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# Embracing self service technology for hotel productivity growth

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EMBRACING SELF SERVICE TECHNOLOGY FOR HOTEL  
PRODUCTIVITY GROWTH

by

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Bachelor of Engineering  
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1995

A professional paper submitted in partial fulfillment  
of the requirements for the

**Master of Hospitality Administration**  
**William F. Harrah College of Hotel Administration**

**Graduate College**  
**University of Nevada, Las Vegas**  
**September 2010**

## ABSTRACT

### **Embracing self service technology for hotel productivity growth**

by

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This paper explores the various ways in which self-service technology (SST), if employed by the hotel industry, can actually contribute to the productivity growth in Singapore. The study provides an understanding of customer's technology acceptance and readiness by utilizing the two widely extended and accepted approaches, Technology Readiness Index (TRI) and Technology acceptance model (TAM). The study also evaluated the four common self-service technology channels: electronic kiosks, the Internet, mobile devices, and the telephone applications. From an investigation on past studies, it is found that Singapore is receptive to self-service technology. Self-service technology thus could bring a highly respectable return on investment (ROI) to the Singapore's hotel industry, as illustrated by ROI models in this paper. Moreover, hotels could leverage on a number of Singapore's government funding to optimize their investment on SST. With the government's master plan (iN2015) platform to realize the intelligent nation by 2015, hotels could benefit from the self service technology features that this platform is offering. Various avenues to ride on this platform and recommendations are featured.

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Last but not least, I would like to thank my lovely wife Josephine. The course work and hotel attachment are very demanding, and she has been standing by me and support me. I would not be able to complete this course without her patience and understanding.

## PART ONE

### Introduction

Productivity has been identified by Singapore government as the primary force for the coming years of economy growth. Hospitality is one of the industry sectors chosen by the National Productivity and Continuing Education Council (NPCEC) to have the most potential for productivity improvements (Chuang, 2010; Khamid, 2009). Singapore competitiveness report reveals that the United States has done exceptionally well in leveraging new information technologies to improve the productivity of its companies through the redesign of its systems and processes. Thus further investigations may be required to determine the reasons of Singaporean companies for not relatively effective in adopting information technologies to improve productivity in hospitality services (Ketels, Lall, & Neo, 2010).

U.S Information Technology & Innovation Foundation (ITIF) has highlighted that Self-Service Technology (SST) has the capacity to develop into a major force for growth in productivity and improvements in the quality of life. SST, a fixture in American today, has proven to add more efficiency and convenience to the Americans' lives today, to the point that the technology is often taken for granted. ITIF estimates that if self-service technology were more widely deployed, the U.S. economy will grow approximately \$130 billion larger annually (Castro, Atkinson, & Ezell, 2010).

#### **Purpose**

This paper is an exploratory study on the potential of SST for Singapore hotels to harness with the objective of improving productivity. The paper seeks to provide as an

input to the Singapore hotels, to enable the hotels to take on a more definitive step in making the decision to adopt SST for productivity growth. The paper will discuss the evolution and advancement of SST globally, the latest development of hotel SST, customer technology acceptance and readiness models, and SST implication to the hotel industry from Singapore context. The paper will conclusively address the readiness of Singapore hotels' customers in utilizing SST.

**Statement of Problem.** When a hotel considers adding SST to their product or service line, they would have to invest time in understanding their customer readiness and the available technologies. Self-service is one of the channels to serve the customers and provide what they want. Customers, generally, want reliable, affordable and quality services that are convenient and easy to acquire. Hotel need to understand the technology readiness of their customers, before they could develop implementation strategies that would help the firm to gain operation efficiency and improve customer experience (Hsieh, 2005). The significance of this research would aid hotel businesses towards a more definitive phase in incorporating SST for their operations. This paper explores the studies on SST consumers with respect to the Technology Acceptance Model (TAM) and Technology Readiness Index (TRI). TAM put forward perceived usefulness and perceived ease of use as leading factors for technology acceptance behaviors (Davis, Bagozzi, Richard, & Warshaw, 1989) while TRI is being examined from four dimensions: optimism, insecurity, discomfort and innovativeness (Parasuraman, 2000). The latest customer surveys, best practices, and technologies of SSTs which address technology acceptance and readiness will also be investigated. The findings can be used as inputs by the hotel property to determine their customer technology readiness towards SST.

## **Justifications**

In the past decade, we have witnessed a rapid growth in self services in our daily lives. SST has brought a transformation to a broad range of industries, from ATMs in banking to e-commerce in the travel industry. Businesses passed on the significant savings gained to consumers in the form of lower prices and better services (Castro, Atkinson, & Ezell, 2010). The advancement of SST could not come at a more crucial time for Singapore hotels in the country's globalized position, its rapid economic growth and intense competition within the region. The Singapore hotel industry will need the power of SST to avoid serious labor shortage and increasing wages in future. In its preparation in adopting SST, hotel owners need to understand their customers' level of technology acceptance and readiness, so that they could select the appropriate type of SST to generate the best business outcome.

## **Constraints**

There is limited research done in Singapore on this particular subject. Hypotheses will be derived from the past studies of SST in other countries on the potential implications to the Singapore hotels. Further survey and research can be done in Singapore based on the TAM and TRI survey structure.

