Technology Trust and E-Banking Adoption: The Mediating Effect of Customer Relationship Management Performance

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Abstract
The electronic revolution in the Malaysian banking sector has started in the 1970's. The first visible form of electronic innovation in the Malaysian banking industry was the introduction of Automated Teller Machines in 1981. Finally, on June 1, 2000, the Malaysian Central Bank gave the green light for locally owned commercial banks to offer Internet banking services. Due to the drastic changes in the business environment, it leads financial institutions to revise their marketing strategies to stress long-lasting relationships with customers. Relationships is important criteria in the selection of private bank. In many conditions, customer satisfaction mediates the relationship between antecedent’s factors and marketing performance. Hence, CRM performance is about maintaining good relationship and repurchases behavior, word-of-mouth and customer retention. Trust has been studied in traditional physical commercial environments. In the marketing and management literatures, trust is strongly associated with attitudes toward products, services, and purchasing behaviors. So that, the main objective of this research paper is to investigate the role of CRM performance as the mediator in the relationship between trust and E-Banking adoption. Hence, this empirical paper confirmed the role of customer relationship management performance as the mediators in the relationship between trust and electronic banking adoption.

Key words: Trust, Customer Relationship Management Performance, E-Banking Adoption

1. Introduction
CRM practices have since become the in-thing of marketing strategies but unfortunately many people are still confused about the actual domain of CRM that perceives customers and service providers act as the major players. Under the concept of fair benefits for both customer and organization the definition of basic CRM principles by original authors were adapted to the rational marketing environment. Still the emphasis is on increasing customer value and satisfaction and for those reasons this paper intends to suffuse the organizational factors as a major tool for the CRM success.

Many studies relate the concept of customer satisfaction on adopting electronic banking service provided by the banks. Past study by Trust is the cornerstone for a successful and lasting relationship with the customer it largely determines the customer's future behavior and loyalty towards the business (Berry and Parasuraman, 1991). Hence, this paper will draw attention to trust as the main antecedent for e-banking adoption mediates by CRM performance.
2. Customer Relationship Management Performance

It is very important to measure the performance of CRM in our organization. Not many researches have been done to measure the performance of CRM in the organization. Previous researcher believe that CRM performance should be measured ultimately in terms of customer behaviors since they are the underlying sources of value of current customers of a firm and have the potential to increase the future revenue streams associated with them and those prospective customers (Wang, Lo, Chi, & Yang, 2004). Their argument was support by Grant & Schkesinger (1995) by saying that the fundamental of CRM is to ensure steady streams of revenue and maximization of customer lifetime value or customer equity, in this case customer behaviors become strategically significant.

Based on such literature, the propose of customer relationship strength, sales effectiveness, and marketing efficiency as relevant CRM performance evaluation metrics (Kim, Choi, Qualls, & Park, 2004). In their study, Kim et al., (2004) define CRM performance as the amount of improvement that retailers achieve in customer relationship strength, sales effectiveness, and marketing efficiency – achieved after implementing CRM technology.

As the requirement of this study, the concept of CRM performance will be based on the concept that introduced by the previous researcher which are base on the customer since they are the underlying sources of value of current customers of a firm. Customer retention, repurchase decision and word of mouth will be choose as a main indicators for CRM performance, as proposed by Wang et al., (2004). This concept was chosen due to the propose definition of CRM, so that the performance of CRM means the success of creating value for customer through organization for the objective of increasing the retention, repurchase and word of mouth for the purpose of achieving and improvement of and relationship quality.

Previous studies found that customer values have a significant impact on CRM performance (Wang et al., 2004). In the study, Wang et al. (2004) categorized the customer values to four categories of specification; functional value, social value, emotional value and perceived sacrifices. Their research have found that only functional value have a positive relationship to the customer behavior-based CRM performance. Wang et al. (2004) and many other researchers like Woodruff (1997), Slater (1997), and Day (1994) stress on customer value in term of benefit and sacrifice components. However this study will explore the organizational factors or values as a main contribution for CRM performance beside customer value.

