

Technological Determinants of Purchase Decision of Client-Server Hardware System in Malaysia SME's Business

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— *Review of* —
**Integrative
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ABSTRACT

Information and communications technologies (ICT) is regarded by academicians and practitioners as an essential tool in enhancing the competitiveness of small and medium enterprises (SMEs) in global marketplaces. Consequently, ICT, especially client-server hardware system (C-SHS) has gained its popularity in SM enterprises. However, there is insufficient research and understanding in areas related to determinants of purchase decision of C-SHS in SMEs particularly in Malaysia. Thus, this research intends to fill this gap. A preliminary theoretical framework was developed based on literature and also the diffusion of innovation (DOI) theory. This research employed qualitative methodology using convergent interview and thematic data analysis techniques to explore and confirm the preliminary theoretical framework. The identification of respondents in this research was based on a snowballing technique. The findings from this research confirm relative advantage, compatibility system, complexity system, existing IT infrastructure, trialability, cost of purchase, scalability system, security system as technological determinants of purchase decision of C-SHS in SMEs. The finding of this research has implications on practical and methodological aspects. This study also proposes recommendations for future research.

Keywords: information and communications technologies (ICT), client-server hardware system (C-SHS), small and medium enterprises (SMEs)

1 INTRODUCTION

1.1 Background of the Research

Technology is transforming every aspect of the business sector and changing the way how businesses are conducted. In essence, ICT is the lifeblood of this change, (Modimogale & Kroeze, 2011). ICT is a powerful tool that allows us to do amazing things and be incredibly productive. The usage of ICT has been widespread in economy activities (Torrent-Sellens & Díaz-Chao, 2010). In the business environment, competition is inevitable and also getting more intensified. To remain and sustain in the business, every business or organization is constantly finding ways and means to

enhance the operation process and efficiency. More and more businesses are leveraging on the advance of technology developments to improve the business performance and to gain some competitive advantages (Fisher & Kenny, 2000; Porter, 1980). Besides, organization also capitalizes on the technologies for the survival and success for their company (Lester & Tran, 2008). In short, organization that do not accept new technologies and do not adjust themselves to accept new technologies will fall behind (Davidoff & Kliener, 1991 cited in Murad & Thomson, 2011).

Today, the term ICT is so powerful and important in every business and aspect of our life in viewed on the wide range of benefits it offers (OECD, 2004). The Minister of Communication in Botswana described ICT as the “world’s most important facility in the 21st century” in his speech in the World Communication day (Magang, 2001). Similarly, Saleh and Burgess (2009) have called out that ICT is a crucial tool in the increasingly competitive global economy. Indeed, ICT can do wonderful magic and surprises to the world, be it in business context and also in personal daily life. In the last few decades, ICT has changed the world and also the way how people think, how people act and react, and how people communicate in their daily lives.

One of the key technologies within ICT industry is the client-server hardware system (C-SHS). C-SHS is a computing architecture where it represents a form of distributed processing in which the system distribute information and computing task among computers that are linked by a network (Chengalur-Smith & Duchessi, 1999). According to Subramanian and Lacity (1997), client-server computing is a phenomenon that is transforming the information system (IS) industry. One of the primary reason is C-SHS allow organization to respond more rapidly because it is able to create and disseminate information which is then distributed to the desktop of individuals (Kavan, O’Hara, Patterson & Bostrom, 1999). In recent years, with the continuing development and advancement of the technologies, the client-server computing system is gaining popularity and has been very critical in the world of IT and also in the world of business. C-SHS is an appropriate technology in today’s rapidly changing environment (Kavan et al., 1999) and is an indispensable tool for SMEs to compete and survive in the playing field. In the context of SME’s business and at least for now, client-server computing is still a valid and feasible technology over cloud computing which is an emerging technology still in the infancy stages. C-SHS for SME’s business still relatively important to develop the business and to gain the competitive edge in the marketplace.

The global statistic has shown that SME’s business contribute substantially to the nation’s income, output and employment. In the context of SME’s business in Malaysia, there are three (3) key challenges and barriers with respect to the continuous growth and competitiveness sustainability. These challenges are as follows;

i. Low ICT adoption rate in Malaysia SME’s business.