## PART TWO

### Literature Review

#### **Productivity reports of Singapore hospitality services**

Singapore's key challenge is the comparatively volatile labor productivity growth and high productivity gap relative to the United States. From the Singapore hotels and restaurants perspective, the productivity growth has declined from 8% (year 2003-2004) to -8% (year 2007-2008) (Ketels, Lall, & Neo, 2010). Singapore government has targeted to achieve productivity growth of 2% to 3% per year for the next ten years. Productivity growth will reduce Singapore dependency on the foreign labor. The foreign workforce growth will be moderated, and the continuous increase will be avoided in its total workforce proportion. The Singapore government has created an incentive that known as "Productivity and Innovation Credit" (Ministry of Finance, 2010), to provide sizeable tax deductions for the following range of investment and innovation activities:

- automation through software or technology,
- intellectual property acquisition,
- intellectual property registration,
- research & development,
- design activities, and
- employee training.

The credit is eligible to all businesses, and based on any of the above listed activities investment amount. From their taxable income, 250% can be deduct from their expenditures on each of these activities. Each activity has a cap of \$300,000 of expenditure (Ministry of Finance, 2010). Hotel owners can take advantage of this tax

incentive for their implementation of Self-Service Technology (SST) solutions through the automation through technology or software activity, to achieve growth in productivity and improvements of service quality.

### **Customer technology acceptance and readiness studies on SST**

There is a great benefit from the SST implementation. However the level of acceptance and readiness of customers of SST usage are importance to the success of the implementation. Understanding the drivers of customers' intentions to adopt SSTs is needed by all hotel managers (Wang, Harris, & Patterson, 2007). SST provides the ability for customers to conduct their business wherever, whenever, and however they want. Hotels could improve a guest's experience by making it faster and easier to check in and out using the self-service solutions. In this way, hotels can increase the revenue per available room rate through more consistent room upgrades and amenity cross-selling. The 2010 Self-Service Technology Study by Hospitality Technology magazine shows that 59% of consumers are likely to stay at a hotel which offers a self service check-out option over one which does not (Lorden, 2010). On the other hand, even when the benefits of SST are obvious, consumers may still choose to avoid them if they are uncomfortable with technology. Technology Readiness Index (TRI) and Technology acceptance model (TAM) are broadly extended and accepted in SST studies. TAM is developed by Davis (1985) to explain technology adoption behavior by people. TAM posits primary belief for computer acceptance behaviors to be perceived usefulness and perceived ease of use. Parasuraman (2000) developed Technology Readiness Index (TRI) to measure and predict accurately the perception and behavior of customers.

**Customer technology acceptance for SST.** Information technology offers potential gains in a company's daily operations but it is often obstructed by the user's willingness to accept and use (Davis, 1989). Research has revealed that the better opinion an individual has towards SST, the more widely the technology will be adopted (Curran & Meuter, 2005). The perceived usefulness and the perceived ease of use are two specific variables that the scales are developed and validated by Davis (1989). These scales are hypothesized to be the primary determinants of information technology acceptance by the user.

Morosan and Jeong (2006) have explored the TAM in their research *Understanding Travelers' Adoption of Hotel Reservation Web Sites*. They found that the reservation web sites acceptance level of hotel can be forecast by the extended TAM framework. According to their study, an individual's perceived usefulness, prior experience, perceived ease of use and perceived playfulness have an influence on attitude toward reservation Web sites usage. Furthermore, the most significant determinants of intention to made reservation in these Web sites by the travelers are attitudes and perceived playfulness.

Examination of a variety of attitude-based and attribute-based antecedents of customers' intentions to accept SSTs are extended in more studies, which are summarized in Table 1 (Wang et al., 2007).

Table 1

*Studies of customers' intentions to adopt SSTs.*

Attribute-based antecedent	Supporting study	Attitude-based antecedent	Supporting study
Perceived Ease of use	Lin et al. (2007), Curran and Meuter (2005), Dabholkar and Bagozzi (2002), Dabholkar (1996).	Technology readiness	Lin et al. (2007), Chris Lin and Peiling (2006), Parasuraman (2000).
Perceived usefulness	Lin et al. (2007). Curran and Meuter (2005).	Technology anxiety	Meuter et al. (2005), Meuter et al. (2003).
Perceived control	Lee and Allaway (2002). Dabholkar (1996).	Need for interaction	Curran and Meuter (2005), Meuter et al. (2005), Dabholkar (1996).
Perceived complexity	Meuter et al. (2005), Walker et al. (2002).	Attitude towards technology	Bobbitt and Dabholkar (2001), Dabholkar (1996).
Perceived Risk	Meuter et al. (2005), Curran and Meuter (2005), Lee and Allaway (2002), Walker et al. (2002).	Attitude towards using SSTs	Curran and Meuter (2005), Curran et al.(2003), Bobbitt and Dabholkar (2001). Dabholkar and Bagozzi (2002),
Fun/enjoyment	Dabholkar and Bagozzi (2002). Dabholkar (1996).		

**Customer technology readiness for SST.** Surveys have consistently shown that consumers' increasing awareness, readiness and willingness to use SST are on the rise. As the technology's sophistication advances, some consumers may prefer self-services to

face-to-face interactions because of the privacy, accuracy and personalization it can provide. Sixty-three percent of consumers say that they are likely to check in and out of a hotel using a self service kiosk if there is one available. This is an indication that the presence of self-service technology is increasingly affecting consumers' decisions about where to eat and where to stay (Lorden, 2010).

