

**LEVEL OF SERVICE QUALITY OF SME LABORATORY SERVICES ON
CUSTOMER SATISFACTION**

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ABSTRAK

Perkhidmatan makmal adalah bidang perkhidmatan yang profesional di mana ia melibatkan pengetahuan sains yang luas dan melibati alat uji yang canggih untuk memenuhi kepuasan pelanggan. Ia memainkan peranan sebagai penapis untuk memastikan hanya produk yang berkualiti sahaja dipasarkan atau dieksport.

Objektif kajian ini adalah untuk mengkaji hubungan antara kualiti perkhidmatan makmal dengan kepuasan pengguna moderator oleh ekuiti jenama. Kebanyakan perkhidmatan makmal di Malaysia adalah daripada syarikat yang kecil and size sederhana. Ketidakpuashatian pelanggan terhadap perkhidmatan diperolehi adalah disebabkan oleh kebolehpercayaan terhadap keputusan analisa, maklum balas, teknologi peralatan, menepati masa, komunikasi, sikap dan tingkah-laku pekerja. Pengeksport menghadapi kerugian kewangan yang besar disebabkan bahan yang dieksport tidak memenuhi spesifikasi yang ditetapkan oleh negara pengimport.

Kajian ini bukan sahaja penting digunakan untuk penambahbaikan kualiti perkhidmatan makmal, tetapi juga meningkatkan tahap keyakinan industri dan juga meningkatkan imej Malaysia sebagai pusat berasaskan pengetahuan di peringkat antarabangsa. Satu kajian kuantitatif dengan penggunaan struktur soalan selidik yang diadaptasi daripada kajian sebelum ini menggunakan persampelan bertujuan untuk diedarkan kepada 150 pekerja yang bekerja dikilangdan juga melalui pengedaran langsung. *Statistical Package for the Social Sciences (SPSS)* dan *Partial Least Square (PLS)* telah digunakan untuk menganalisis data. Didapati laporan ujian dan sikap dan tingkahlaku pekerja di makmal mempunyai hubungan kesan positif dengan kepuasan pengguna. Teknologi adalah kesan negative terhadap kepuasan pelanggan. Di samping itu, kesan jenama ekuiti sebagai

moderator adalah kesan positive terhadap laporan ujian dan kepuasan pengguna. Jenama kesetiaan sebagai moderator adalah tiada kesan terhadap quality perkhidmatan dan kepuasan pengguna.

Perolehan daripada kajian ini boleh digunakan untuk merangka strategi yang lebih baik untuk makmal tempatan dan memperoleh kepuasan perkhidmatanmakmal yang lebih tinggi dan membawa kepada prestasi kepuasan pelanggan yang lebih besar akhirnya.

ABSTRACT

Laboratories service is part of professional services under legal services which involves knowledge based and high end equipment is a necessity to fulfill customer requirement. The lab service market is niche and it plays a crucial role to pre-qualify the product as final check point for importer and exporter before shipment.

The objective of this study is to examine the relationship between service quality and customer satisfaction moderated by brand equity. The reason of the dissatisfaction by the customer was due to inconsistency of the service quality in term of result reliability, staff responsiveness, instrument technology, informative of test report, turnaround time, communication and staff attitude and behavior. Local exporters are facing billion dollars in financial lost and reputation damage due to product recalls and banned by importers' countries. It is due to fail to fulfil importers country's regulation.

Increase the laboratory service quality is important for lab service provider as a continuous improvement-solution plan and building up the industry confidence. Besides that, it can improve Malaysia images as knowledge based hub internationally and also attract more customers from oversea to send in the samples to Malaysia for analysis. A quantitative study, using self-administered structured questionnaire adapted from previous studies, were issued using purposive sampling via direct distribution to 150 employees who are working in manufacturing via email. Statistical Package for the Social Sciences (SPSS) and Partial Least Square (PLS) were used to analyse the data. Test report and staff attitude and behavior have positive significant relationship with customer

satisfaction; which technology has negative significant relationship with customer satisfaction. Brand awareness has positive significant moderator effects on test report towards customer satisfaction. Brand loyalty has no significant moderator effects on service quality towards customer satisfaction.

The research findings can be used to formulate better strategy for the SME laboratory for continuous improvement in service quality towards customer satisfaction.

Chapter 1

1.1 Introduction

This chapter covers the background of study, research problems, research objectives, research questions, significance of the study, definition of variables and a brief summary of the chapter in this research proposal.

