SUSTAINABLE SERVICE QUALITY OF WATER AND SEWERAGE COMPANIES

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ABSTRACT

Although Malaysia is blessed with abundant water resources, sustainability issues on water supply and sewerage services can affect our future if they are not properly managed. Water and sewerage issues such as non revenue water (NRW), water disruption and sewage overflow have impacted the sustainability of companies' businesses and that their quality of service may be questionable. Therefore, it is crucial to identify how far a company is able to meet customer expectations as sustainable service quality (SUSSERV) by water and sewerage companies will give a positive impact on government machinery especially from the Ministry of Energy, Green Technology and Water (KeTTHA) and National Water Services Commission (SPAN). Past studies noted that previous efforts made were focusing either on water quality and water treatment or process quality based (technical issues). Thus, this research attempted to fill in the gap between service, product and process quality. The aim of this study was to measure the quality level of sustainable services for water supply and sewerage companies in Malaysia. SUSSERV model with six independent variables namely tangibles, reliability, responsiveness, assurance, empathy with an additional dimension, sustainability, was developed by modifying the SERVQUAL instrument. This research employed a survey utilizing a quota sampling technique through 500 questionnaires of which 250 questionnaires were distributed to the customers of Syarikat Bekalan Air Selangor (SYABAS) while 250 questionnaires were distributed to Indah Water Konsortium Sdn. Bhd. (IWK) customers in the state of Selangor and Federal Territories comprising Putrajaya and Kuala Lumpur. The results show that SYABAS' perception on the service quality for all SUSSERV dimensions were much lower than IWK. It was also found that there were no significant differences between the means of perceptions with the exception of eight out of 31 variables and three out of 31 variables in the category of Services (Water and Sewerage) and in Living Status (Type of Houses) respectively. The importance-performance analysis (IPA) indicates that the Assurance and Responsiveness dimensions were at high levels but Sustainability dimension was low for both performance (perceptions) and importance (expectations). The advantage of using the IPA is to assist companies to improve their services. The IPA indicates that both SYABAS and IWK services are rated as very reliable by the customers despite the dissatisfaction of majority of the customers with the services rendered by both companies investigated in the study. The main contribution of this study is the successful utilization of a modified SERVQUAL instrument that can measure sustainable service quality. It is recommended that future research should focus on extending the use of the instrument to other states to further validate and test the instrument.