TRI refers to inclination of people using and embracing new technologies for realizing goals both at home and at work. TRI examine the customer readiness from four dimensions: innovativeness, insecurity, optimism and discomfort (Parasuraman, 2000). Chris Lin & Pei-ling (2006) indicate that technology readiness impact behavioral intentions and perceived SST service quality. Behavioral intentions and customer satisfaction toward SSTs is positively influence by perceived SST service quality. Verma, Victorino, Karniouchina, and Feickert (2009) use TRI as a mechanism to establish segments of customers' inclination toward technology. They found that those guests with a high TRI score are more ready to pay comparatively high room rates and are usually frequent business travelers. The study revealed that the hotel guests with high TRI scores were more affluent, more highly educated, and relatively younger than the sample as a whole, and a greater percentage are male guests. Elliott & Meng (2009) examines the impact of the Technology Readiness Index (TRI) dimensions on the inclination of China consumers. The study shows that companies' biggest challenge in China is to encourage consumers to try the newly launched technology. The TRI dimensions show to be useful assessment of the likelihood of consumers in China to use self-service technology, with the exception of Innovativeness. Meng, Elliott, & Hall (2010) suggest that the TRI is a

cross-culturally valid measurement scale for both American and Chinese consumers. Both consumer groups have the same four technology-readiness dimensions exist.

### **SST products and technologies**

When a technology is new, it is often difficult to use and usually requires specialized skilled workers to operate it. However, as the technology evolves and become more user-friendly to the point where an average person can operate it on his own, then self service becomes a possibility. Presently most self-service technology uses one of these four channels: electronic kiosks, the Internet, mobile devices, and the telephone (Castro, Atkinson, & Ezell, 2010). With the aid of convergence solution such as NCR's c-tailing solutions, businesses can have the ability to offer consumers greater personalization and consistency across channels, such as the Internet, mobile devices, social media or on-location. These converged solutions enable businesses to differentiate themselves, resulting in lower operating costs and attracting today's empowered and elusive consumers (Lorden, 2010).

**Electronic Kiosks.** Electronic kiosks are becoming more affordable and convenient. These kiosks are often equipped with advanced technology like touch screen displays, card readers, scanners, thermal printing, Power over Ethernet (PoE+) and wireless networks. The availability of broadband Internet access has made deploying consumer-friendly computer kiosks a cost-effective option for many services. The kiosk implementations have flourished as a result. In 2008, self-service kiosk transactions in North America totaled \$607 billion, and 41% of kiosks solutions are deployed in the hospitality and commercial services sectors. The self-service kiosk transactions in North America are projected to reach \$1.7 trillion by 2012. There are seventy four thousands

self-checkout terminals deployed in North America. However it is only three thousand self-checkout terminals deployed in Asia Pacific in the year 2008 (Castro et al., 2010). In the 2010 Hospitality Technology survey on the growing acceptance of the self-service kiosks, fifty-four percent of interviewed consumers say that they are more likely to visit a hotel which offers a self-service order and payment option over one which does not have it (Lorden, 2010).

***IATA Common Use Self-Service (CUSS) standard.*** In the recent years, major hotel chains are turning to self-services and Common Use Self-Service (CUSS). The CUSS concept is a kiosk platform to be shared by any number of CUSS standard conformed check-in applications. It was developed by a mix of airlines, airports and suppliers. Deployment of CUSS kiosks at the Hilton Hawaiian Village resort is a good example. Hilton's research discovered that their guests dislike queuing for check-in, just like in an airport. The introduction of self-service check-in kiosks enable the guests to get their hotel keys from the process, and can even check-in at hotel kiosks installed at the airport while waiting to collect their bags (IATA, 2010). Hotels can also apply the standard to let guests not only check out of a room, but check in for a flight, check in for their rental cars and register for a convention they are attending.

***Hotel Check in/out solutions.*** The 2010 Hospitality Technology survey reflected that hotels are maximizing their investment by offering a broader array of self-service functionalities. Ninety-four percent of respondents cite "customer service" as the top of the list for key business drivers. Check-in capabilities still top the list of kiosk features at 88%, followed by check-out capabilities at 76%. Other popular features include room key encoding/dispensing (47%); airline checkin/boarding pass printing (47%);

maps/directions (41%); and entertainment ticket purchasing and printing (41%). Among the respondents, 31% have already deployed check-in kiosks, 63% are planning to do so within one to two years. (Lorden, 2010).

**Online Concierge.** Digital Concierge helps hotel enhance guest satisfaction and experience. One example is Marriott Courtyard who redesigned some of their hotel lobbies with a large-format touch screen concierge called GoBoard. The GoBoard offers the guests the convenient of accessing information such as weather, real-time news, travel information interactive maps to places of interest. Courtyard reported guest satisfaction scores rose 10%, intent-to-return scores increased 27% and 7.5% increase in market share with the investment of GoBoard (Marriott Courtyard, 2009).

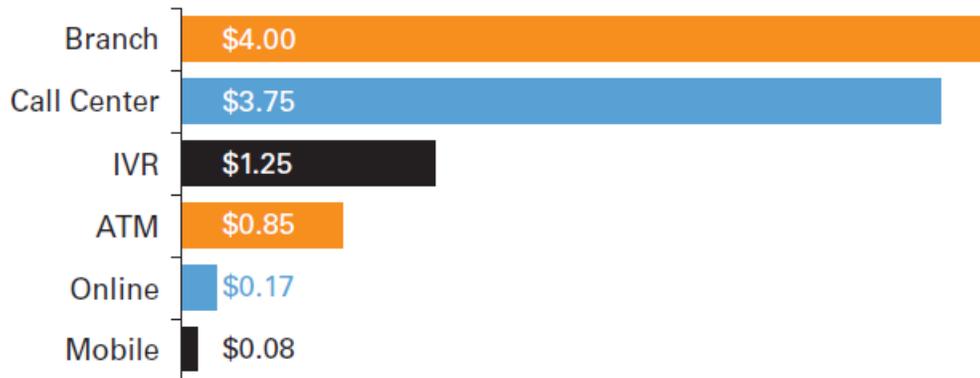
**Internet.** Economic turmoil is forcing companies to cut operational costs in creative ways through web self-services. One emerging approach involves adding Rich Internet Applications: video, graphics, sound, etc., to better guide the new customer through step-by-step instructions. With the cost of a phone interaction ranging from \$15 for consumer call centers to \$45 or higher for enterprise technical support, the financial payback for increased call deflection is attractive (Ragsdale, 2009).