1.2 Background of the Study

Malaysian economy has passed through a considerable transformation from agricultural based to industry-based and now shifting to knowledge-based economy to achieve the Vision 2020 as a high income country (Ong *et al.*, 2010).

Laboratory service is part of professional services under regulatory services which involving strong science based knowledge and equipped with high end instrument to fulfill customer requirement. The services coverage is very wide, ranging from medical diseases diagnosis, instrument calibration, mechanical reliability testing, chemical composition testing and microbiological testing. (Department of Standard Malaysia, 2014). It plays an important role to screen and diagnose the quality of the product before launching to market. The market is niche and play a crucial role to pre-qualify the product as final check point for importer and exporter.

Commercial Laboratory service become more and more important in regulatory compliance, food safety, environmental safety, health safety, and product quality control, functional and reliability test. Data generated by validated methods from a laboratory become a key factor in ensuring the said goods are really performing as claimed. (Chen, *et.al*, 2014)

Based on Department of Standard Malaysia, the fields of testing and accreditation programmes are group under 3 categorises:

Table 1.1: Fields of Testing Categorized by DSM

Field of Testing	Field of Calibration	Field of Medical Testing
Chemical	Heat and Temperature	Cytopathology
Biological	Electrical	Histopathology
Electrical	Dimensional	Chemical Pathology
Thermal	Acoustic and vibration	Haematology
Mechanical/Physical	Radioactivity	Medical microbiology
Non-destructive	Optical and Photometric	Medical microbiology (Virology)
Radioactivity	Mass and Mass Related Quantities (density, pressure, force, torque, hardness, viscosity, flow & volume)	Cytogenetics
Bioefficacy of Household Pesticides		
Toxicity		
Veterinary		
Genetically modified organism (GMO)		
Electromagnetic Compatibility (EMC)		
Nucleic Acid		
Forensic Science		
Information Technology		
Security Testing		
Software Testing		

Souce : *Skim Akreditasi Makmal Malaysia (SAMM) JSM Portal (www.jsm.gov.my)*

Based on Malaysia Food Act, 281, the Certificate of Approval (COA) issued by an approved laboratory shall be, in any legal proceedings under this Act, be admissible in evidence and shall be *prima facie* of the facts so certified. So an analysis report is an important documentation to certify a product is free of certain tested toxic chemicals/ biological substances. (Law of Malaysia, Act 281, Food Act 1983, incorporating all amendments up to 1 January 2006, Percetakan National Malaysia Berhad).

In Economic growth perspective, laboratory services are bringing income to the country, which plays an important contribution for a developing country like Malaysia. Each analysis services are charging with a minimal cost. And each transaction cost is contributing to government via sales and service tax (GST) and company taxation.

Testing laboratories are in highly demand in the private sectors and becoming an important competitive component for exporter firms, especially when their targeted markets are regulated with Product Related Environmental Regulations (PRERs). The more enforcement for the PRERs, the more testing requirements on raw materials or during process control or final products or emission to the environment. It will directly increase the employment and be the source of revenue to the national economy (Chen, *et.al*, 2014).

Up to 31st August 2015, there are 732 laboratories were accredited by Standards Malaysia, and 606 laboratories are actively playing their roles in the market. From the statistic, 473 over 567 units are active testing laboratories, 79 of 108 units are active calibration laboratories, 15 of 17 units are Testing and Calibration laboratories, and 39 of 40 units are active Medical Testing laboratories.

The SERVQUAL instrument is widely used to define the service quality in between the customer's expectation and perception. It is stated as, $Q = P - E$, where Q is quality of service, P is perception of the service and E is the customer expectation of the service. (Cody & Hope, 1999).

Service quality represent most sustainable basis for:

a) Differentiation (Zeithaml and Bitner, 1996);

The unique differentiating characteristic of the services as perceived by the customers is important. It can be in terms of better technology, price, convenience, value added after sales service like advice or consultation, and technical knowledge sharing, which are changing customer expectation. It can distinguish the services provided by our business compare to our competitors, and make an influence on purchase decision making. Entrepreneurs who have been successful from initial small and medium enterprise were always thinking of the attributes for differentiation.