From the past researches and surveys, the ICT adoption rate in the Malaysia SME’s business is relatively low (Alam & Ahsan, 2007; Kogilah, Santhapparaj, Eze, 2008; Salleh & Burgess, 2009). It is only 30% whereas it is 80% in Europe and America (Saleh & Burgess, 2009). Another statistics based on the SMEICT Survey has demonstrated that 70% of the SME’s business in Malaysia do not have a website.

Another survey conducted by ACCM, shows that 72% of SMEs in Malaysia are not ready for e-commerce and that implied majority of Malaysian SMEs have not embrace ICT, in particular the C-SHS. The ability of SMEs to survive in an increasingly competitive global environment is largely predicated on their capability to leverage information as a resource (Mutula & Van Brakel, 2006). However, the underutilization of ICT applications in Malaysia SME's business results in a shortage of adequate and reliable information. Therefore, low ICT adoption rate remains a significant problem and challenge to SME's business in Malaysia.

ii. Low Labor Productivity in Malaysia SME's business.

The Malaysia SMEs labor productivity, as measured by real GDP per worker, is far below other countries such as Singapore, Japan, Korea and those countries in Europe and America. It is also noticed that US firms are among the highest in labor productivity. One of the explanations for this is linked to a high usage of ICT (Lucchetti & Sterlacchini, 2004; Sadun & Reenen, 2005). Extensive studies have been carried out to determine and discuss the relationship between ICT and productivity. The findings from these studies have shown a strong positive relationship between high labor productivity and the usage of IT (Doo & Sohn, 2008; Esselaar, Stork, Ndiwalana & Deen-Swarray, 2007; Ianmmarino, Jona-Lasinio & Mantegazza, 2004; Onu, Olabode & Fakunmojo, 2014).

Low productivity in Malaysia SME's business brings negative impacts in regards to their competitiveness in the global business environment and ultimately this will have negative implications to the growth of the economy in the country. As such, low labor productivity is a critical problem and challenge faced by SME's business in Malaysia.

iii. Shortcoming of Malaysia SME's contribution to the country economy.

In Malaysia, SME's business account for the large proportion of businesses where it represents 97.3% of establishments. Therefore performance of SME' business greatly makes a significant difference in the Malaysia economy. The SME's business contributions to the country economy can be assessed based on three (3) key parameters that are, their share of contribution to gross domestic product (GDP), employment, and export activities. The performance of these three (3) parameters is summarized in Table 1.1 below.

This problem has been acknowledged by the Malaysian government and therefore the Malaysian government has come out with the SME Masterplan from the year 2012 until 2020. The aim of this master plan is to create a business ecosystem for SMEs which will support towards achieving the high income economy by 2020. Under this master plan, the contribution of SME's business towards nation GDP, employments and export are expected to be 41%, 62%, and 25% respectively by 2020. To achieve these targets, obviously there is a need for SME's business to take a drastic change to improve their business operational process and efficiency and be more competitive in the international marketplace. Leveraging on the use of ICT is one of the promising solutions.

Table 1.1

Gaps of performance in SME's business in Malaysia

Gaps of Performance in SMEs Malaysia	
1. Contribution to GDP	● Approximately 33% compared to 39% (middle-income countries) and 51% (high-income countries).
2. Contribution to employment	● Approximately 57% compared to 97.2% (Indonesia), 90% (Korea), 70% (Singapore), 82% (Thailand and China).
3. Contribution to export activities	● Approximately 15%, the lowest in the region.

Source: developed for this research

1.1. Research Problem

Also, as discussed in previous sections, ICT particularly the C-SHS plays a vital role to SME's business. A lot of studies have documented and reported the significance of the contribution and importance of C-SHS to SME's business especially in improving the efficiency of operation process and in enhancing business competitiveness. In that context, C-SHS is deemed as one of the key components in the success of SME's business in Malaysia. However, despite the importance of C-SHS to SME's business, there is only handful of studies, if not none, had been conducted specifically on the C-SHS itself and also in relation to Malaysia SME's business per se. Very little is understood about determinants of the purchase decision of C-SHS in SME's business in Malaysia (Hashim, 2007). Moreover, what and how these factors determine the Malaysia SME's business owner in purchase decision of C-SHS also remains a big gap to be filled. All in all, this remains a whole lot to be researched, explored, discovered and understood in this research topic. Therefore, this is the research issue that to be the main focus in this research.

By identifying the determinants of the purchase decision of C-SHS, the owners or top management of SME's business in Malaysia will be better supported and better prepared to adopt and leverage the technology rapidly to enhance the competitiveness and compete in the global arena. In alignment to these thoughts, this research is guided by the research problem statement as follows: How and why to establish the technological determinants of the purchase decision of C-SHS in Malaysia SME's business?