Leong (2001) found that most hotels internet reservations are less than 10 per cent of the overall reservations. Chiang (2003) found that 95.45% to 98.48% of the hotels in Singapore provide basic information on their websites, but many have not utilized RIA technological features like audio, video and downloadable directories. The websites were used to disseminate information mainly on hotel rooms, facilities and services. Chiang (2003) suggested that hotels should make their website productive through enhancement of the six categories: Promotions, basic information, secondary information, ECommerce,

technology and services. Singapore Tourism Report (2008) found that 53% of Singapore tourist learns about Singapore from the web. These findings presented good prospect for Singapore hotels to leverage on RIA.

**Mobile devices.** The next generation of self-service applications is focused more on consumers' own technology, such as cell phones, PDAs and other handheld devices. There are over 40 million handsets in Japan that are in use with capability of point of sale payments, while South Koreans can use their mobile devices to make check-out lane payment and bill payments (Fiserv, 2009). More operators are increasingly aware of, and open to the use of Web-enabled phones for hotel check-in (Lorden, 2009). 2010 Hotel Technology survey showed forty-nine percent of respondents see the potential for using these devices to check into a hotel, and 31% would consider such an implementation (Lorden, 2010).

Based on Asia Pacific financial institution implementations by M-Com in 2008, the Asia-Pacific leading financial institutions have reduced costs by diverting customers to less expensive channels, for example from the call center to the mobile channel. This is especially successful for the Generation Y age group. Mobile devices introduce new operational costs to hospitality industry, but it is considerably the lowest-cost channel today that we have in place as shown in the Figure 2. Furthermore, more potential functionalities are available than some channels, such as interactive voice response (Fiserv, 2009).



Source: TowerGroup, Fiserv/M-Com Data: Mobile transaction costs based on actual data from M-Com, the international mobile banking and payments solutions provider and Fiserv partner whose technology powers Mobile Money from Fiserv.

Figure 1. . Per-transaction costs by banking channel. Adapted from “How to achieve a compelling ROI from mobile financial services” by Fiserv, 2009. Copyright 2009 by Fiserv, Inc.

**Phone applications.** Digital technology has enabled consumers to use the telephone to access self-service solutions. Businesses are replacing dual tone multi frequency (DTMF) systems with interactive voice response (IVR) phone systems that allow consumers to interact with a computer system through speech recognition technology. Companies can provide information over the telephone using text-to-speech technology. The cost of an American-based customer-service telephone agent is approximately \$7.50 per phone call, compare to 32 cents per call on an automated phone system. The saving from the IVR is substantial (Castro, Atkinson, & Ezell, 2010). Returns on Investment (ROI) of speech recognition offers one of the highest proven in the contact center market place. A financial institution, Dreyfus, increased its IVR self-service usage rate from 45% to 63% by adding speech to its existing IVR platform, and saved \$1 million/year. Almost any enterprise that handles repetitive tasks through live agents will realize a 6 to 12

month payback from a speech recognition investment (Fluss, 2003). The solution would be applicable to the hotel reservation and phone concierge service.

## **Conclusion**

To encourage greater use of self-service technology and its related benefits, government policy plays an importance role. The Singapore government “Productivity and Innovation Credit” give incentive to those hotels who consider automation through SST, and prepare the hotels for reducing the impact of the rising cost of labor.

The Singapore tourists come from Americas (4.8%), Africa (0.8%), Asia (71.2%), Europe (13.5%), and Oceania (9.7%) (Singapore Tourism Board, 2010). The tourism industry is increasing more culturally diverse and international, it is imperative for hospitality managers to understand the customer acceptance level and readiness for technology from the different tourist segments. It is important that SST is not been perceived as shifting work to the consumer or depriving them from human contact. The knowledge and understanding can be achieved through research and incorporated into their SST adoption plan. The SST technology has matured substantially over the past decade, and there are wide ranges of products with respectable ROI for hospitality managers’ selection. Selecting the right SST solutions that meet different guests’ expectation and needs would eventually attain a higher level of satisfaction among the growing number of Singapore tourists.

## PART THREE

### Introduction

Varini & Murphy (2007) study showed that there was a general consensus among hotel industry experts on the lack of investment in improving technology within the hotel industry. There was a general agreement that the savings enabled by the use of new technologies such as SST will provide higher efficiency and effectiveness.

During the recent economy downturn, some businesses may view information technology budgets as an easy target for cost reduction. When companies are struggling with high fixed costs and slow sales, large IT investments tend to be deemed as a target for cost cutting. On the other hand, economic downturn could also be an excellent timing to invest in technologies which could reduce labor costs, enable operational efficiency and improve customer service capabilities. Such investments can in fact moderate the worst effects of economic downturns. When the economy begins to improve, the adoption and investment in technology will position the companies to boost sales and profits, and capture a bigger slice of the market share. IT investments such as self service technology can expect handsome returns during economic downturns (RIS News, 2009). In Singapore, hotels can increase their project funding through leveraging on a number of Government schemes that provide good subsidy on their technology projects. Schemes include the “Productivity & Innovation Credit” and “Technology Innovation Programme” (Enterpriseone, 2010).