However, the fundamental paradigm is “customers don’t buy features; they buy benefits’. In another words, customer only buy based on the ‘perceived benefits’ (Leonard *et.al.* 2015).

b) Leveraging customer satisfaction and value (Parasuraman,1997)

Satisfaction on service quality value always impacts on customer’s purchased intentions. Satisfaction plays a significant role in how much revenue a customer generate for a business. Value perceived may due to the appreciation feeling of the attributes of good quality e.g. knowledge of the service, thoroughness, accuracy, consistency, reliability, reasonable cost, willingness to correct errors, timely and prompt service.

The attributes of poor quality included lack of knowledge about the service, employee’s indifferences, and reluctance to correct mistakes, service inconsistency, sloppiness, and high cost. Value can be viewed as the ratio of perceived quality

relative to price or benefit received relative to costs incurred and the perceived quality and anticipates experiences (Doddset *al.*, 1991).

c) Driving market share and profitability (Buzzel and Gale,1987); and

This is widespread acceptance that service quality is driving market share and profitability from persuasive market-oriented perspective. More organization actively using some customer satisfaction measurement in developing, monitoring or evaluating products and service offering, as well as for evaluating, motivating or compensating employees.(Eugene *et al.*, 1994).

These criterions shall evaluate from the accounting perspective which has positive economic in returns. The prediction of economic returns shall evaluate from the customers' cumulative satisfaction which will be the fundamental indication of the firm's past, current and future performance.

d) Developing a strategy (Gronroos, 2000)

Researching customers' behavior always use as a factor for making marketing strategies and adapting the marketing mix to their needs. This is the only way for high grade satisfaction of the customers' need. Customers' satisfaction will be indicating from their feedback in repeating purchase or switching to other service provider. Most of the service provider will use customer satisfaction index as their information for strategic business and applications. It will be direct reflects in consumer spending and corporate earnings.

Customer satisfaction is crucial and a necessity for a business provider survival in the market. At the same time, Malaysian shall be equipped with the necessary knowledge about criteria of service quality that required from customers. Quality is generally being a key criteria that is influencing customer's satisfaction. Hence, the commercial laboratories shall strategically position to provide excellent service quality to satisfy customers.

Commercial laboratories need to investigate the degrees of customers' sensitivity and expectations towards customer service quality. Armed with such information, commercial laboratories outfits are then able to strategically focus service quality objectives and procedures to fit the Malaysian, as well as attract more oversea market too. The purpose of this study was to examine the criterion of laboratory service quality factors on customer's satisfaction

Brand equity or image or brand name is another factor that consumer may consider in engaging a testing services. The concept of brand equity is often related to Farquhar's approach 1989, which defines it as has added value to a company and customer. It is associate with brand name, such as awareness, loyalty, perceived quality and proprietary assets. (Aakar 1991). There are 2 dimension will be used and discussed in this study, which is brand awareness and brand loyalty. Normally the brand awareness are positively related to brand equity because they can be a signal of quality and commitment and they help a buyer consider the brand at the point of purchase, which leads to a favorable behavior towards the brand. Besides that, brand loyalty will generate higher willingness to continue with the service brand without switching to another brand (Chang and Liu's 2009). Therefore, whether a consumer

willingness to stay close to a particular commercial lab, proudly promote the commercial lab to others, it's all associate with brand equity. And brand equity normally due to the benefit or value of service quality perceived by the customer (Loureiro et al, 2014).

1.3 Problem Statement

Since Malaysia is switching towards knowledge-based economic, SME becomes crucial and play an important role in the country's overall production network. It is due to SME is comprises over 98% of total establishment and contributing to over 65% of employment as well as over 50% of the gross domestic products (SME Annual Report 2012/13). Hence, there is a big room for SME to grow in Malaysia industries. Focus in the SME may help country to achieve the Vision 2020, which is to be a high income nation. If service industry can be understand well about customer expectation and perception in service satisfaction, it will help to improve the statistic figures.

Laboratories shall acts as neutral roles and as third party verification in service sectors. Local Lab is having the advantages edge in cost and time advantage compare to oversea labs. (Verbeke.A (2013). It can minimize the cost fluctuating due to forex exchange and agility respond to customer enquiry without time zone problem. However, there are few issues that need to be high-lighted which related to lab services.