3. The Antecedent of CRM Performance

3.1 Trust

Trust can be defined as "a generalized expectancy... that the word, promise, oral or written statement of another individual, or group can be relied upon" (Rotter, 1980). Also trust can be defined as users' thoughts, feelings, emotions, or behaviors that occur when they feel that an agent can be relied upon to act in their best interest when they give up direct control (Patrick, 2002). Many studies have proved the significant relationship between trust and electronic banking or any e-commerce adoption. For example, pass empirical study found that trust significantly important on online purchasing intention (Chen and Barner, 2007), web site loyalty (Flavian and Guinaliu, 2006), online banking commitment (Mukherjee and Nath, 2003), electronic banking adoption (Rexha et al., 2003) and behavior intention to adopt online information service (Chen and Corkindale, 2008).

On-line trust also found to be important for CRM performance regarding to e-banking
services. When CRM performance represents the customer intention to repurchase or reuse of e-banking services, there is an evident that trust is one antecedent of behavior intention in electronic services. For example, previous study by Chen and Barner (2007) proved the important of initial trust becoming important components on purchase intention towards online shopping. Chen and Barner (2007) found both online initial trust and familiarity with online purchasing have a positive impact on purchase intention. Their empirical research found positive influence of perceived initial online trust on purchase intention among the online books shoppers; however the familiarity with online purchasing rise up the influence of online trust towards the purchase intention. The context of their study is among the online customers in Taiwan. The customer intention to maintain with same providers are considered as repurchase intention which presenting the concept of customer relationship management performance in the current study. The familiarity of using online purchasing was not considered in the present study because all the respondents have electronic banking experience at least ATMs machine. Nowadays, the Wi-Fi and Wi-Max technologies provide wireless internet access, removing the need for physical connections. This enables the market to be extended to areas without the conventional telephone or cable networks. Although these new technologies are set to generate new business opportunities, they also represent a particular challenge to consumer trust (Flavia’ñ and Guinalíu, 2006).

Flavia’ñ and Guinalíu (2006) conducted an empirical survey on web site loyalty; their study reveals that an individual’s loyalty to a web site is closely linked to the levels of trust. Thus, the development of trust not only affects the intention to buy, but it also directly affects the effective purchasing behavior, in terms of preference, cost and frequency of visits. For instance, recent research has indicated that “trust” has a striking influence on users’ willingness to engage in online exchanges of money and sensitive personal information (Hoffman, Novak & Peralta 1999). The present study investigate the influence of perceived trust on customer relationship management performance that also have an appearance of behavior-based intention to loyal, word of mouth and repurchase the services.

Mukherjee and Nath (2003), conduct a survey in India to investigate the model of trust in online relationship banking. The main finding from their research confirms the positive relationship between perceived trust and customers’ commitment in online banking transaction. They strongly established that that the future commitment of the customers to online banking depends on perceived trust. According to them, perceived trust is one of the important factors for customer intention.

In the same year, Rexha et al. (2003) conduct the study on the impact of the relational plan on adoption of electronic banking. It was found that trust was the key factor influencing the adoption of electronic banking. Perceived customer satisfaction with the bank only impacted indirectly on the adoption of electronic banking.

The lack of trust is a critical issue that needs addressing pertaining to the internet and E-commerce adoption (CommerceNet, 1997). Evidently, Gummerus et al, (2004) mentioned that lack of trust has been one of the most significant reasons for customer not adopting online services involving financial exchanges. Researchers have suggested that online customers generally stay away from vendors whom they do not trust (Reichheld and Schefter, 2000). Researchers warn that a lack of trust may be the most significant long-term barrier for realizing the full potential of electronic commerce (Keen 1997; Hoffman et al. 1999). Trust is a dynamic process that must be built over time. Since business-to-consumer electronic commerce is still in its infancy, trust in this new market is still relatively scarce. However, various approaches have been suggested to help accelerate the trust building process for the online consumer. Literatures
have proven that trust is even more difficult to be built in an online environment (Hoffman et al. 1999).

4. The Consequence of CRM Performance

4.1 Customer Relationship Management Performance and E-Banking Adoption.

CRM performances explain the process of value creation which ends with the customer behavior intention (to retain, repurchase, positive word of mouth), customer satisfaction and loyalty towards the brand. Value creations become new strategies for the firms to increase their relationship with the customer, regarding to this Khalifa (2004) was highlighted that the move of firms’ strategy from transactional to relational can meet the customer needs. This strategy also will change the way of the firms looking at their customer from the general perspective to more personal. According to the marketing literatures, a basic ways to satisfy the customers is through fulfilling the customer’s need and expectation.