ABSTRAK

Walaupun Malaysia memperoleh banyak sumber air, isu kelestarian bekalan air dan perkhidmatan pembetungan boleh menjejaskan masa depan kita sekiranya tidak diuruskan dengan betul. Isu air dan pembetungan seperti air tidak berhasil, gangguan bekalan air dan limpahan kumbahan memberi kesan kepada kelestarian perniagaan syarikat dan kualiti perkhidmatan mereka mungkin dipersoalkan. Oleh itu, adalah penting untuk mengenal pasti sejauh mana sebuah syarikat dapat memenuhi kehendak pelanggan sebagai kelestarian kualiti perkhidmatan (SUSSERV) oleh syarikat air dan pembetungan akan memberi impak yang positif kepada jentera kerajaan terutamanya Kementerian Tenaga, Teknologi Hijau dan Air (KeTTHA) dan Suruhanjaya Perkhidmatan Air Negara (SPAN). Kajian terdahulu menunjukkan bahawa usaha yang dilakukan sebelum ini memberi tumpuan sama ada ke atas kualiti air dan rawatan air atau proses yang berasaskan kualiti (masalah teknikal). Oleh itu, kajian ini merupakan usaha untuk mengisi jurang antara kualiti perkhidmatan, produk dan proses. Matlamat kajian ini adalah untuk mengukur tahap kualiti perkhidmatan lestari bagi syarikat bekalan air dan syarikat pembetungan di Malaysia. Model SUSSERV dengan enam pemboleh ubah bebas iaitu kebenaran, kebolehpercayaan, responsif, jaminan, empati dengan dimensi tambahan, kemampanan, telah dibangunkan dengan mengubah suai instrumen SERVQUAL. Kajian ini menggunakan kaji selidik melalui teknik persampelan kuota dengan 500 soal selidik yang mana 250 soal selidik diedarkan kepada para pelanggan Syarikat Bekalan Air Selangor (SYABAS) manakala 250 soal selidik kepada Indah Water Konsortium Sdn. Bhd. (IWK) di negeri Selangor dan Wilayah Persekutuan yang terdiri daripada Putrajaya dan Kuala Lumpur. Dapatan menunjukkan bahawa persepsi SYABAS untuk kualiti perkhidmatan semua dimensi SUSSERV jauh lebih rendah daripada IWK. Ianya juga menunjukkan bahawa tiada perbezaan ketara antara persepsi dengan pengecualian lapan daripada 31 pembolehubah dan tiga daripada 31 pembolehubah, masing-masing dalam kategori Perkhidmatan (Air dan Pembentungan) dan dalam Status Kehidupan (Jenis Rumah). Analisis prestasi kepentingan (IPA) menunjukkan bahawa dimensi Jaminan dan Responsif berada pada tahap yang tinggi tetapi dimensi Kelestarian adalah rendah untuk kedua-dua prestasi (persepsi) dan kepentingan (kehendak). Kelebihan menggunakan IPA adalah untuk membantu syarikat meningkatkan perkhidmatan mereka. IPA menunjukkan bahawa kedua-dua perkhidmatan SYABAS dan IWK dinilai sebagai sangat dipercayai oleh para pelanggan walaupun majoriti pelanggan tidak berpuashati terhadap perkhidmatan yang diberikan oleh kedua-dua syarikat yang dikenal pasti dalam kajian ini. Sumbangan utama kajian ini adalah kejayaan mengguna pakai instrumen SERVQUAL yang diubahsuai yang dapat mengukur tahap kualiti perkhidmatan lestari. Adalah dicadangkan agar penyelidikan masa hadapan harus memberi tumpuan bagi memanjangkan penggunaan instrumen di negeri lain untuk terus mengesahkan dan menguji instrumen tersebut.

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LIST OF ABBREVIATIONS

Ds	-	Dimensions
EE	-	Emotional Experience
F.T.	-	Federal Territory
JBA	-	Water Supply Department or *Jabatan Bekalan Air*
JPP	-	Sewerage Services Department or *Jabatan Perkhidmatan Pembetungan*
IPA	-	Importance performance analysis
KeTTHA	-	Ministry of Energy, Green Technology & Water
KMO	-	Kaiser-Meyer-Olkin
IWK	-	*Indah Water Konsortium Sdn. Bhd.*
MWIG	-	Malaysia Water Industry Guide
MOHE	-	Ministry of Higher Education Malaysia
OFWAT	-	Office of Water Services United Kingdom
PAAB	-	*Pengurusan Aset Air Berhad*
PWD	-	Public Works Department or *Jabatan Kerja Raya*
SC	-	Sewerage Company
SPAN	-	*Suruhanjaya Perkhidmatan Air Negara*
SUSSERV	-	Sustainable Service Quality
SYABAS	-	*Syarikat Bekalan Air Selangor*
UTM	-	*Universiti Teknologi Malaysia*
UK	-	United Kingdom
US	-	User Satisfaction
WAMCO	-	Water Asset Management Company
WC	-	Water Company
WP	-	*Wilayah Persekutuan*

LIST OF SYMBOLS

χ^2	-	Chi-Square
df	-	Degree of freedom

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CHAPTER 1

INTRODUCTION

1.1 Problem Background

The history of Malaysian water services began in the early 19th century. Services and water supply system were first implemented in Penang in early 1804, whereas in Sarawak, its capital city Kuching began supplying water in 1887. In general, the water supply system in Malaysia started to be implemented systematically with the development of modern gravity filtration plants since the 1930's (KeTTHA Annual Report 1996/1997). The water supply service industry after that began to grow rapidly, being developed and operated by the Public Works Department (PWD) and later transferred to the Water Supply Department (Jabatan Bekalan Air).