The problem is Malaysian consumer always threaten under the product safety issue which has passed manufacturer quality control check and cross checked by commercial lab. Such as food-borne illness outbreak due to pathogen contaminant

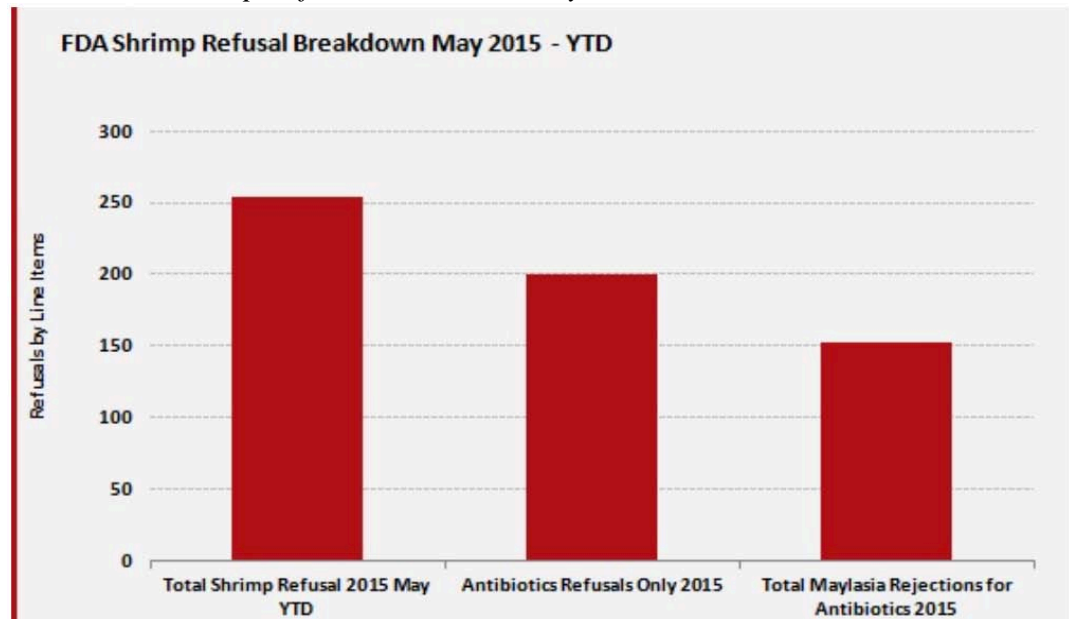
(*Salmonella typhimurium* infection, *E.coli* infection in chicken salads etc.), product recall due to allergen or mycotoxin contaminant (peanut butter recalled due to aflatoxin), industrial grade chemical contaminant into food product like mercury in seafood; misused adulterant like sildenafil (Viagra) and tadalafil (Cialis) in energy drinks; migration toxic chemical from packaging etc. Is the test result by commercial lab is truthfulness and reliable? (source: Bahagian Keselamatan dan Kualiti Makanan, Kementerian Kesihatan Malaysia (<http://fsq.moh.gov.my/v5/ms/tag/industri/>))

In 2008, based on the Official Website of Embassy Malaysia, Brussels, Malaysian Seafood's was banned by European Commission from exporting to European countries due to failed in meeting EU standards.. This issue had caused a multi-billion-dollar exports was hold off due to not able meet EU health standard until year 2012 (info from Ministry of Foreign Affair, 2008).Malaysian seafood failed the inspection by EU where indicated these commodities may be public concern and animal health. However, pre- shipment of the products, the exporter is required to apply for Health Certificate from Ministry of Health, where with the test report (certificate of analysis) issued by local commercial laboratory. Local manufacturers were disappointed with local laboratory due to fail to be final scan prior export.

Besides that, laboratory staff shall well know on countries regulatory and control limit and advise customer the suitable sensitivity instrument to screen the product before export. However, in 2015, based on the US Food and Drug Administration's (FDA) announcement that Malaysian shrimp was detected high antibiotic in the shipment. There were 80% of total 254 shrimp shipments have been refused entry to the US market. In the same report, it was stated that Malaysia aside,

the rejection was double amount of shrimp imports from major suppliers India and Vietnam through May 2015. (Ramsingh. M (2015). Thus, laboratory staff competency and knowledge will part of the criterion to fulfill customer satisfaction.

Table 1.2: FDA Shrimp Refusal Breakdown May 2015- YTD



Source: Urner Barry's Foreign Trade Data

Industry always running with times. Testing report is important for customer to make decision or waive the on-hold product prior out-going shipment. Timeliness is always crucial for a commercial laboratory. However, laboratory works is highly human intensive especially in the sample preparation and extraction part. Robotic extraction and analysis only by high end instrument. At the same time, human capital retention in SME is one of the major challenge in SME industry (Chua, 2005). Shortage of manpower will cause delaying in report issuing time. Thus, improve the report delivery time will indirectly improve customer shipment and better cost saving.