Studies of information kiosks in Singapore have shown that SST can be receptive in the country and it is independent of the demographic variables (i.e. age, educational qualification, and occupation). It is viable for hotels to conduct feasibility study for SST

adoption. ROI calculation is an important tool for justifying the project funding and measurement of the success. The variables in the ROI calculation varies by project, so hotel would have to customize it with their environment and requirements accordingly. There are best practices of ROI calculation that company can refer to, so that company can understand how SST application helps in realizing cost saving and eventually contribute to the overall productivity growth.

### **SST acceptance in Singapore**

Tung (2001) conducted a study to understand the factors affecting kiosks usefulness and ease of use, and to determine the future improvements desired by the Singapore kiosk users. Tung (2001) found that Singapore kiosk users are receptive of information kiosks. The background concept of this study was formed by the TAM literature. The study highlighted data security, ease of operation, reliability of data, and convenience as the top four determinants of usefulness and ease of use. The suggestions that is more significant on improvement of the kiosk to better serve the customers' future needs, are introducing more functions, making faster operating kiosks, and improving user-friendliness.

In another study on the user experience of kiosks in Singapore, Tung (2002) found that more than 95% of kiosk users use high-end kiosks and they are independent of the demographic variables (i.e. age, educational qualification, and occupation). The results are shown in Figure 2-4. The high 95% is a good indicator for self service acceptance in Singapore when the technology meets the user needs. Tung (2002) classified kiosks into 4 types: high-end kiosks, high information dissemination kiosks, high transactional kiosks and basic information kiosks. The definition of high end information kiosks in the study is (Tung, 2001),

High End Information Kiosks (HEIKS) have high transactional and information dissemination capabilities. It is deemed to be more "intelligent" than the other three categories of kiosks. To qualify as a high-end kiosk, the kiosk should be publicly available and able to connect to more than one database.

Survey respondents that used High-End kiosks are the largest proportion of the respondents who were surveyed for all 4 kiosk categories. The study revealed that users use the kiosks because their transaction needs and convenience. They also indicated that High End kiosks are quite easy or very easy to use.

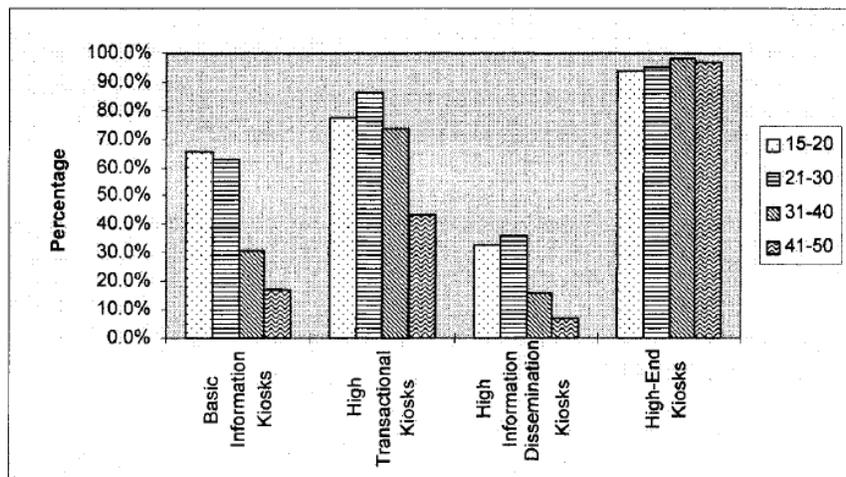


Figure 2 . Proportions of users among in each age group for the four types of kiosks.

Adapted from “Information kiosks: Singapore users' experience” by L. Tung, 2002,

*Human Systems Management*, 21(1), p. 25.

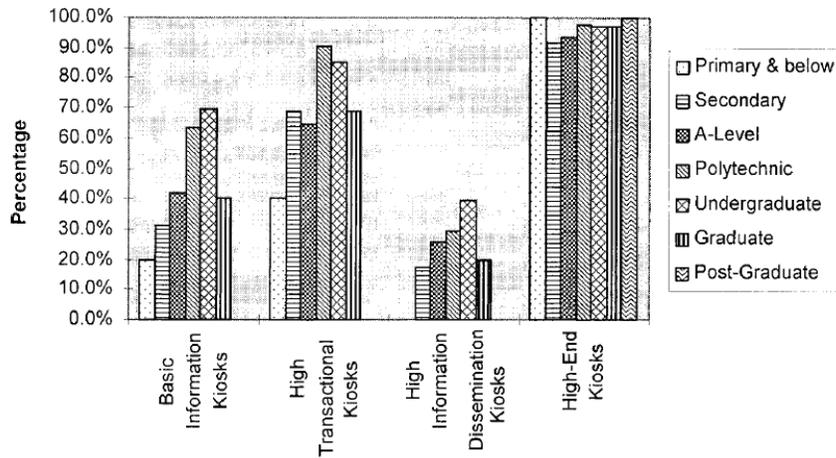


Figure 3. . Users in each educational qualification group for the four types of kiosk. Adapted from “Information kiosks: Singapore users' experience” by L. Tung, 2002, *Human Systems Management*, 21(1), p. 26.

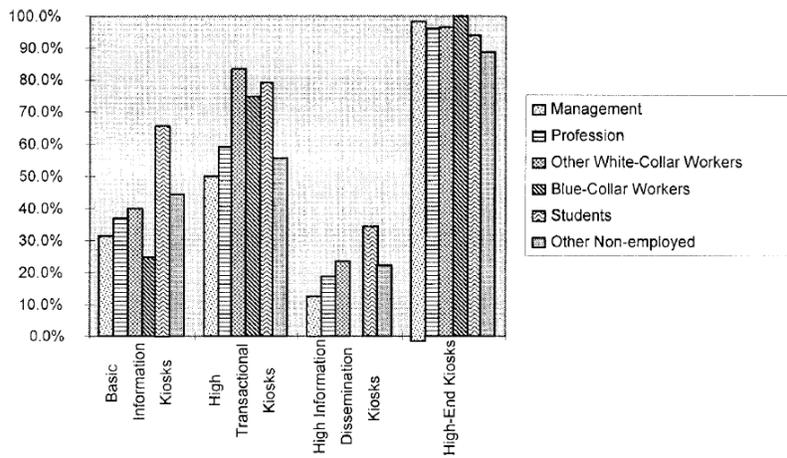


Figure 4. Proportion of users in each occupational group for the four types of kiosk. Adapted from “Information kiosks: Singapore users' experience” by L. Tung, 2002, *Human Systems Management*, 21(1), p. 26.