The water and sewerage industry services in Malaysia are more focussed in providing infra-structure facilities but not much effort on improving the quality of services. The quality of services is related to how customers perceive the actual service performance against what customers expect from the offered services. In addition, sustainability is an important to be included in determining service quality to ensure water industry companies remain relevant to their customers.

Suruhanjaya Perkhidmatan Air Negara (SPAN) was formed under the 654 Act or SPAN Act 2006 as a regulatory body for water and sewerage industry in Peninsular Malaysia and Federal Territories (F.T.) of Putrajaya and Labuan covering all related stakeholders.

SPAN is assisted by Pengurusan Aset Air Berhad (PAAB) since May 2006 to restructure the nation's water industry towards achieving the Government's vision for efficient and quality water services using the Asset-Light Model. Under this model, PAAB will finance water infrastructure and lease to water companies whereby SPAN will ensure lease charges are fair and reasonable, as a financial incentive (Hope and Rouse, 2013). New or replacement of water assets must be approved by SPAN and tied to key performance indexes (KPI's) of water companies.

It is necessary to know whether service quality of the companies are being delivered as expected particularly in the aspect of water quality due to its significant impact on sustainable development (Habiba et.al., 2014) however, challenging service requirements can limit efforts to uphold sustainability (Bretzke, 2014). At the same time, the socio-political goals and economic goals must be functioning in parallel to attain sustainable water and sewerage services (Kheong, 2008).

In Malaysia, the overall water services non-revenue water (NRW) is high at the average of 35.2% and there is a high number of inquiries and complaints about water supply and sewerage services in 2016 (The Malaysian Water Association, 2017) as shown in Table 1.1. There were few major issues on water supply services such as pipe burst, pipe leak or NRW, water quality and water supply disruption (rationing). The issues on sewerage services involved billing and sewer network or sewage overflow. These water and sewerage issues resulted to the companies' business sustainability and its service quality is questionable. Furthermore, each state has only one main operator that provides water supply services, whereby for sewerage services, Indah Water Konsortium Sdn. Bhd. (IWK) is providing about 77% sewerage services in Malaysia with the exclusion of Kelantan, Sabah, Sarawak and two local authorities in Johor Bahru and Pasir Gudang.

It is crucial to understand consumer satisfaction and their loyalty whether it is because of product quality or service quality but most importantly is how sustainable is the water and sewerage companies' service quality. Sustainable service quality (SUSSERV) by water and sewerage companies will give a positive impact on government machinery especially SPAN. For a company owned by the government,

the issue of monopoly can influence the perceptions of the customers towards service quality and considered not essential (Jannadi *et al.*, 2000).

Table 1.1: The number of complaints for water supply and sewerage services and total revenue vs total expenditure in year 2016

States / Water Supply Issues	Pipe burst/ Breakages/ Leak	Water Quality	Water Pressure	Water Supply Interruption	Billing & Meter	Others
Selangor/ F.T. Kuala Lumpur	123,930	2,894	33,126	259,537	62,517	16,039
F.T. Labuan	564	19	28	803	70	0
States / Sewerage Services Issues	**Billing**	**Desludging Services**	**Sewage Treatment Plant**	**Sewer Network**	**Others**	
Selangor	216,593	8,304	5,400	10,653	8,321	
F.T. Kuala Lumpur	74,975	1,837	369	2,386	2,141	
F.T. Labuan	1,793	606	4	95	75	
F.T. Putrajaya	1,010	0	1	33	48	
States / Water Supply Company	**Total Revenue (RM'000)**		**Total Operating Cost (RM'000)**		**Net Operating Surplus/ (Deficit)**	
Selangor/ F.T. Kuala Lumpur/ F.T. Putrajaya	2,040,494		2,656,842		(616,348)	
F.T. Labuan	30,212		29,262		950	
States / Sewerage Service Company	**Total Revenue (RM'000)**		**Total Operating Cost (RM'000)**		**Net Operating Surplus/ (Deficit)**	
Selangor/ F.T. Kuala Lumpur/ F.T. Putrajaya	386,184		554,579		(168,395)	
F.T. Labuan	1,926		5,086		(3,160)	