Based on U.S. Food and Drug Administration (FDA) website, more and more food scandals were being detected. Melamine contaminant in baby milk powder in 2008 which cause 300,000 babies affected; 2012 U.S black licorice detected high lead contain; 2013 horse meat scandal in beef burger in Britain and Ireland; 2014 with plasticizer contaminant in Taiwan milk tea; 2015 Caraga candy poisoning etc. All food scandal happened will cause social worries. Lab staffs shall able to consult the root cause of incidents, application of the contaminants, suitable methodology and limit of detection of instrument, regulatory pre-set limit of tolerant etc. Laboratory staffs should help customers to solve customer enquiries and queries. Without proper handle customer complaint, it will lead to customers dissatisfaction.

Malaysian commercial laboratory is mainly from small and medium industry. They are not emphasis on brand promotion but running the lab with conventional method. Their brand image was build due to the years of establishment in the market. Physical building and appearance are not emphasis by lab owner but more emphasis on lab integrity and value chain. Most of the lab is running the business in small shop-lot compare to multinational lab like SGS, TUV SUD, ALS etc, which their lab set-up in Malaysia is more emphasis in modern design and multi-level stories building. Physical image could gain a greater brand image and value in differentiating from other competitors (Kayaman and Arasli, 2007).

Thus, overall problems indicates SME lab are with local mind-set and level of service quality is low and average. Due to many issues stated above, thus, a study on LabSERV is needed to examine the level of satisfaction.

1.4 Research Objective

The purpose of this study is to identify the relationship of the factors that affected customer satisfaction and lab service quality in SME laboratories in Malaysia.

- a) To examine the relationship between service quality towards customer satisfaction in SME type laboratory.
- b) To examine the relationship between the service quality towards customer satisfaction moderated by brand equity.

1.5 Research Questions

To study the service quality dimensions towards customer satisfaction for SME laboratory in Malaysia, two major questions have been developed:

- a) What is the relationship between service quality towards customer satisfaction in SME type laboratory?
- b) What is the relationship between the service quality towards customer satisfaction moderated by brand equity.

1.6 Significant of Study

Researcher and firm have confirmed those with good service quality that recognized by customers will generate confirmation profit and mandatory for a firm survival (Zeithaml, 2000). It is due the service quality is a crucial factors to added value to the service and consequences lead to better repeat sales and customer loyalty.

This study contributes to further research for organizational perspective and individual perspective (customers). The certainty and reliability of the result are able to act as a baseline study and future research guideline for future research for Malaysia SME service industry especially in commercial laboratory segment.

From organization perspective, this study will helps to foster better understanding and knowledge on customer satisfaction in terms of service quality with physical requirement of building or facilities (tangibility), result accuracy and precision (reliability), speed of response to customer enquiry of queries (responsiveness), lead-time/ time frame for service delivery (turnaround time), advancement or high-end instrument availability (technology), format and informativeness of test report, effectiveness of two ways communication and laboratory staffs' attitude and behavior.

A part of it, this study also will help to determine the most significant dimension of service quality relationship with the customer perceptive satisfaction. It helps the commercial laboratory to identify the problem and dimension needs to emphasis in the service quality with improve customer loyalty and repeat purchase once the satisfaction was being fulfill. Furthermore, this study will be a useful information for laboratory to set a more a precise mission and company policy in maximizing customer satisfaction experience.

From the individual perspective, this study will helps to identify the individual experience and perception of satisfaction on the laboratory service quality based on their demographic data given. Different services engaged or required by different position customer, normally will demand different level of service quality.

By end of the study, this research study should lead to a deeper understanding of brand equity effects for service quality towards customer perceived satisfaction. Two criteria will be study, brand awareness and brand loyalty. It will give a meaningful implications for the management people in SME commercial laboratory.

1.7 Definition of Terms

Table 1.3: Table of Definition

No	Terms	Definition
1	Commercial Lab	A laboratory which accept the samples from public and performs fee for the analysis services (US FDA, 7 CFR 58.101)
2	Small and Medium Enterprise (SME)	Sales turnover in service sector shall not exceeding RM20 million OR full-time employees not exceeding 75 pax (SMECORP, 2013)
3	Tangibility	All the visually appearing elements in the laboratories which can be see and touch, e.g, physical facilities of building, testing tools and equipment, appearance or groom of personnel and communication materials (Santos, 2002)
4	Reliability	Ability to perform the promised service dependably and accurately. It can be define as helpfulness in terms of solving customers provide the right service at the right time, including provide the on-time services, having error-free records, fulfilling the promises made, providing complete and better information to customers and the availability when customer request on service delivery (Nantel and Bahia, 2000).