There were various reasons given for the users not using the other three categories of kiosk (i.e. high information dissemination kiosks, high transactional kiosks, and basic information kiosks). However, based on the findings from the usage of high end kiosks,

we can thus hypothesize that independent of the demographic variables (i.e. age, educational qualification, and occupation) self-service technology can be embraced by Singapore users when it serves and meets their needs.

### **Return On Investment (ROI)**

National Productivity and Continuing Education Council (NPCEC) regards labour productivity as a measure of each worker's output achieved or value added. It is affected by factors such as technology, processes, systems, and training adopted by the company (Enterpriseone, 2010).

Through introducing SST into the hotel processes and enhancing the value added per worker, the ROI is a key guideline when considering the investment. Companies can balance the investment benefits against the associated costs through the measurement of ROI. In each investment, the ROI model of technology purchase has to be customized as the savings will vary by site even within organizations. The following are some examples of ROI models for SST solutions, which demonstrated the value added to the productivity of the hotel operations.

**Kiosk ROI Model.** The kiosk industry is perceived to be in the early stages of understanding ROI. The business objectives would not be achieved if the business case is not crystal-clear and expectations are not clearly laid out to the involved parties. This could be the reason for so many kiosk failures. However, the industry is developing and leading to more success stories. The two prime examples in the adoption of SST within the hospitality industry are the Hilton Hotels test of self-check out kiosks with IBM, and check-in kiosks pilot project in two large Starwood Hotels and Resorts hotels (Zimmerman, 2004). In the following IBM ROI calculator, we will try to look at ROI

from a dollar-and-cent approach. There are many crucial elements, such as getting buy-in from staff and working relationship with business partners, but it will not be considered within the scope of this paper.

The following Figure 5 which is generated from a IBM ROI calculator (Hoffman, n.d.). It presented the possibility of achieving a ROI of 201% through the introduction of kiosks. The productivity is gained by saving labor time in guest processes (i.e. guest self service), reduce manual error by operator which reduce shrinkage and waste as well, and automated active marketing while guest is using the kiosk.

ROI Calculation - 7 Year View, Discounted Yearly									
NPV Savings	Year								
	0	1	2	3	4	5	6	7	
Depreciation	\$ -	Tax Rate	0	0	0	0	0	0	0
Return									
Reduction of Manual Errors	-	200	200	200	200	200	200	200	200
Improved Shrinkage & Waste	-	200	200	200	200	200	200	200	200
Labor Savings	-	144	144	144	144	144	144	144	144
Active Marketing	-	861	861	861	861	861	861	861	861
Yearly Savings	\$ -	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405
Discount Factor	0.0%	1.000	1.080	1.166	1.260	1.360	1.469	1.587	1.714
Discounted Savings		-	1,347	1,273	1,154	1,054	976	895	820
<b>Net Present Value of Savings</b>	<b>\$</b>	<b>7,518</b>							
<i>Non-Discounted Value</i>	\$	9,836							
NPV of Costs									
NPV of Costs	Year								
	0	1	2	3	4	5	6	7	
System Acquisition Cost	\$ -								
Discount Factor	0.0%	1.000	1.080	1.166	1.260	1.360	1.469	1.587	1.714
Discounted Costs	\$ -	-	-	-	-	-	-	-	-
<b>Net Present Value of Investment</b>	<b>\$</b>	<b>2,500</b>							
<i>Non-Discounted Value</i>	\$	-							
ROI Calculation									
Savings NPV	\$	7,518							
Investment NPV	\$	(2,500)							
Return	\$	5,018							
Investment	\$	2,500							
<b>ROI</b>		<b>201%</b>							

Figure 5. . ROI calculator. Adapted from “ROI Calculator” by J. Hoffman, n.d.

**Internet.** Hotel internet reservation sites can expect higher reservation values and increased conversion rates by adopting RIA to facilitate multifaceted shoppers’ decision making. Forrester Research built a simplified Return Of Investment (ROI) model for hotel reservation site which have been upgraded from a multipage HyperText Markup Language (HTML) reservation process to a single-screen RIA version. The model includes costs of development, testing, and maintenance as illustrated in Figure 5. Hotel reservations are done through a wide array of channels like Interactive Voice Response (IVR) system, call center and email. To accurately reflect the increase use of RIA, companies will need to monitor and benchmark all channels (Rogowski, 2007). Nevertheless the high ROI is an attractive investment consideration for the business.

