data envelopment analysis. Retrieved from http://www.HaworthPress.com/web/JTTM

Hussain, Z. (2010, February 16). Productivity target achievable: PM. *The Straits Times.* Retreived from

http://www.pmo.gov.sg/News/Transcripts/Prime+Minister/Productivity+target+achi
evable+PM.htm

Ingram, A. & Fraenkel, S. (2006). Perceptions of productivity among Swiss hotel managers:

A few steps forward? *International Journal of Contemporary Hospitality*

Management, 18(5), 439-445. Doi:DOI: 10.1108/09596110610673565.

Input. (nd). In *Business dictionary.com*. Retrieved from

http://www.businessdictionary.com/definition/input.html

Johnston, R. & Jones, P. (2004). Service productivity: Towards understanding the

relationship between operational and customer productivity. *International Journal of*

Productivity and Performance Management, 5(3), 201 – 213. doi:**DOI:**

10.1108/17410400410523756

Jones, P., & Siag, A. (2009). A re-examination of the factors that influence productivity in

hotels: A study of the housekeeping function. *Tourism & Hospitality Research*, *9*(3),

224-234. doi:10.1057/thr.2009.11.

Ketels, C. Lall, A., & Neo, B.S. (2010). Singapore competitiveness report. Retrieved from

http://www.spp.nus.edu.sg/aci/docs/Singapore%20Competitiveness%20Report%202
009.pdf

Khamid, H. M. A. (2009, February 2). Singapore launches S$100m plan to improve

customer service. Retrieved from

http://www.smu.edu.sg/news_room/smu_in_the_news/2009/sources/CNA_2009020
2_1.pdf

Kilic, H. & Okumus, F. (2005) Factors influencing productivity in small island hotels:

Evidence from Northern Cyprus. *International Journal of Contemporary Hospitality*

Management, 17(4), 315 – 331. doi: DOI: 10.1108/09596110510597589

Krugman, P. (1994). The myth of Asia's miracle. *Foreign Affairs*, *73*(6), 62-78. Retrieved

     from Business Source Premier database.

Kuo, C. F. & Nelson, D. C. (2009). A simulation study of production task scheduling for a

     university cafeteria. *Cornell Hotel and Restaurant Administration Quarterly, 50,*

     540-552, doi:DOI: 10.1177/001088049803900607

Labour productivity. (2010). In *Wikipedia, the free encyclopedia*. Retrieved from

     http://en.wikipedia.org/wiki/Productivity

Lane, H. E. (1976). The scanlan plan: A key to productivity and payroll costs. *Cornell Hotel*

     and Restaurant Administration Quarterly, 17, 76-80. doi:DOI:

     10.1177/001088047601700116

Lee-Ross, D. & Ingold, T. (1994). Increasing productivity in small hotels: Are academic

     proposals realistic? *International Journal of Hospitality Management 13*(3), 201-

     207.

Lee, Y. S. (2010). Employee of the year and productivity ideas award presentation

     ceremony, Singapore. Retrieved from

     http://www.mom.gov.sg/Home/MOM_Speeches/Pages/20100527-MOS_FDAWU-

     SHA-NTUC.aspx

Li, X. (2010, June 25). Productivity: Govt strategy not good enough? *The Straits Times*, pp.

     A26.

Lieberman, M. B. & Kang, J. (2008). How to measure company productivity using value-

     added: A focus on Pohang Steel (POSCO). *Asia Pacific Journal of Management*

     25, 209-224. doi:DOI: 10.1007/s10490-007-9081-0

Lim, L. (2008). *Singapore's Economic Growth Model – Too Much or Too Little?* Paper

     presented at the Singapore Economic Policy Conference 2008, Singapore. Retrieved

     from http://www.fas.nus.edu.sg/ecs/scape/doc/24Oct08/Linda%20Lim.pdf

Mandelbaum, R. (August 20, 2008). Jump in hotel labor costs are concern in 2008.

    Retrieved from

    http://www.bluemaumau.org/jump_hotel_labor_costs_are_concern_2008

Nomura, K. & Lau, E. (2010). International comparisons of productivity:

    a panoramic view for decision making. Retrieved from http://www.apo-

    tokyo.org/productivity/mp_001.htm

Nomura, K. & Lau, E. Y. M. (2010a). Why labor productivity matters. Retrieved from

    http://www.apo-tokyo.org/productivity/mp_002.htm

Output. (2010). In *The free dictionary*. Retrieved from

    http://www.thefreedictionary.com/output

Oyeranti, G. A. (2000). Concept and measurement of productivity. Retrieved from

    http://www.cenbank.org/OUT/PUBLICATIONS/OCCASIONALPAPERS/RD/2000

    /ABE-00-1.PDF

Parasuraman, A. (2002). Service quality and productivity: A synergistic perspective.

    Managing Service Quality, 12(1), 6-9.