5	Responsiveness	Willingness to help customers to provide prompt service, employee's involvement and concerns when customers required on assistance. It can extended to convenience operating service hours, individual and personal attention given to customers, attention to their problem facing and customers risk and safety evaluation (Kumar and Kee, 2009)
6	Communication	It is relies on trusting, responsive, available, timely service during the intermission scene whereas communication depends on proactive, explaining, accessible, professional service during the transition scene (Strombek and Shu, 2013)
7	Technology	It is the common consensus to evaluate the capability of an analytical laboratory (Burtis, 1987).
8	Turnaround Time	A reasonable time frame to conducting an analysis. It is vital to make fast decision from the outcome of analysis report Oja <i>et al</i> (2010).
9	Test Report	It is a vital document which shall be clear and easily interpreted by others. All the relevant information shall state in the test report to avoid confusion and misunderstanding. Based on ISO 17025 required, all the test report shall signature by approved signatory. It means the signatory personal shall responsible for the test report. Any discrepancy of the test report will under full responsible of the person sign it (Allen and Harris, 2010)
10	Staff Attitude and Behavior	Assurance and empathy of laboratory staffs, in terms of their knowledge and courtesy and the ability to inspire trust and confidence in analysis they conducted. Behavior of the laboratory staffs shall caring and individualized provided to customer (Parasuramanet. <i>al.</i> , 1988).

11	Satisfaction	It is a personal feeling of either pleasure or disappointment resulting from the evaluation of services provided by an organization to an individual in relation to expectation (Oliver, 1980)
12	Brand Equity	It is lies in brand knowledge and its positive associations(Keller, 2003.) It is also defines as a process, both internal and external to the organization, of offering a value proposal represented by the brand(de Chernatony, 2003)
13	Brand Awareness	It depends customers are familiar about the availability and accessibility of the laboratory services (Malik et. al,2013).
14	Brand Loyalty	It is deeply held commitment to rebuy or re-patronize a preferred product/service consistently in the future, thereby causing repetitive same brand or same brand set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior (Oliver 1999).

Chapter 2 LITERATURE REVIEW

2.1 Introduction

This chapter consist of the literature review of the underlying theories of service quality, customers' perceived satisfaction and the lab related information. The purpose of this chapter is to understand on the study of independent variables (service quality) and dependent variable (customers' perceived satisfaction) on how they contribute to the study. Based on the literature reviews, a research framework is proposed and hypothesis of the research model is developed and showed in the end of the chapter.

2.2 Theory

A resource – based theory of an organization was become attention, as an alternatively to the traditional product based of competitive advantage. Resources either in tangible and intangible form are important in operating a business as well as a commercial laboratory.(Teece et al 1997). Tangible resources in a commercial lab could be the basic categories are financial (capital), physical (equipment), human (skills of employees), technology (brand, patent) and reputational.

Intangible resources is referring to human capital of a commercial lab. It's towards knowledge – based theory. How skillful and knowledge impressive of laboratory staffs to customers can make a value added to customers. Commercial laboratory is liaise with material science. Explain the jargon words of the test method or result finding in a simple and easy understand language is important to a customer. Besides this, competency of a laboratory staff was crucial and vital in analysis trouble-shooting.

Human capital and high end equipment are parallel important for a commercial laboratories. In commercial lab, it is many rely on individual performance and personal touch. The skillfulness and the knowledge equipped with a staff will be an advantage to a commercial lab. However, any sabotage of the staffs will direct impact to a service image/ brand name too (Jalal Hanaysha and Haim Hilman, 2014).

SME is important to build up the reputation with service excellent. Service quality has been considered as an essential strategic factors for a sustaining a firm's competitive advantage and growth (Siddiqi, 2011). It is due to various research themes have been studied on service quality role in driving business success. This indicate differentiation in service quality was playing significant role on customer evaluation of product or service. (Angelova and Zekiri, 2011). In general, provide good service quality to customers is regarded as a fundamental strategy for long term business success in highly competitive market. Enhancement in service quality with superior quality of service will improve and sustain their business positively in long run (Taleghani, et.al, 2011). Therefore, a brand image with focusing in added value on high service quality will cause customer to purchase it, as a result gain of greater value and differentiating from other competitors (Kayaman and Arasli, 2007).