1.2 Problem Statement

Companies that deliver their product and services have identified that sustainability will be the main factor in determining whether a company continues to be competitive whilst their service quality will be very critical to ensure that they will remain relevant to their customers. Sustainability has become a good strategy for manufacturers to evaluate and improve their performances from both economic and environmental perspectives (Li *et al.*, 2017). However, identifying sustainability

factors, in terms of economic, social and environmental benefits, is a difficult task and a complex process especially in the water resource and water supply projects because the supply must meet consumers demand (Aksorn and Charoenngam, 2015).

The water supply services were running at a loss and high NRW coupled with capital shortage and problems in cost recovery (Kun *et al.*, 2007). The water companies have received an assurance will be placed on a sustainable ground despite the restructuring exercise under the Water Services Industry Act 2006 (WSIA). Under this new regime, the water assets will be transferred to PAAB. However, SPAN will still be required to look into other issues affecting the low performance of water companies and regulatory measures to ensure successful transformation of the water sector into a sustainable sector (The Malaysian Insider, 18 February 2014). To ensure sustainable water industry, transformation of water supply services for Selangor, F.T. Kuala Lumpur and Putrajaya will be implemented by Air Selangor Sdn. Bhd. (The Sun Daily, 12 September 2014).

Although the sustainable or sustainability concept has been widely used, it is not easy to understand and adapt to real business (Filho, 2000). This research will be able to seek clarification on why a new sustainable service quality (SUSSERV) instrument need to be developed for measuring service quality by adding the sustainability dimension and modifying the existing SERVQUAL instrument.

The research problems identified are:

i. What are the perceived sustainable service quality and sustainability dimensions for the water and sewerage industry?

ii. How can one measure sustainable service quality of the water and sewerage companies using a suitable instrument?

iii. What are the differences that exist between the water and sewerage companies towards perceived service quality?

iv. What are the most important performance for all dimensions of sustainable service quality?

1.3 Research Objectives

The research has focussed on the following objectives:

i. To determine the perceived sustainable service quality and sustainability of the water and sewerage companies.

ii. To develop an instrument to measure sustainable service quality in Malaysia's water and sewerage services.

iii. To determine differences in perceived service quality between water and sewerage companies.

iv. To identify the most important performance for all dimensions of sustainable service quality.

1.4 Scope of Research

In this research, respondents were the customers of water and sewerage companies in peninsular Malaysia. There are six (6) independent variables on sustainable service quality namely tangibles, reliability, responsiveness, assurance, empathy, and sustainability. The dependent variable is the result or objectives to be obtained from the response and feedback caused by independent variables which were also the caused factors, stimulate factors, causes and forecast factor on the carried-out research (Cooper and Schindler, 2001).

For the purpose of this research, four (4) demographic factors were identified namely race, location, type of houses and type of business (water or sewerage) because of the significant contingency effects on the relationship between dependent and independent variables (Davis and Cosenza, 2000).

The respondents of this study were not the staff of service companies but the customers or clients of the service providers because generally customers or purchasers themselves are able to assess the quality of service because it involved the interaction between the seller and the buyer (Bell *et al.*, 1993 and Naik *et al.*, 2010). Furthermore, the two main service providers, Syarikat Bekalan Air Selangor (SYABAS) is a water supply company belonging to the state government whereas IWK is a sewerage company owned to the federal government. Therefore, the question on how sustainable their service quality is still not available and require some answers especially for public interest.

The scope of the research are as follows;

i. Pilot Research: SYABAS and IWK clients/account holders in the area of Putrajaya and Shah Alam.

ii. Specific location: All districts in Selangor and Federal Territory (F.T.) Kuala Lumpur and F.T. Putrajaya.

iii. Primary data: Data from survey questionnaires from customers or clients of SYABAS and IWK in all districts in Selangor and F.T. Kuala Lumpur and F.T. Putrajaya.