2 LITERATURE REVIEW

2.1 Underpinning Theory

This research is underpinned by the diffusion of innovation (DOI) theory. DOI was developed by Everett E. Rogers in 1960s. This is another popular and widely used theory for ICT research in the investigation of the behavior of users in adopting new technological innovation (Karahanna, Straub & Chervany, 1999; Tan, Chong, Lin & Eze, 2009). Literatures have provided sufficient evidence that DOI is a valid model towards investigating new technological adoption and diffusion in different sectors of economy, including SME’s business (Tan et al, 2009). Rogers (1983) proposed five (5) important perceived characteristics of innovation used to explain the users’ adoption and decision-making process. These five (5) characteristics are relative advantage, compatibility, complexity, trialability and observability. In the context of C-SHS in this research, these five (5) characteristics are very much relevant. Therefore, the full DOI theory is used as the primary underpinning theory in building a preliminary theoretical framework for this research.

2.2 Synthesization of Literature Review

Based on the 23 selected articles from the literatures, a total of seven (7) technological determinant of the purchase decision of C-SHS in SME’s business have been identified as shown in Table 2.1 below. Except *relative advantage* and *cost of purchase*, the rest of five (5) determinants matched well from the DOI theory.

Table 2.1
Synthesization of literature on the technological determinants of purchase decision of C-SHS in SME’s business

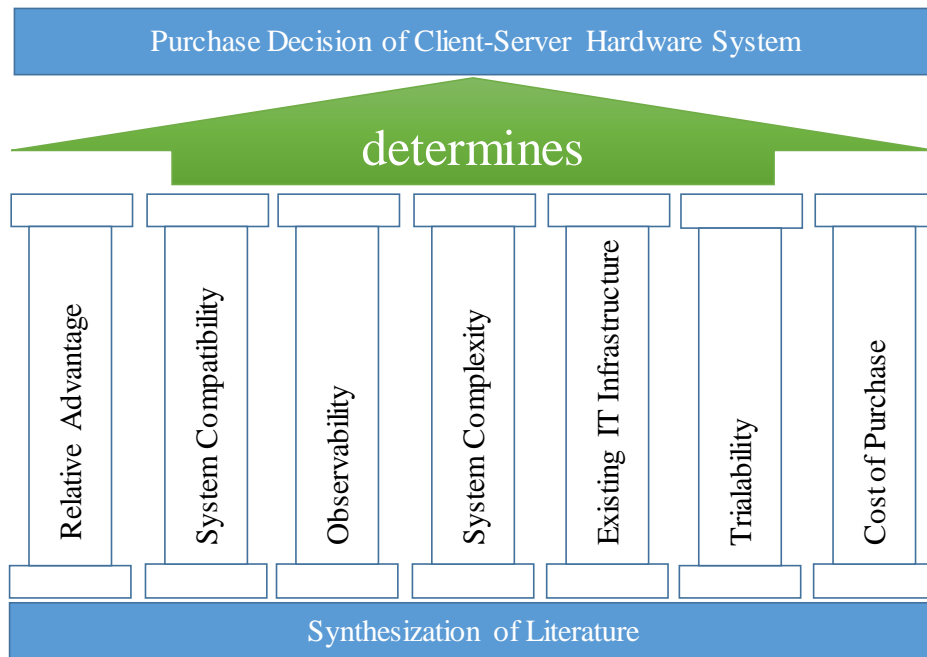
		Authors of the Articles Reviewed on Non Malaysian Literatures																							Frequency to be considered for this research	
		Non-Malaysian Literature											Malaysian Literature													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
	Determinants of Purchase Decision of C-SHS in SME's Business	Ezer & Kofi (2014).	Mohammed, Alnsafir & Alnaser (2013).	Randani, Chevers & Williams (2013).	Iefin, Abdul-Azeez & Tijani (2012).	Kenneth, Rebecca & Ayodo (2012).	Hani & Maha (2012).	Lee & Wu (2012).	Chinyao, Yabseh & Mingchang (2011).	Ratanapopphun & Lee (2011).	Azam & Quaddus (2009).	Nguyen (2009).	Chong (2006).	Roberts, Steel & Toleman (2006).	Chen (2004).	Kendall et al (2001).	Poorang et al (2013).	Ghobakhloo, Sabouri, Fung, & Zulkifli (2011).	Tan, Chong, Lin & Eze (2009).	Saleh & Burgess (2009).	Alam & Mohammad Noor (2009).	Hashim (2007).	Ramayah, Lim & Sulaiman (2006).	Hussin & Noor (2005).		
1	Relative Advantage		✓	✓				✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	15	✓
2	System Compatibility	✓		✓						✓	✓			✓		✓		✓			✓				9	✓
3	Obervability			✓							✓		✓				✓		✓			✓			7	✓
4	Sysrem Complexity			✓							✓			✓				✓	✓			✓			7	✓
5	Existing IT Infrastructure	✓			✓	✓						✓						✓				✓			6	✓
6	Trialability	✓		✓									✓	✓	✓	✓									6	✓
7	Cost of purchase				✓		✓	✓										✓		✓					5	✓
Total		3	1	5	2	1	1	2	1	2	3	1	3	2	3	3	3	5	4	1	1	4	1	3	7	