For long term sustainability and competitive advantage, SME commercial laboratory shall emphasis the resources to be valuable to customer, difficult to imitate, rare and non-substitutable.

2.3 Service Quality

In the past three decades, a lot of studies related to Service Quality being conducted by researchers towards an understanding of phenomenon in different service industries (Parasuraman et al., 1985, 1988, 1994, 2001; Babakus and Mangold, 1992; Nyeck et al., 2002). Service quality is commonly defined from four perspective: excellence, value, conformance to specification and meeting or exceeding customers' expectations (Hernon and Nitecki, 2001). Service quality is the service deliver to customers while customer's satisfaction is based on their experience with the services (Malik, 2012).

SERVQUAL is the most commonly used in service quality measurement. It gained the significant popularity among researchers is due to applicable and adaptable in various sectors (Nyeck et al., 2002). SERVQUAL model is measuring in five dimensions: reliability, responsiveness, tangibility, assurance and empathy. (Ramaseook-Munhurrun et al., 2010; Prayag, 2007).

Even though Parasuraman et al., (1985) and Hirmukhe (2012) argued that SERVQUAL is a universal and applicable in measuring any service quality in any service organization. However, Dabholkar et al. (1996) mention that need to develop industry specific measures of service quality.

Literature with specific reference to laboratories is limited. Vinaysing et al. (2015) started a service quality framework clinical laboratories. It is broaden the measuring in the framework more specifically in laboratories services. There are eight dimensions of service quality being measuring which are tangibility, reliability,

responsiveness, turnaround time, technology, test reports, communication and laboratory staff attitude and behavior.

Tangibility, reliability, responsiveness, assurance and communication are the 5 core SQD service industry. However, Vinaysinget *al* (2015) did high-lighted that turnaround time, test report, technology and laboratory staff attitude and behavior were significant affect the service quality in laboratory services too. There are 8 dimension of the service quality will be study in the study for

2.3.1 Tangibility

Santos (2002) refer the tangibility as the all the visually appearing elements in the laboratories which can be see and touch, e.g, physical facilities of building, testing tools and equipment, appearance/ groom of personnel and communication materials.

Tangible items are being considered the most significant elements in providing service (Kumar and Kee, 2009). Normally customers are easily influenced by the tangible facets of the service engaged either physiological, psychological, emotional and cognitive ways (Aslam and Khan 2011).

Most of the studies showing it has a significant influence on the marketing management services (Parasuraman *et al.*, 1985; and Grönroos, 1990), especially in healthcare and hospital industries. It makes customer difficult to understand the physical evidence and price rather than the core service. Physical evidence refers to the environment in which the service delivered where the laboratory and customer interact in any tangible commodities that facilitates performance or communication of

the services. It is including the design and solid building of the laboratory, interior design, modern equipment, visual appearance of facilities and staff uniform and professional appearance. For customer, tangibility could be their first impression of a lab services which direct link with their expectation and perception of performance later. Tangibility are used to convey image and signal quality (Zeithaml *et al.*, 2001).

2.3.2 Reliability

This dimension refers to ability to perform the promised service dependably and accurately. It can be define as helpfulness in terms of solving customers provide the right service at the right time. This including provide the on-time services, having error-free records, fulfilling the promises made, providing complete and better information to customers and the availability when customer request on service delivery (Nantel and Bahia, 2000).

Reliability is critical as all the customers want to deal to the firm that keep their promises and this is generally implicitly communicated to the firm's customers. In laboratory services, it is part of the trustfulness and integrity of the value chain of services

2.3.3 Responsiveness

This dimension is referring to willingness to help customers and provide prompt service. It can define as level of employee's involvement and concerns when customers required on assistance. It's very depending on individual customer's wants and needs. It can extended to convenience operating service hours, individual and personal attention given to customers, attention to their problem facing and customers

risk and safety evaluation (Kumar and Kee, 2009). This dimension is urgency and fast response when dealing with the customers' requests on new enquiry, questions of uncertainty of result or extraction method, feedback and complaints. A firm is considering responsive when it use the shortest time to communicate and get back the answer to customers. A successful company shall look at responsiveness from the view of customer rather than company perspective (Zeithaml *et al.*, 1990).