1.5 Significance of Research

This research is of national interest and important because the water service industry is still new in Malaysia. There is very little research on sustainable approaches to provide safe water and sanitation especially for big city (Kun *et al.*,

2007) such as Kuala Lumpur therefore, a study on sustainable service quality of water and sewerage companies is a good knowledge contribution. All water companies and sewerage companies should be able to deliver quality services to their customers from the aspects of sustainability namely economic, environment and social that will have a positive impact on government machinery relating to water services, especially through KeTTHA and SPAN.

This research contributes to the water industry, technology management and body of knowledge as follows:

i. Knowledge to the policy-makers or government, regulator or SPAN, practitioners or water companies, developer, and manufacturer of the water and sewerage industry.

ii. Advanced knowledge, literature and reference for SPAN to determine the sustainable service quality of water companies.

iii. New instrument to measure sustainable service quality for the water and sewerage industry.

1.6 Conceptual Definitions

Gronroos (1978, 1982, 1984) and Parasuraman *et al.* (1985, 1988), are well known marketing gurus who contributed significant ideas and theory on service quality which is still applicable until today such as Service Quality Model or Nordic Model and SERVQUAL model. The primary definitions used in this study involved the SERVQUAL model with ten dimensions (10Ds) of service quality of which later were collapsed into five dimensions (5Ds) as shown in Figure 1.1 (Salleh and Yusof, 2016). These five (5) dimensions of the model with a survey questionnaire that measures customer expectations of service quality and their perceptions of the service they received. When customer expectations are greater than their perceptions of received delivery, service quality is interpreted low, and vice versa.

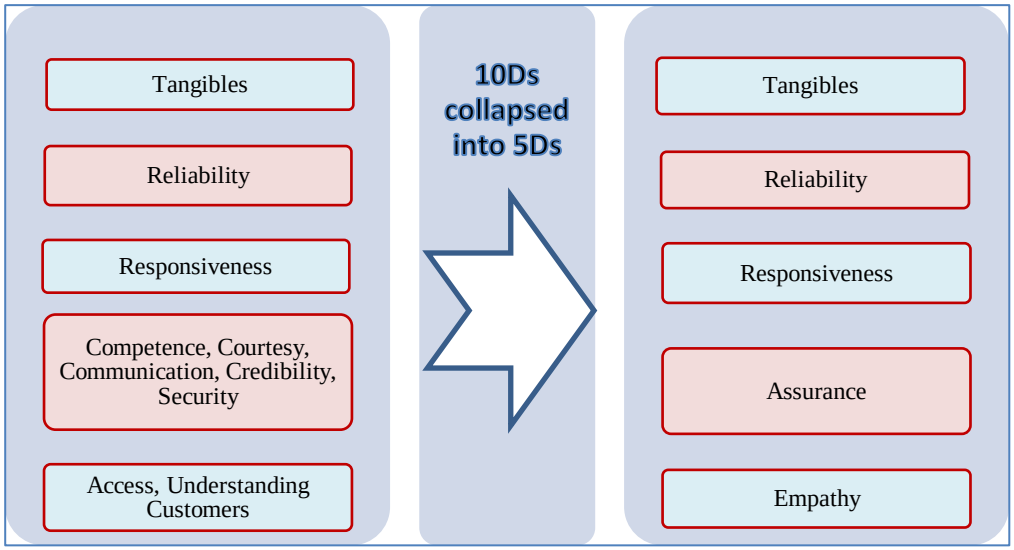

Figure 1.1: SERVQUAL factors or dimensions

The concept of sustainability in service quality was indirectly discussed by Gronroos (1988a) with the Five (5) Rules of Services to an organisation in the service economy to be more competitive as shown in Figure 1.2 (Salleh and Yusof, 2016). It is believed that, the Five Rules of Services elements are comparable with Sustainable Factors.