This research will choose the electronic technology usage by the bank customers as the consequence of CRM performance. Since the theory selected in this study is the Technology Acceptance Model 2 (Venkatesh and Davis, 2000), overall framework will design to have attitude tributes, intention and behaviors. In this study electronic banking adoption has been choose as the behavior of customers using electronic banking service.

Among the variables in customer requirement are machine availability, convenient service, friendly interface, openness, security and information updated. The researchers add that the increase in customer involvement through frequent contacts and feedback can influence customer satisfaction and keeping the customer retain with online bank services. Rexha et al., (2003) investigate the impact of the relational plan on adoption of electronic banking. Respondents in the study are individual from selected firms included accountants, financial managers, chief financial officers, financial controllers, and financial directors, as they represent key informants in company-bank dealings. They found that perceived customer satisfaction with the bank only impacted indirectly on the adoption of electronic banking.

Other study in Portugal found that electronic banking customer satisfactions are depending upon on performance of the channel used. Besides that the customer characteristics, and the type of financial operation, are also identified as important factors influencing this process acceptance (Pripio L., Fisk R.P. and Cunha, T.F., 2003). A survey among more than 2,000 customers of an Austrian online bank was conducted to gain important insights into how customer retention in the online banking business can be ensured. The empirical survey by Floh and Treiblmaier (2006) identified that trust and satisfaction are important antecedents of customer loyalty towards electronic banking services. According to Griffin J (1995), loyalty is geared more on behavior and when a customer is loyal, he or she exhibits purchase behavior. However, in e-service scenario, loyalty towards the services is enough to be defined as electronic technology adoption such in electronic banking services.

The study by Methlie and Nysveen (1999) investigate the ways of bank in Norway retaining their electronic banking customers. Their finding indicates that the adoption behavior or loyalties in online banking environment are similar to those in the physical market-place. However, customer satisfaction is found to have the most significant impact, followed by brand reputation, while switching costs and search costs, although significant, have minor explanatory power (Methlie and Nysveen, 1999). This study also proves that customer satisfaction which represents CRM performance is very important attributes for e-banking adoption. Study by Sathye (1999) empirically investigates the adoption of
Internet banking by Australian consumers. The purpose is to quantify the factors affecting the adoption of internet banking by Australian consumers. The sample for this survey was drawn from individual residents and business firms in Australia. They finding shows that security concerns and lack of awareness about Internet banking and its benefits stand out as being the obstacles to the adoption of Internet banking in Australia. If we compare this finding with the concept of customer satisfaction, it shows that security and benefits issues are very important factors for the satisfaction. The customers tend to be less satisfied if the service appear less security and benefits to them. This situation indirectly gives a negative impact on the e-service adoption.

Past research suggested that customer behavior in adopting electronic banking should consider other possible factors derived from literature. An important area is to look more deeply on marketing literature and test acceptance with for instance innovation theory and the TPB (Pikkarainen et al., 2004). The current research have chooses TAM theory from the basis of TRA and TPB believed to be a most acceptable theories that can explain customer acceptance of electronic system. TAM (Davis, 1989) is an extension of the Theory of Reasoned Action (TRA) (Ajzen & Fishbein 1980) and the Theory of Planned Behavior (TPB) (Ajzen 1985, 1991). TAM appears to be the most widely accepted model among information systems researchers (Lallmahamood, 2007). The reviewed of the literatures shows the possibilities of proposing CRM performance as the preceding factors for e-banking adoption behavior among the bank customer. So that, e-banking adoption was choose as the consequence of CRM performance in this research.