ROI Model For Hotel Reservations Site					
	Starting assumptions	% improvement, low	Low benefit after 1 year	% improvement, high	High benefit after 1 year
<b>Increased sales</b>					
Visitors to booking engine	1,500,000		1,500,000		1,500,000
Conversion rate (completed bookings)	10%	10%	11%	30%	13%
Avg. reservation value	\$97	5%	\$102	15%	\$112
Total reservation value	\$14,550,000		\$16,805,205		\$21,752,250
	<b>Total increased reservation value</b>		<b>\$2,255,250</b>		<b>\$7,202,250</b>
<b>Lower cost of sales</b>					
Call center reservations per year	50,000	-5%	47,500	-20%	40,000
Cost per call center reservation	\$6		\$6		\$6
Cost per online reservation	\$1		\$1.55		\$1.39
Total cost of reservations	\$250,000		\$211,375		\$184,400
	<b>Savings from online bookings</b>		<b>\$38,625</b>		<b>\$65,600</b>
	Gross benefit of RIA		\$2,293,875		\$7,267,850
	Cost of RIA		\$300,000		\$500,000
	Net benefit of RIA		\$1,993,875		\$6,767,850
	<b>Total benefit: ROI</b>		<b>665%</b>		<b>1,354%</b>

Source: Forrester Research, Inc.

Figure 6. ROI Model For Hotel Reservations Site. Adapted from “The Business Case For Rich Internet Applications” by R. Rogowski, 2007. Copyright 2007 by Forrester Research, Inc.

The following Figure 7 is another ROI model which illustrated the effectiveness of diverting the phone call reservations to online reservations. The ROI model is created by PricewaterhouseCoopers for HotelView, the world's largest distribution network for tourism and travel video library. The metrics effectively calculated a member resort property's ROI for online reservations. The resort property is located on a popular Caribbean island and the data is the actual first quarter 2001 result (Dubsky, 2001).

<b>HotelView Quarterly ROI Worksheet</b>			
Property:	<b>A HotelView Caribbean Beach Resort</b>		
	<b>Month</b>	<b>Video Views</b>	<b>"Book It" Conversions</b>
Month 1	January-01	2236	393
Month 2	February-01	1640	314
Month 3	March-01	2069	423
<b>Totals</b>		<b>5945</b>	<b>1130</b>
<b># of Reservations Based on %</b>	<b>10.0%</b>		<b>113</b>
<b>ADR</b>		<b>\$175.00</b>	
<b>Avg. Nights/Stay</b>			<b>3</b>
<b>Quarterly Revenue</b>	<b>\$ 59,325.00</b>		
<b>Quarterly Investment</b>	<b>\$ 1,350.00</b>		
<b>Quarterly Income</b>	<b>\$ 57, 975.00</b>		

Figure 7. Hotelview quarterly ROI worksheet. Adapted from “Hotel Advertising: Augmenting Traditional Advertising Channels with a Targeted, and Measurable, Media-Rich Internet Approach” by M.Dubsky, 2001.

**Phone applications.** Applying speech recognition in phone applications can offer one of the highest proven ROI. Figure 8 demonstrated a high ROI model example from DMG Consulting LLC. This ROI model is typical for many service organizations in the financial insurance, services, travel industries and utilities. The model exhibited the financial benefits of a customer service contact center by introducing speech recognition technology. Speech recognition technology is expected to grow rapidly with the compounded annual growth of 25% to 50%. Speech is the most common form of communication globally, which make speech recognition one of the most preferred forms of self-services. (Fluss, 2003).

***Speech Recognition ROI Model***

<b>Assumptions</b>					
		<b>Baseline</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Total incoming calls		5,000,000	5,000,000	5,250,000	5,512,500
Touch-tone IVR Automation %		25%	25%	25%	25%
Automation % uplift from adding speech		0%	11%	14%	16%
Incremental automated call volume		N/A	562,500	721,875	895,781
Average agent talk time (minutes)	4.0				
Average talk time of speech IVR (minutes)	2.0				
Average talk time of DTMF IVR (minutes)	2.0				
Average hold time for agent calls (minutes)	1.5				
Toll-free cost/minute	\$0.04				
Cost per agent-handled call	\$5.00				
<b>Expenses</b>					
<b>One Time Investments</b>					
DTMF ports (hardware/software)	\$ 48,000				
Speech ports (software)	\$ 76,800				
Development, implementation and integration costs	\$ 300,000				
Total one-time investments	<b>\$ 424,800</b>				
<b>Annual Costs</b>					
			<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Incremental DTMF ports (hardware/software)			\$ -	\$ -	\$ 48,000
Incremental speech ports (software)			\$ -	\$ -	\$ 19,200
Follow-on software development			\$ 150,000	\$ 100,000	\$ -
In-house support (1 FTE)			\$ 100,000	\$ 100,000	\$ 100,000
DTMF port maintenance (18%)			\$ 8,640	\$ 8,640	\$ 17,280
Speech port maintenance (18%)			\$ 13,824	\$ 13,824	\$ 17,280
Total annual costs			<b>\$ 272,464</b>	<b>\$ 222,464</b>	<b>\$ 134,560</b>
<b>Benefits</b>			<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Displace calls from live agents			\$ 2,812,500	\$ 3,609,375	\$ 4,478,906
Reduced call length			\$ 45,000	\$ 57,750	\$ 71,663
Reduced call hold time			\$ 33,750	\$ 43,313	\$ 53,747
Total annual savings			<b>\$ 2,891,250</b>	<b>\$ 3,710,438</b>	<b>\$ 4,604,316</b>
<b>Return on Investment</b>					
Pay-back Period (months)	1.9				
Internal Rate of Return	646%				
Net Present Value (3 years @12%)	\$7,875,477				

*Figure 8.* Speech recognition ROI model. Adapted from “The intimate connection between customer satisfaction and ROI” by D. Fluss, 2003. Copyright 2003 Nuance Communications, Inc.