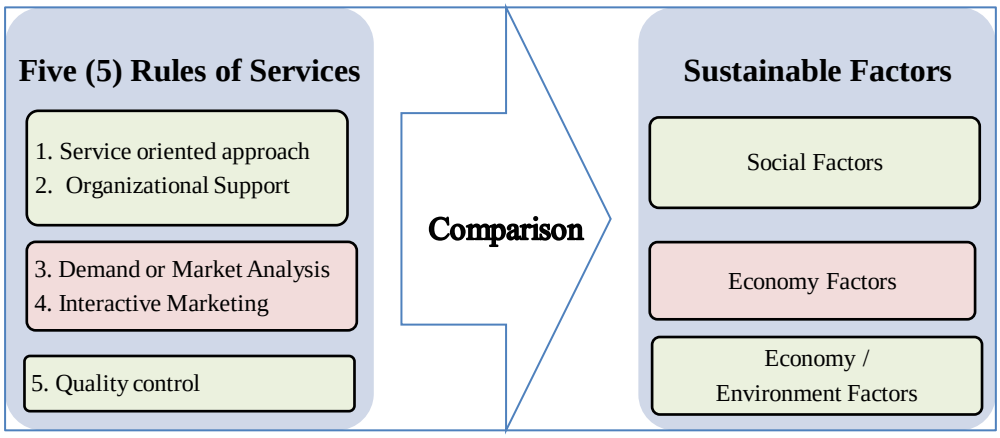

Figure 1.2: Five rules of service and comparable with sustainable factors

Enquist *et al.* (2007) examined the relationship between service quality and sustainability using their own model called Values-Based Service Quality for Sustainable Service Business. The model proposed four (4) dimensions to values-based service quality: (1) "technical"; (2) "functional"; (3) "experiential"; and (4) "human resources and corporate climate". The model also adopted five (5) dimensions

to sustainability namely (1) an “ethical dimension”; (2) a “social dimension”; (3) a “nature-philosophic dimension”; (4) an “economic dimension”; and (5) a “legal dimension”.

The concept of sustainability through a review of supply chain management literature by Carter and Rogers (2008) have suggested a sustainable supply chain management with three dimensions namely social, environmental, and economic goals. The highest level of economic performance will occur at the intersection of environmental, social, and economic performance. To achieve sustainability better, the company maximize performance of all three dimensions at the same time but not one or two only (Carter and Rogers, 2008) as shown in Figure 1.3.

The model has been used and then extended by Sloan (2010) with detailed variables and indicators for supply chain sustainability framework.