Source: developed for this research

These seven (7) technological determinants are used to develop the preliminary theoretical framework for this research as shown in the diagram Figure 2.1 below.

Figure 2.1

Preliminary theoretical framework developed for this research



Source: developed for this research

With reference to the preliminary theoretical framework developed for this research, a research issues for this research is derived as below;

What are the technological determinants of purchase decision of C-SHS in SME's business in Malaysia?

3. METHODOLOGY

3.1 Qualitative Approach

There are two (2) reasons why qualitative research is appropriate for this research. The first reason is associated to the objective of this research. The objective of this research is to explore and provide a deeper insight and understanding into a very little-researched area of what determine the purchase decision of C-SHS in SME's business in Malaysia and how. According to Robson (2002), an exploratory research employs an open and flexible approach in order to find out "what is happening; to seek new insights; to ask questions and to access phenomena in a new light". In aligning to this research objective, qualitative approach is a more suitable type of research against quantitative research (Mohd Harif, 2002). In the same note, Hair, Bush and Ortinau (2009), also suggested that qualitative approach is best for gathering as much information as possible in this very limited research topic.

The second reason is the type of information needed by this research. The depth and detail of qualitative data is required to understand complex phenomena by immersing into the subject matter (Denzin & Lincoln, 2005; Horn, 2009; Silverman, 2005). This view is also supported by Tran & Hoang (2011) as saying qualitative method enables researcher to study individual or organizational behaviors, the phenomena within their environments and in revealing rich and complex processes. Therefore to fully understand the complex process of purchase decision of C-SHS in SME's business, qualitative method was deployed in this research.

3.2 Convergent Interview Technique for Data Collection

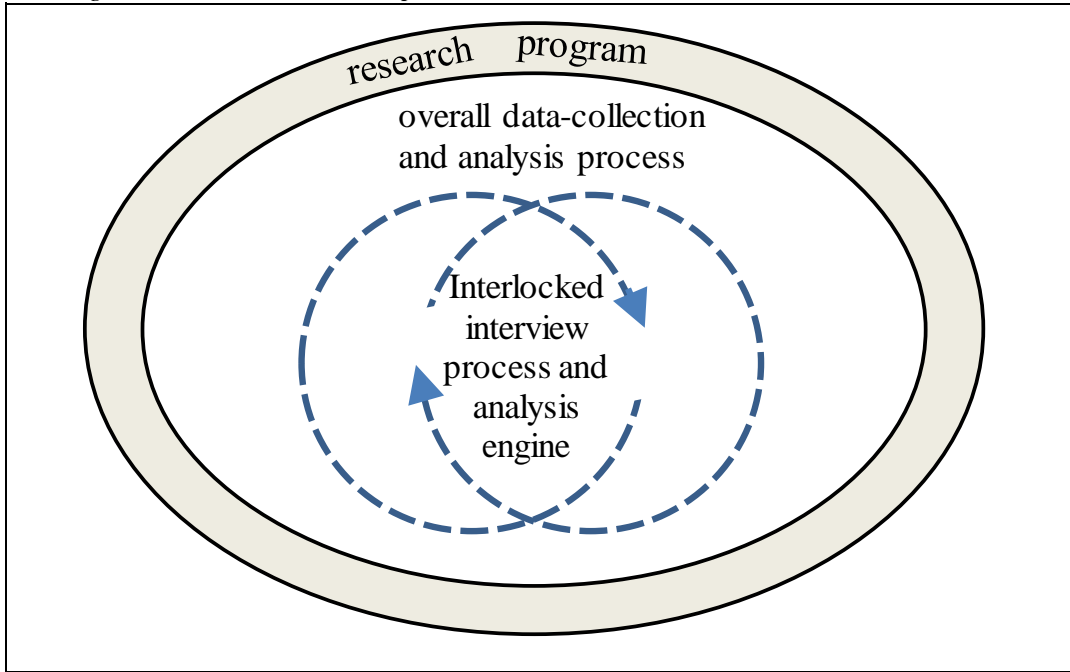
This research employed convergent interview technique for data collection. Convergent interview is a type of in-depth interview procedure characterized by a structured process and unstructured content (Dick, 2012). Convergent interview has the ability to refine the contents and the process of the interview and zoom in on a broad research issue (Rao & Perry, 2003). As such, convergent interview is considered a more suitable data collection technique for this research, and thus it was chosen. Convergent interview technique is defined as a tool used to enrich the information in the research area, that is as 'an interactive interviewing technique for collecting, analyzing, and interpreting relatively large amounts of interview data in less researched and established areas of study' (Riege & Nair, 2004). Convergent interview has emerged as a qualitative technique that attempts to address research topics that lack theoretical underpinning (Dick, 1990). Likewise, also commented by Attwater (2005), convergent interview is becoming popular in qualitative research as it provides a valid, reliable and rigorous process of data collection. Convergent interview has been described as "A way of collecting qualitative information about people's attitudes and beliefs through the use of interviews" (Dick, 1990).