Partial factor productivity. (2010). In *The encyclopedia of business* (2nd ed.). Retrieved from

    http://www.referenceforbusiness.com/management/Pr-Sa/Productivity-Concepts-

    and-Measures.html

Pavesic, D. V. (1983). The myth of labor-cost percentages. *Cornell Hotel and Restaurant*

    Administration Quarterly, 24, 27-30. doi:DOI: 10.1177/001088048302400305

Productivity. (2010). In *Encyclopedia of business and finance*. Retrieved from

    http://www.enotes.com/business-finance-encyclopedia/productivity

Production possibility frontier. (2010). In *Investopedia*. Retrieved from

    http://www.investopedia.com/terms/p/productionpossibilityfrontier.asp

Ramayandi, A. (2010). Singapore. Retrieved from

      http://www.adb.org/Documents/Books/ADO/2010/SIN.pdf

Reynolds, D. (1998). Productivity analysis: In the on-site food-service segment. *Cornell*

      Hotel and Restaurant Administration Quarterly, 39, 22-31. doi:DOI:

      10.1177/001088049803900307

Reynolds, D. (2003). Hospitality-productivity assessment: Using data-envelopment analysis.

      Cornell Hotel and Restaurant Administration Quarterly, 44, 130-137. doi:DOI:

      10.1177/0010880403442012

Sahay, B.S. (2005). Multi-factor productivity measurement model for service organisation.

      International Journal of Productivity and Performance Management, 54(1), 7-22.

      doi: DOI 10.1108/17410400510571419.

Sasse, M. & Harwood-Richardson, S. (1996). Influencing hotel productivity. In Johns, N.

      (Ed), *Productivity management in hospitality and tourism* (pp. 141-163). London:

      Cassell.

Sigala, M. (2004). Using data envelopment analysis for measuring and benchmarking

      productivity in the hotel sector. *Journal of Travel and Tourism Marketing 16*(2/3).

Sigala, M., Jones, P., Lockwood, A., & Airey, D. (January, 2005). Productivity in hotels: A

      stepwise data envelopment analysis of hotels' rooms division processes. Retrieved

      from http://www.informaworld.com/smpp/content~content=a714005142&db=all

Simple ratios. (2010). In *Encyclopedia of business and finance*. Retrieved from

      http://www.answers.com/topic/simpleratios

Singapore Tourism Board (STB) (2010). Tourism focus May 2010. Retrieved from

      https://www.stbtrc.com.sg/images/links/X1TFMay2010.pdf

Talluri, S. (May 2000). Data Envelopment Analysis: Models and Extensions. *Decision Line 31(3)*, 8-11. Retrieved from

http://www.decisionsciences.org/decisionline/Vol31/31_3/31_3pom.pdf

Teo, C. H. (2009). Business Excellence Awards Gala Dinner, Singapore. Retrieved from

http://www.spring.gov.sg/NewsEvents/PS/Pages/Speech-by-Mr-Teo-Chee-Hean-at-the-BE-Awards-Gala-Dinner-20091104.aspx

Thompson, G. M. (1998). Labor Scheduling, Part 2: Knowing how many on-duty employees to schedule. *Cornell Hotel and Restaurant Administration Quarterly, 39,* 26-37, doi:DOI: 10.1177/001088049803900607

Thompson, G. M. (2003). Labor Scheduling: A Commentary. *Cornell Hotel and Restaurant Administration Quarterly, 44*, 149-155. doi:DOI: 10.1177/001088040304400520

Total factor productivity. (2010). In *The encyclopedia of business* (2nd ed.). Retrieved from

http://www.referenceforbusiness.com/management/Pr-Sa/Productivity-Concepts-and-Measures.html

Triplett, J. E. & Bosworth, B. P. (2000). Productivity in the services sector. Retrieved from

http://www.brookings.edu/~/media/Files/rc/papers/2000/01useconomics_triplett/200 00112.pdf

Van der Hoeven, W. H. M., Turik, A. R. (1984). Labour productivity in the hotel business. *The Services Industries Journal, 2*(2), 161-173.

Wijaya, M. (2010). In Singapore, productivity at all costs. Retrieved from

<http://www.atimes.com/atimes/Southeast_Asia/LC23Ae01.html>

Wijaya, M. (2010). In Singapore, productivity at all costs. Retrieved from

<http://www.atimes.com/atimes/Southeast_Asia/LC23Ae01.html>

Witt, C. A. and Witt, S. F. (1989). Why productivity in the hotel sector is low. *International Journal of Contemporary Hospitality Management, 1(2),* 28-34. Retrieved from Hospitality & Tourism Complete database.

Wölfl, A. (2005), "The Service Economy in OECD Countries: OECD/Centre d'études prospectives et d'informations internationales (CEPII)", *OECD Science,Technology and Industry Working Papers*, 2005/3, OECD Publishing. doi: DOI:10.1787/212257000720

Wong, W.K. (2010, April 2010). Monthly digest of statistics Singapore, April 2010. Retrieved from http://www.singstat.gov.sg/pubn/reference/mdsapr10.pdf

Yeoh, B.S.A. (2007). Singapore: Hungry for foreign workers at all skill levels. Retrieved from http://www.migrationinformation.org/Profiles/display.cfm?ID=570

Young, A. (1994). Lessons from the east Asian NICS: A contrarian view. *European Economic Review, 38*(3-4), 964-973. doi:DOI: 10.1016/0014-2921(94)90132-5

Young, A. (1992). A tale of two cities: Factor accumulation and technical change in Hong Kong and Singapore. *NBER Macroeconomics Annual, 7*, 13-54. Retrieved from http://www.jstor.org/stable/3584993