## **Conclusion**

Studies that are done in Singapore on the SST have shown the technology is receptive in the country, so it is worthwhile for hotel to do a feasibility study for the SST adoption. The productivity drive for Singapore and the rapid advancement of SST solutions are converging very timely. SST could bring in a higher respectable ROI to the hotels and increases the value add in the workforce. Furthermore, hotels can leverage on the government tax incentive announced recently to optimize their investment. Beside the financial benefits, SST is also a powerful tool in meeting the growing demand by customers for more control of their travel needs and preferences. With the proliferation of multichannel technology development, competitive room price is no longer the only factor in attracting the customer. Thus, it is important for hotels to keep pace with the trend in a globalized and technology- driven world, and embrace SST for productivity growth.

## **Recommendations**

In conjunction with the Singapore government effort to alleviate the country’s tourism and economy, there are promising potentials for SST in the country. Singapore Tourism Board vision for year 2015 is to make Singapore a powerful tourism hub and a destination of choice for businesses and talents from across the world. The targets set is to have 17 million of visitors arrivals and tourism receipts of S\$30 billion, which is more

than double growth compare to year 2004. The three areas that STB will be focusing are (Singapore Tourism Board, 2010)

- A leading convention and exhibition city in Asia
- A leading Asian leisure destination by providing an enriching experience that is uniquely Singapore.
- A services centre of Asia where visitors come to enjoy high-end quality services such as healthcare and education services.

In order for Singapore to compete successfully in the global tourism market and reach her aspired targets, Singapore needs to provide premium and personalized experience to every visitor. The current efforts of building new attractions (e.g. integrated resorts), rejuvenating Orchard Road (a famous shopping strip in Singapore), and transforming the service level in hospitality, all have set Singapore to be a more exciting and attractive place to visit. Furthermore, the Infocomm Development Authority's (IDA) Intelligent Nation 2015 (iN2015) masterplan for Tourism, Hospitality and Retail (THR) is seeking to leverage on infocomm to bring high touch experience and quality services for Singapore visitors. The goal is use infocomm to transform the THR section and differentiate Singapore as a leading travel destination. The infocomm will bring superior experience to visitor and enhanced growth and competitiveness of the THR sector. The strategies are (Leong, 2006)

- Create seamless and personalized services through the programs: (a) Digital Conceive and (b) Enabling Speedy Registration (EASE).
- Improve industry efficiency through programs: (a) Technology Adoption Program (TAP) and (b) Supply Chain Integration.

- Extend to new areas through infocomm-themed attractions.



Figure 9. iN2015 THR outcomes, strategies and programs. Adapted from “Enhancing service, enriching experience, differentiating Singapore. Report by the iN2015 tourism, hospitality and retail sub-committee” by Leong, W.L., 2006. Copyright 2006 Info-communications Development Authority of Singapore.

These infocomm programs embrace the SST from many aspects. Digital Concierge is a SST service that allow visitor to access tourism-related content through his mobile device, internet, kiosk or interactive television. Six companies have been selected by IDA in April 2010 through a Call-for-Collaboration to invest \$10 million to develop a set of common mobile shared services for Digital Concierge. These shared services provide a platform for hotels to leverage on the Digital Concierge technology. Another form of SST

solution which is being adopted is EASE, a technology which requires only one point of registration, and the information automatically flows to service providers along the value chain. Visitors can have speedy entry into Singapore, check-in at hotels and registration at conference venues with minimum human intervention. It minimizes the routine and mundane tasks, and permits the service staff to focus on enhancing visitor experience (Tay, 2010).

Despite the advanced development of infocomm in Singapore, a 2005 survey of the Singapore tourism industry revealed that the adoption of infocomm in the THR sector is relatively low. The reasons could be the affordability of such technology and the lack of the application knowledge (Leong, 2006). IDA iN2015 for THR provides an excellent platform now for hotels to tap on the technology, expertise and funding to create a competitive edge for Singapore tourism. It is imperative for hotels to start planning the adoption of SST and compliment with the iN2015 initiatives, or else they will lag behind the competition. The challenge for hotels would be to select the right solutions which can meet the property's financial objectives and exceed the customers' expectations.

My recommendations would include the following areas :

- Engage IDA to understand the development of iN2015 THR plan, so that hotels can select SST solutions that can integrate with the share services developed for the Digital Concierge and EASE programs.
- More Market research to be conducted specifically on the tourists' acceptance and readiness of new technology for the hotel targeted segments. The research can leverage on the TAM and TRI studies. The findings will serve as a good input to the management so that sound decisions can be made in the technology selection.

- ROI model is a powerful tool for the justification on technology investment. However, the savings can vary in different properties even within the same organization. It is thus important for the property itself to develop their own key ROI guideline for their investment. The ROI model has to be customized according to the technology purchased. The company or property can balance the associated costs against the investment benefits such as cost saving and customer satisfaction.
- Hotels can leverage on the TAP funding to optimize their SST investment, such as Tourism Technology Fund (TTF, 2010) and Productivity and Innovation Credit.

While Singapore is moving towards an Intelligent Nation of 2015, embracing the SST for productivity growth will enable Singapore hotels to compete in the transforming THR, enabling better work practices and accessing better opportunities in the global tourism market. The trend in innovation technology in our present world will mean the utilizing of more technology such as SST in every services-related arena of our lifestyle. If the hotel industry is not able to watch the evolution of such uptrends in the global market and utilizing it to maximize their productivity, it will mean they will lack in the services they could provide for their customers. Businesses such as online travel services and other tourism industry like the airports, which have moved towards using SST, have seen a high return on their productivity growth and cost-savings to date. Singapore hotel businesses thus need to seriously consider adopting the SST as one of the means towards their productivity growth. With the Singapore government favorable incentives and support in this area, and the current efficient infrastructure already in place, there is indeed no reason to delay in adopting SST to gain higher competitive measures. For the customer, it will be an added value that will just keep them coming back.

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