In the core of convergent interview, there are two interlinked processes, which are cyclic or iteration, and data driven (Dick, 2012). These two interlinked processes are interview process and data analysis process as illustrated in the diagram Figure 3.1. In other words, as shown in the diagram, the data collection alternates with the analysis of interview data in a tight cycle.

Convergent interview adopt a method of using semi-structured interview questions. In other words, convergent interview combines some of the key advantages of both unstructured and structured interviews approach (Dick, 1998). The interviewer develops some interpretation of the data, which will then be used to refine and focus the content and process of subsequent interview. This process is undertaken after each interview as illustrated in Figure 3.2 (Mohd Harif, 2002).

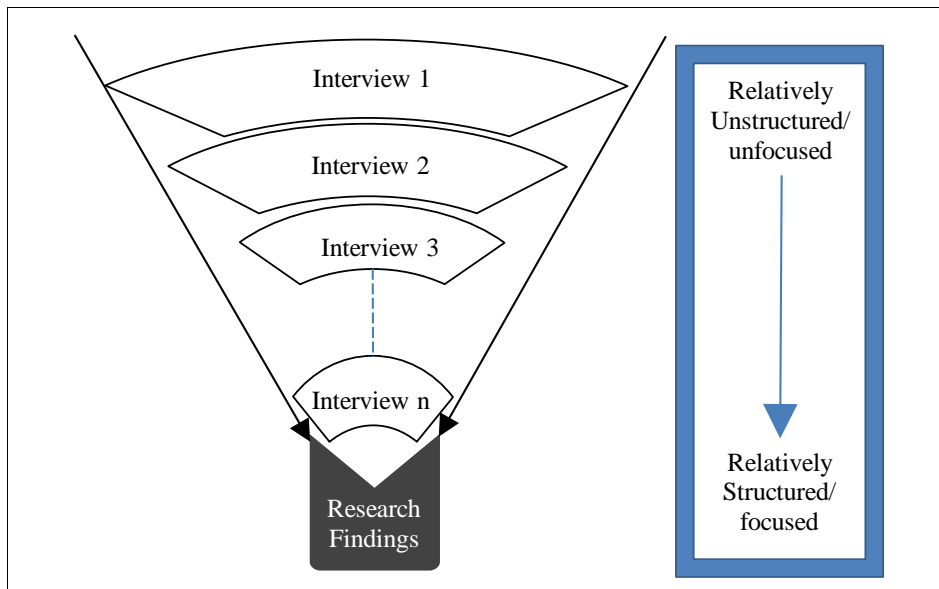
Figure 3.1

Convergent interview interlocked processes



Source: adopted based on Dick (2012)

Figure 3.2
The convergent interview approach



Source: modified based on Woodward (1997) for this research

3.3 Research Design

Sampling technique

There are multiple techniques available for sampling. Palinkas et al. (2013) commented that purposive sampling is one of the sampling strategies that is widely used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest. On the same thought, according to Patton (1990), information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term purposeful sampling.