5. The Mediating Effect of CRM Performance

The study by Al-Hawari (2006) investigates the impact of automated service quality on bank financial performance and the mediating role of customer retention. The idea in their study is to propose that the quality of automated services by the bank is important because it can guarantee the bank performance. As we know, bank performance can be achieved when the bank manage to maintain the good relationship with the customer because it ensure that the customer will return. So those in their investigation they have chosen the customer retention as the mediator on the relationship between firm strategies and customer behavior adoption. Their empirical study confirmed the role of customer retention as a mediator in the effect of automated service quality on financial performance. Similar to our study, the main investigation is the role of CRM performance as a mediating factor in the relationship between the technology factors, process factors and customer value factors towards electronic banking adoption. Since the customer retention is constructed as behavior based CRM performance (Wang et al., 2004), we proceed with this mediating effect of CRM performance on the electronic banking adoption.

Other study by Al-Hawari and Ward (2006) also investigate the role of customer satisfaction as the mediator in the relationship between service quality and financial performance. Again, their study confirms the stand of customer satisfaction as the mediating variable in the relationship. Therefore, it is reasonable to proposed CRM performance as mediator variable in the relationship between technology factors such as trust, usefulness and ease of use towards electronic banking adoption. One of the main dimensions in CRM performance is customer satisfaction (Wang et al, 2004). Research by Lam, et al (2004), hypothesize that customer satisfaction mediates the relationship between customer value and customer loyalty from the basis of the cognition-affect-behavior model. The results support most of the hypotheses and, in particular, confirm the mediating role of customer satisfaction.
In 2001, Robertson et al. conduct a study to investigate the inter-relationship between service value, service quality, satisfaction and behavior intentions. They found that service quality does not have a direct relationship to behavior intentions; rather it indicates that the effect is indirect through the customer satisfaction and customers’ service value evaluation. These findings confirm the mediating effect of customer satisfaction in the relationship between service quality and behavior intentions. Their finding was supported the previous research finding by Bagozzi (1992) and Gotlieb et al. (1994).

The study by Colgate and Smith (2005) explores the role of relationship banks towards the success in the customer relationship between the bank and their customer. Their study confirms the role of relationship banks as a mediating factors in creation the successful customer relationship positively in the technology context compared to face-to-face environment. This research finding can be considered in arguing the important of relationship quality in creating successful customer relationship in technology base communication environment.

Regarding to the literatures that has been reviewed, the present empirical paper has proposed CRM performance might mediates the relationship between technology trust and e-banking adoption.

6. Research Framework

Figure 1 showed the causal relationship between technology trust, CRM performance and e-banking adoption.

7. Objectives and Methodology

The main objective of this empirical paper is to investigate the relationship between technology trust and CRM performance, the relationship between CRM performance and e-banking adoption and last but not least to investigate the mediating effect of CRM performance in the relationship between technology trust and e-banking adoption.

675 questionnaires were distributed to the academic staff of three universities in the northern state of Malaysia. Out of this number, 350 were returned, 43 of which were excluded because they contained too many missing values. Thus, a total of 307 questionnaires considered valid and were used for empirical analysis, giving a response rate of 45.5 percent.

8. Result

As shown in Table 1, the Cronbach Alphas of the measures were all comfortably above the lower limit of acceptability that is > 0.5. Hence, all the measures were highly reliable.

Table 1. Reliability Coefficients for the Variables in the Study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number of Items</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic banking adoption</td>
<td>6</td>
<td>0.74</td>
</tr>
<tr>
<td>Customer relationship management</td>
<td>9</td>
<td>0.94</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived online trust</td>
<td>9</td>
<td>0.96</td>
</tr>
</tbody>
</table>
Table 2. Regression Analysis on the Influence of Customer Relationship Management on Electronic Banking Adoption

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRM Performance</td>
<td>0.845</td>
<td>0.049</td>
<td>0.703</td>
</tr>
</tbody>
</table>

Note: R² = 0.495; F = 298.396; Sig. F = 0.00; **P < 0.01

B = Unstandardized coefficient beta; SEB = Standard error of regression coefficient; Β = Beta coefficient

With the F value of 298.396 (p < 0.005), indicates that customer relationship management performance is significantly influencing electronic banking adoption. Furthermore, the model is rather strong with customer relationship management performance explaining 49.5 percent of the variation in electronic banking adoption. We also note that the score for β is .70, which confirm that customer relationship management performance makes the highly contribute to the dependent variable (Table 2).