2.3.4 Turnaround Time

Oja *et al* (2010) mention that turnaround time is vital to make fast decision from the outcome of analysis report. Time frame given should be reasonable and to avoid any delay further action taken. Turnaround time can be used to measure the lab service productivity too, where how soon to get the result, so that can proceed for invoicing and payment.

Lab service is many rely on human intensive. But the turnaround time shall continuous to accelerate. Complete the analysis shorter than projected schedule is highly appreciated by customers. Of course, if the testing doesn't adhere to the proper quality standards, then faster isn't better. Agility and urgency in timeliness can help customer make faster decision making especially in critical condition like production line breakdown or the moment of food scandal outbreak. Time effectiveness measure is link with cost effective of company performance measurement (Poister, 2003)

2.3.5 Technology

Technology is used as common consensus to evaluate the capability of an analytical laboratory (Burtis, 1987). Performance and quality of a laboratory were enhance by owning the latest technology facilities and equipment in diagnosing and analyzing (Boyde *et al.*, 1997). Technology is providing new opportunity for delivering existing services in more accessible, convenient and productive ways. Technology is a critical component in service provision and value creation.

In lab service, technology is refers to hardware for advancement of facilities and instruments and software in information technology. Advancement of facilities and instruments is co-related to lower detection limit, preciseness of true result and user friendly (robotic effect). Information technology is refer to harnessing of customer data, where all the relevant information shall traceability either the historical data for sample received date, completion date, calculation, instrument used etc. Investment in technology facilities service assessment and improvement process is essential (Dutton and Starbuck, 2002).

2.3.6 Test Report

Allen and Harris (2010) did mention that laboratory test report is a vital document which shall be clear and easily interpreted by others. All the relevant information shall state in the test report to avoid confusion and misunderstanding. Based on ISO 17025 required, all the test report shall signature by approved signatory. It means the signatory personal shall responsible for the test report. Any discrepancy of the test report will under full responsible of the person sign it.

In commercial lab, the test report is refer to certificate of analysis (COA). Under ISO 17025 requirement, an accredited organization is allowed to issue SMM endorsed report/ certificated only for tests and calibrations and reference materials which is accredited. The laboratory may carry out other activities which not hold SMM accreditation, but if it wishes to include the results of such activities on a SMM endorsed report/ certificate, approval from SMM Executive must be obtained. Such activities have to be clearly mark as non-accredited (DSM, 2014)

2.3.7 Communication

Strombek and Shu (2013) commented that communication relies on trusting, responsive, available, timely service during the intermission scene whereas communication depends on pro-active, explaining, accessible, professional service during the transition scene.

Communication is basic and essential activity in any interaction process. Relationship development, required on-going cordial communication. A successful communication between the lab and the customers will be the basic of successful interaction and bring for long term mutually meaningful relationship. A good communication shall able to reduce uncertainty, better understanding, transmission of information and intentional (Kirchmajer L, 2011).

2.3.8 Laboratory staff attitude and behavior

More to assurance and empathy of laboratory staffs, in terms of their knowledge and courtesy and the ability to inspire trust and confidence in analysis they conducted. Behavior of the laboratory staffs shall care and individualized provided to customer. (Parasuraman *et. al.*, 1988). It can strengthen the customers and employees relationship as business partner rather as customer-supplier relationship. Business partner will be the symbiotic where both parties are getting the beneficial and growth together. Nowadays, business world is more emphasis on win-win situation rather than only pros- to a side.

2.4 Brand Equity

Most of branding concept and its related ideas were subsequencely stimulated by Aaker (1991, 1995, 2004) and Keller (1993, 1998) who focus on brand equity and brand strategy management.

In Aaker's Brand Equity Model, 5 components were identified: (1) brand loyalty, (2) brand awareness, (3) perceived quality, (4) brand associations and (5) other proprietary assets. Aaker's defines brand equity is a set of assets and liabilities that link to brand name and symbol and value added by product/ services to the firm and firm's customers (Aaker, 1996). Based on Asker, these assets and liabilities are more to intangible rather than tangible.

Another branding theory is Keller's Customer-Based Brand Equity Pyramid (1993, 2001, 2003). Based on Keller, consumer response is based on their brand knowledge and effects when consumer possesses a favorable and unique brand associations. (Keller, 1993). This model consist of 4 steps with 6 brand building block