In this qualitative research, the goal is to explore, discover and gain a greater depth of understanding of the purchase decision of C-SHS in Malaysia SME's business. To achieve this goal, the information was obtained from the subject matter expert of ICT-related industry and the SME's business owners. This implied that the first sample in this research was carefully selected with purpose. Therefore purposive sampling strategy was deployed in this research. In addition to the purposive sampling, this research also used the snowballing sampling technique which is also known as "chain sampling". Combining these two (2) sampling techniques, resulted in a technique known as purposive-snowballing technique which is the technique deployed in this research.

The advantage of snowball sampling is that one informant refers the researcher to another, so that the researcher has a good introduction for the next interview. A disadvantage is that the variation in the sample may be limited because it consists of respondents who belong to the networks of the index cases. To overcome this disadvantage, it is important to have at least two different additional entrances in the community. In this research, the addition of more subsequent respondents were based on the referrals from the first and the previous respondents whom thinks that these referrals have the relevant knowledge and are potentially able to participate or contribute in this research. Most of the referrals were the SME's business owners based in Malaysia.

Sampling size

Unlike quantitative research, there are no specific rules for sample size in qualitative research (Patton, 1990). The determination of sample size in qualitative is based on what you want to know, the purpose of the research, what is at stake, what will be useful, what will have credibility, and what can be done with available time and resources (Patton, 1990). Nevertheless, there are at least two (2) aspects to be considered – *saturation* or redundancy (Lincoln & Guba, 1985, cited in Patton, 1990) and *variation representation within the target population* (Nastasi, 2004). Representative aspect has already been discussed in the paragraph just before this. In qualitative research, the emphasis is on saturation or obtaining a comprehensive understanding by continuing to sample until no new substantive information is acquired (Miles & Huberman, 1994). Dick (1990) argues that sample size is "data-driven" whereby sample size must be sufficiently large from which to derive a conclusion and usually it should contain at least twelve (12) interviewees before saturation occurs. However, on the other hand, Riege and Nair (1995) suggest that it is possible for stability to occur with less than twelve (12) interviews.

The sampling size for this research was built on the principle of saturation. In other words, obtaining a comprehensive understanding by continuing to sample until no new substantive information is acquired (Miles & Huberman, 1994). Adopting the principle of snowballing, this research continued to add more respondents until a saturation or a stable pattern of agreement or disagreement on the determinants was achieved.

Research instrument

The research instrument for this research is the convergent interview with a set of pre-designed semi-structured interview questions. It contains seven (7) open-ended questions. Question 1 to 2 were the opening questions where the questions were broad and general in nature. Question 3 to 5 were the probing questions. These probing questions were specific to generate a convergence view on the determinant of purchase decision of C-SHS in Malaysia SME's business. Question 6 which was to ask the interviewer any questions should be asked in regards to this research. Lastly, Question 7 was requesting for referral from the respondent to participate in this research.

4. DATA ANALYSIS

4.1 Results & Findings

This research adopted the thematic approach for data analysis. According to Boyatzis (1998) and Roulston (2001), thematic approach is one of the widely used techniques in qualitative data analysis. Thematic analysis is a technique in identifying, analyzing and reporting patterns (themes) within the data collected from the interview (Braun & Clarke, 2006). It minimally organizes and describes your data set in (rich) detail.

Based on the 17 interviews conducted, all the respondents have given their views and inputs with regards to the technological determinants of purchase decision of C-SHS in Malaysia SME's business. From the thematic analysis process, all the consolidated initials codes can be grouped into eight (8) *main themes*. Table 4.1 below summarized each of the technological determinants with respect to the preliminary theoretical framework of this research.

In summary, the eight (8) technological determinants, inclusive of the two (2) new discoveries, of purchase decision of C-SHS in Malaysia SME's business are relative advantage, system compatibility, system complexity, existing IT infrastructure, trialability, cost of purchase, system scalability, and system security. Therefore, this finding answered the research issue of this research.