Table 3. Regression Analysis for Factors Influencing Customer Relationship Management Performance (N=307)

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Standard Coefficient</th>
<th>t</th>
<th>Sig.</th>
<th>Beta (β)</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Trust</td>
<td>.408</td>
<td>6.75</td>
<td>.000</td>
<td>.375</td>
<td>2.67</td>
</tr>
</tbody>
</table>

To investigate which antecedents that have the most influence on customer relationship management performance, we used the beta values as showed in the table. Based on the beta values Perceived trust (β=.41), exercising the influence on customer relationship management performance.

The mediator effect of the customer relationship management performance on the relationship between independent variables and electronic banking adoption were measured based on Baron and Kenny (1986). It shows that the beta coefficients in model 1 are significantly higher than the beta coefficients in model 2. The mediation effects of the customer relationship management performance are also explained by the increase in R square corresponding to the inclusion of the customer relationship management performance into the model. The increase of R square in model 2 explained the increase in the variation in electronic banking adoption by the mediation effect of the customer relationship management performance. With the reference to above table, the results indicate that the relationship between perceived of trust and electronic banking adoption is fully mediated by the customer relationship management performance (β change from 0.395*** to 0.107).

Table 4. Hierarchical Multiple Regression Analysis on the Mediating Effects of Customer Relationship Management Performance

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Independent Variables</th>
<th>Std Beta Step 1</th>
<th>Std Beta Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Banking Adoption</td>
<td>Perceived of Trust</td>
<td>.395***</td>
<td>.107</td>
</tr>
<tr>
<td>CRM Performance</td>
<td>Mediator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>F Change</td>
<td>.38</td>
<td>.52</td>
</tr>
<tr>
<td>Sig. F change</td>
<td></td>
<td>92.51</td>
<td>86.28</td>
</tr>
</tbody>
</table>

Note: Significant levels: ***p<.00; **p<.01; *p<.05
(Step 1 refers to regression with the independent of two antecedent factors; whilst Step 2 refers to regression with the mediator variable).

9. Conclusion and Recommendation

From the above literature, we can conclude that the technology trust is important for CRM performance and e-banking adoption. Furthermore, CRM performance has a significant impact on e-banking adoption. The analysis result also support the mediating effect of CRM performance on the relationship between technology trust and e-banking adoption.

For the practices, the e-banking services provider must ensure that their online services equipped with trust element for the success of adoption. A cost should be invested to meet the responsibility of the managers and all the staff as required by CRM principles. The management must start thinking about developing brand loyalty, positive word of mouth (WOM) through technological trust among the customer to support the CRM performance and e-services adoption.

References


E- Service Quality, Ease of Use, Usability and Enjoyment as Antecedents of E-CRM Performance: An Empirical Investigation in Jordan Mobile Phone Services

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Abstract

Electronic Customer relationship management performance E-CRM is a comprehensive business and marketing strategy that integrates people, process, technology and all business activities for attracting and retaining customers over the internet and mobile phone to reduce costs and increase profitability by consolidation the principles of customer loyalty. Therefore, the results of E-CRM performance are repeat purchase, word of mouth, retention, cross buying, brand loyalty and customer satisfaction. The keen competitive in the communication and mobile phone service market place and the increasing numbers of mobile phone users all over the world has influence the researchers to investigate ease of use, usability, enjoyment and e- service quality as antecedents of electronic customer relationship management performance in mobile phone services industry. 488 questionnaires have returned and analyzed. Four factors been tested to investigate the relationship with E-CRM performance. The analysis shown that e- service quality, ease of use and usability was positively significant towards E-CRM performance. Enjoyment has failed to predict E-CRM performance. This paper makes a theoretical and methodological contribution and suggestion for the managers in improving their E-CRM performance in mobile phone service industry.

Key words: E-customer relationship management performance, Mobile Phone Services, e- service quality, ease of use, enjoyment and usability.

Key words: relationship management, CRM

1. Introduction

The development of wireless communication systems started in the 1930s with the use of 'Walkie-talkies' during the Second World War to enable foot soldiers to stay in contact with the headquarters (Elliott and Philips, 2004). In the US, AT&T Bell introduced the first commercial radiotelephone service in 1946, to connect between mobile users in cars and the public fixed network. The Improved Mobile Telephone Service (IMTS) launched by Bell Systems in the 1960s, which laid the basis for commercial-sector mobile communications.