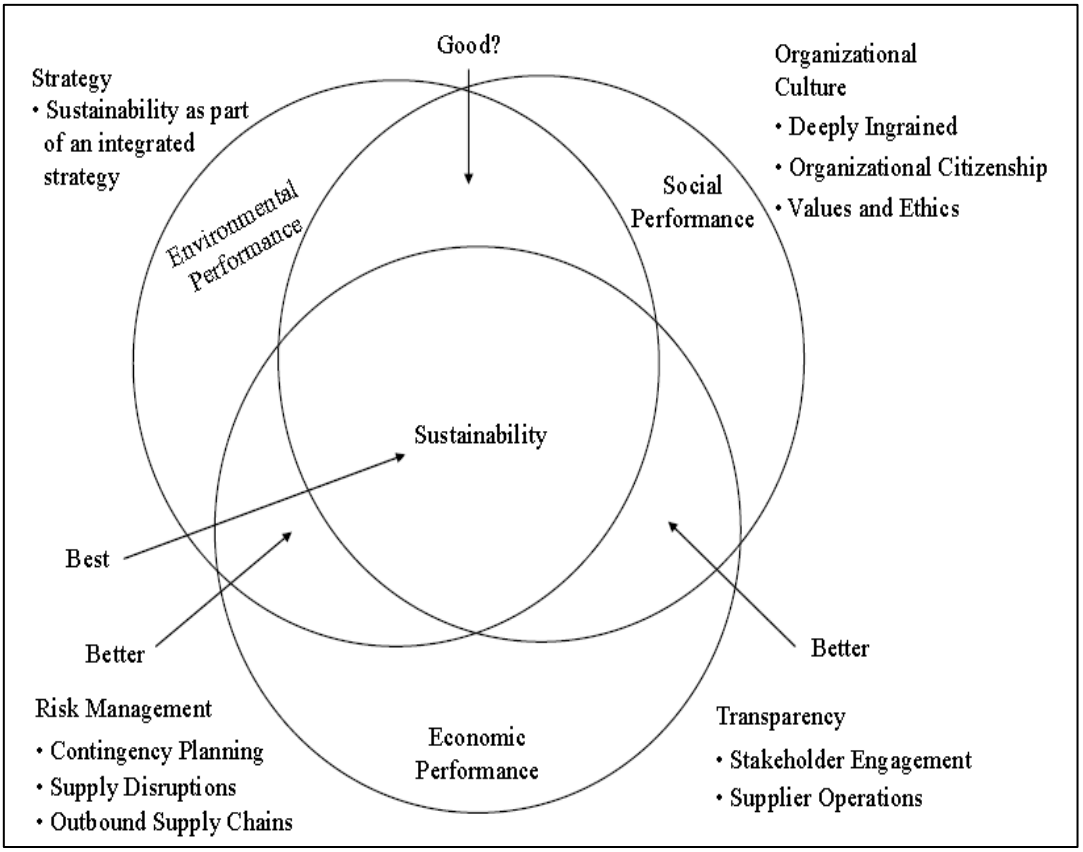

Figure 1.3: Sustainable supply chain management model

1.7 Operational Concept

There are six independent variables on service quality comprised of five independent variables (Parasuraman *et al.,* 1988) except for sustainability as an independent variable with the economy, environment, and social factors (Carter and Rogers, 2008). There was a positive relationship between business growth and profitability and important to this research as it is believed to affect the economy factor. This is due to quality and profitability showing positive correlation when the Profit Impact of Marketing Strategies (PIMS) measure of relative quality is used (Garvin, 1988).

The modified SERVQUAL model developed is in the context of water and sewerage services provided by the service provider companies. It empirically describes how consumers perceive service quality services offered by these companies.

1.8 Structure of the Thesis

This thesis has five chapters as follows:

Chapter 1 explains the background of the problem and the problem statement underlying the gap to be explored in this study. Furthermore, the objectives of the study and the scope of the study are detailed and are the basis of the research methodology to be implemented in this study as explained in chapter 3. The significance of the study and the conceptual definition and operational concept are describe in this chapter.

Chapter 2 provides a detail literature review on the key study variables service quality and sustainability in term of definition and category. The chapter also explained the relationship between quality and performance. The history of service quality especially in Malaysia and review of SERVQUAL and modified SERVQUAL model are also explains in this chapter. The chapter also discusses other studies that used SERVQUAL, other modified SERVQUAL, and adaptations of the SERVQUAL

model. The chapter explains the history of Malaysian water supply and sewerage services, and the role of SPAN and the importance of sustainable water service industry. The chapter also presents the conceptual framework depicting the independent variables, dependent variable, and the research hypotheses based on the literature review.

Chapter 3 presents the research methodology implemented in this study and provides an explanation of the underlying research design and research framework. The chapter explains the data collection methods including the target population, the sampling procedure employed and research instrument or questionnaire. The chapter also explains the statistical data analysis method including reliability and validity test of the instrument. Finally, brief explanation on the pilot study was described.

Chapter 4 provides a detailed data preparation and screening especially on outliers. The chapter discuss the demographic analysis together with reliability and validity test. The comprehensive statistical analysis includes descriptive analysis, importance-performance analysis and inferential statistical analysis such as exploratory factor analysis, confirmatory factor analysis and ANOVA for hypotheses testing and use of regression models for prediction of the influence of the independent variables on the dependent variable. Finally, a discussion on all SUSSERV dimensions for both combined responses (N=500) and separate responses (by services, N=250 each) of water and sewerage services.

Chapter 5 presents a summary of the findings, contribution and significance of the present study. Finally, the chapter also explains the research limitations and future directions of research.

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