Table 4.1

Summary of data analysis on the technological determinants with respect to the preliminary theoretical framework

Technological Determinants from theoretical framework (refer to Figure 2.1)		Respondents from SME's business in Malaysia																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
		EXP01	SVC01	SVC02	SVC03	MFG01	MFG02	MFG03	MFG04	MFG05	MFG06	SVC04	SVC05	MFG07	MFG08	SVC06	SVC07	SVC08	Frequency
1	Relative Advantage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
2	System Compatibility		✓				✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	10
3	Observability																		0
4	System Complexity	✓	✓		✓		✓		✓	✓					✓	✓	✓	✓	9
5	Existing IT Infrastructure	✓	✓		✓		✓				✓	✓	✓		✓	✓	✓	✓	10
6	Trialability										✓	✓	✓		✓	✓	✓	✓	7
7	Cost of purchase	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	16
8	System Scalability*			✓				✓					✓		✓	✓	✓	✓	6
9	System Security*		✓				✓						✓	✓	✓	✓	✓	✓	8

Legend: * new discovered determinant

Source: developed for this research

5.0 Conclusion

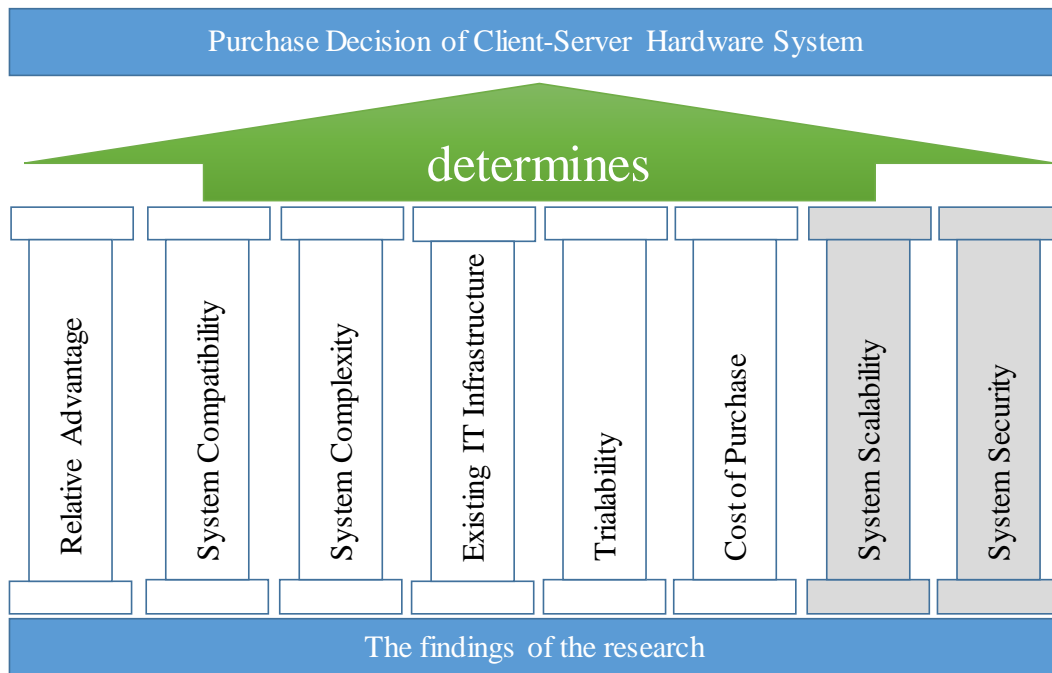
5.1 Conclusion on the Research Problem

With the above finding, it is now able to address the research problem of this research, that is: *How and why to establish the technological determinants of purchase decision of C-SHS in Malaysia SME's business?*

From Figure 4.1, observability is removed from preliminary theoretical framework and at the same time, system scalability and system security are the new technological determinant to the theoretical framework. Based on the findings, the preliminary theoretical framework has been amended to accordingly as shown in Figure 5.1 below.

Figure 5.1

Revised theoretical framework based on the findings from this research



Source: developed for this research

From the above revised theoretical framework, the following two (2) conclusions are drawn;

1. The purchase decision of C-SHS can be determined from the *technological* perspective in SME's business in Malaysia.
2. There are eight (8) technological determinants, inclusive of 2 newly discovered determinants, which determine the purchase decision of C-SHS in SME's business in Malaysia.

In conclusion, this research has addressed the research problem and provided answered to the research issue of this research with the eight (8) technological determinants of purchase decision of C-SHS in Malaysia SME's business.

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Collate acknowledgements in a separate section at the end of the article before the references.

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