Developments in microprocessor technologies in the late 1970s and early 1980s enabled the introduction of the reliable wireless communications system, the so-called first generation. Furthermore, Mobile telephony developed out of radiotelephony in the early part of the twentieth century, but it was primarily used by naval, military, police and fire services (Gascoigne, 1974).

Mobile phones first appeared in United Kingdom during the early 1980s, but were expensive and large. However, modern mobile phones are small, compact, easy to use and have become an essential part of life.
for many people. Mobile phones enable users to maintain contact with family, friends and business associates. By the end of the 1980s, less than 1% of the UK population had a mobile phone. By April 2000, there were approximately 25 million mobile phone subscribers (40% of the potential market) and this is grow to 45 million (75% of the potential market) by 2005 (Report of the Royal Society for the Prevention of Accidents, 2004). Furthermore, United Nations report indicated that by the end of 2008, the number of cellular telephones subscribers reach four billion people out of 7.6 billion the whole world's population (United Nations report, Al-Rai Magazine, 2008).

Recently, mobile phone service industry plays a significant role in all sectors. Therefore, this role cannot be ignored. Therefore, no economy can achieve an appreciable level of development without effective telecom sector. Moreover, Global telecom spending put at US $1.5 trillion for the year 2004 and reached US $2.0 trillion dollars by 2007 (Telecommunications Industry Association: Industry Playbook 2004). Furthermore, the role of the information and communication technology ICT sector in enhancing sustainable development in Jordan has expanding considerably in the last few years, substantial steps have been taken in the legal and regulatory environment that will facilitate the realization of the growth ICT sector in Jordan. Dynamic changes in the development of the telecoms sector occurred recently.

There has been little work on determining and defining exactly what CRM is in the regular business channels and even less in the e-business channel. Many elements are still unclear and causing disagreements among scholars. Technology plays a role in the successful implementation of CRM. Nevertheless, only few studies have discovered the factors that influence E-CRM technology (Avlonitis and Panagopoulos, 2005). Additional research is needed to understand whether and how capabilities of E-CRM technology provide a factor for E-CRM success (Greve and Albers, 2006).

CRM was born from relationship marketing and is simply the practical application of long standing relationship marketing principles which have existed since the dawn of business itself (Gummesson, 2004). However, a number of authors propose that an emphasis on the 4Ps marketing mix is no longer the dominant marketing logic and that RM may be a more appropriate “new” paradigm for marketing thought theory and practice (Dwyer et al., 1987). With increasing focus upon RM, the CRM linkage becomes clear: CRM provides management with the opportunity to implement relationship marketing on a company wide basis effectively. Although the basis of CRM has been around since 1956, it is only within the last 6 to 10 years that CRM has created a significant impact in the business world (Nairn, 2002).

E-CRM is a combination of hardware, software, process, applications and management commitment to improve customer service, retain customer, and provide analytical capabilities (Romano and Fjermested, 2002). CRM is a more complex and sophisticated application that mines customer data that has been pulled from all customer touch points, creating a single and comprehensive view of a customer while uncovering profiles of key customers and predicting their purchasing patterns. Technology that tracks and analyzes customer behavior allows companies to easily identify the best customers and focus marketing effort and reward on those who are likely to buy often. Acquiring a better understanding of existing customers allows companies to interact, respond, and communicate more effectively to improve retention rates significantly.

According to Lee-Kelley, Gilbert and Mannicom, (2003) there is lack of literature
on E-CRM and more research work is needed in this area. This paper will discuss the e-service quality, ease of use, enjoyment and usability as antecedents of E-CRM performance in Jordan Mobile Phone Services by reviewing the conceptual article and research findings.

2. Literature Review

2.1 Electronic Customer Relationship Management E-CRM

E-CRM is a new phenomena that come out from the Internet and web technology to facilitate the implementation of E-CRM. It focuses on internet- or web-based interaction between customer and service provider (Chang, Liao and Hsiao, 2005). There are two approaches for E-CRM, business approach and technology approach. E-CRM within businesses has increased dramatically over the last few years, and will continue to do so in the future. The market of E-CRM products in all economic sectors increased rapidly to $125 billion by 2004, up from $34 billion in 2002 (Iconocast, 2003).

Many authors agree that there is no unified definition of CRM / E-CRM. The term has been defined in different ways, with no clear agreement, but there are two approaches to define CRM/E-CRM, management approach, and information technology approach. However, when we emphasis on management approach, some authors defined CRM stand for Customer Relationship Management which is an integrated approach to identifying, acquiring and retaining customer (Ellatif, 2008).

Since the differences between CRM and E-CRM as mentions by many authors are minor and obvious, the definition for CRM and E-CRM is almost the same except E-CRM uses the internet as a tool or medium. However, the definition of E-CRM is still not clear but most of the researchers and practitioners agree that E-CRM is a business strategy that applies the technology power to tie together all aspects of a company’s business to build long-term customer relationship and customer loyalty.

The “E” in E-CRM not only stands for “electronic” but can also have many other meaning and indications. Suresh, (2002) indicate that “the core of E-CRM remains to be cross channel integration and organization; also the six ‘E’s of E-CRM are briefly explained as follows “Electronic channels, enterprise, empowerment, economics and evaluation.

The concept of E-CRM systems refers to the ability to support customers and dealing with them without human treatment, or interference in the narrowest limits. However, it depends on the use channels in order to deal directly with customers through e-mail and website and mobile phone. In addition to some of the techniques, wireless, chatting and web, wireless application protocol and technical ATM are other possible techniques (Yazbek, 2001).

E-CRM develops the traditional CRM approach of technology tools, such as Internet, website, and wireless, into the e-commerce applications of the overall organization. Some advantages exist when the organization considers using an E-CRM approach to its service interaction marketing, such as quick service/response time, two-way interactive service relationships, and the ability to supply service for customers from anywhere at any time (Pan & Lee, 2003).

It is clear that the relation between the customer and the service providers is become an important issue recently. E-CRM is the main factor to business success. Therefore, it is only natural that companies and service providers to give a greater focus to E-CRM performance. The focus is more on customers instead of products or services; focusing customer's needs and wants to achieve customer's satisfaction and loyalty. E-CRM is all about increasing profitability and enabled
businesses to keep customers under control and making the customer feel they are actually a part of the business progress (Shoniregun, et al., 2004).

Measuring the performance of E-CRM in the organization is very important to assist the companies to increase the revenue and enhance customer loyalty. E-CRM technology should be more advanced and sophisticated to meet the requirement for developing and knowledgeable customers. Greve and Albers, (2006) stated that the usage of CRM technology consistently has a strong impact on CRM performance. They propose that the more comprehensive CRM technology, and higher CRM Technology usage, better CRM performance across the phases of the customer lifecycle. However, CRM technology shows important impacts on the performance of the customer relationship.

E-CRM performance has become a growing concern in marketing and information technology research and practice. Yet despite a number of research reports by both practitioners and academic institutions there remains little evidence of any robust relationship between e-service quality, ease of use, enjoyment and usability with E-CRM performance. Moreover, little is known regarding the underlying factors that influence the CRM performance (Chen and Ching, 2004; Wang et al., 2004). This study investigates e-service quality, ease of use, enjoyment and usability as antecedents of E-CRM performance.

2.2. Usability

Usability is defined as the degree to which a user can complete tasks effectively and efficiently. A usable system is one that meets the needs of the user. Usability is concerned with functionality/usefulness, ease of learning, ease of use, aesthetics, user satisfaction and quality (Uehling, 2000). Gould and Lewis, (1985) suggest that any system designed should be easy to learn, easy to remember, and useful that it should include the essential functionality to develop work and productivity, and be easy and pleasant for users.

According to a traditional definition, usability consists of five usability factors: ease of learning, task efficiency, ease of remembering, understandability, subjective satisfaction (Lausesen and Younessi, 1988). Recent business surveys propose that up to 50% of E-CRM implementations do not give measurable profits on investment. The limited success of E-CRM implementations can be attributed to usability and resistance factors (Fjermestaad and Romano, 2002). They suggest that if organizations want to get the most benefits from their E-CRM implementations, they need to revisit the general principles of usability and resistance and apply them effectively. Manning et al., (1998) expected that 50% of potential sales from a Web site are lost when Web site visitors cannot find the appropriate product, services, or information. They also found that almost 40% of visitors do not return to a site when their first visit results in a negative experience. Evidently, if the browsers cannot use a Web site to find a product or service easily, they will not buy, and will switch to another provider on the website.

Recently the rapid advances in wireless and mobile phone communications have led to faster connection speeds, larger device screen size, multiple modes for inputs and new applications. However, one major issue that has not been addressed so far is the usability of mobile phone. Usability of the mobile phone depends on several factors including how the information is organized and browsed (AlShaali and Varshney, 2005). When using mobile phone device.

Even with these advances in telecommunication technology, a majority of mobile phone users were not able to find the desired information, as there has been significant progress in the usability of websites. Service providers attempt to derive
and use the lessons and experiences for enhancing the usability of mobile phone. Finally, little empirical research in the services marketing literature has been done to examine behavioral intentions and its antecedent factors in online services (Hackman et al., 2006). This study attempts to address this gap by examining the ability of usability as one of the antecedents to explain behavioral intentions in E-CRM performance context.

2.3 Easy of use

Ease of use is defined as the degree to which a person believes that using an information system would be free of effort. It is one of the “classical” concepts in information systems research (Davis 1989; Sanders and Manrodt, 2003; Venkatesh, 2000). A significant body of research in information systems has accumulated evidence for the existence of an effect of ease of use on initial user acceptance and sustained usage of systems (Venkatesh, 2000).

Some previous researchers have noted perceived ease of use as the extent the person accepts using services with no additional cost (Davis et al., 1989; Al-Gahtani, 2001). Davis, (1989); Davis et al., 1989) posits perceived ease of use as the extent to which a person believes that using a particular system will be free of effort. .

Gefen and Straub, (2000) propose that the significance of perceived ease of use will vary with the type of task being addressed. They hypothesize that ease of use will not have a important influence on usage for something that is task oriented, such as making a purchase online, but will be significant in a task that is more essential, such as gathering information.

The two constructs, perceived ease of use and perceived usefulness proposed in TAM, have been analyzed exclusively and used to link with other external variables such as system attributes and social norms, and are proved as effectively predict the individual’s actual behavior from his/her behavioral intention (Davis, 1989, 1993).

Furthermore, a study by Ramayah and Lo, (2007) found that systems or technologies, which appeared to be easy to use and easy to understand, would be more useful from the user’s perspective. Bruggen and Wierenga,(2005) hypothesize that ease of use will be positively related to the individual impact of CRM systems. The success of the system used depends on the level of ease of use of the system. In conclusion, it can be concluded that easy of use is one of the technology factor that plays significant role in E-CRM performance. Therefore, this study proposes easy of use as one of the antecedents that influence E-CRM performance.

2.4 Enjoyment

Enjoyment can be defined as the degree to which performing an activity is perceived as providing pleasure and joy in its own right, aside from performance consequences (Davis et al., 1989; Venkatesh, 2000). Enjoyment in the mobile phone service context can be viewed as the degree to which the activity of service like chatting, games and so on is perceived as fun and enjoyable. Compared with other activities such as online shopping and information system uses, enjoying mobile phone service is more experience-oriented. However, the most important motive for playing online games is seeking to have fun and pleasure. Players who experience enjoyment and the emotional response of pleasure are more likely to be motivated to play more (Huang and Cappel, 2005). Enjoyment had been added into TAM by (Davis et al., 1992), and proved to be an important antecedent to behavior intention.

Previous studies in electronic commerce have so far explored the role of enjoyment in instant messaging (Li, P.Y, Chau, and Lou 2005), and online shopping (Koufaris 2002), but not mobile phone service. Previous research found enjoyment
to be a critical factor in other online activities such as e-mail use and online shopping (Eighmey and McCord, 1998; Jarvenpaa and Todd, 1997). Because online gaming is an e-commerce application with an emphasis on generating enjoyable experiences, the role of enjoyment in system usage has yielded mixed results. Teo, H, Lim, G and Lai, (1999) found that enjoyment has an effect on the frequency of usage, but no significant effect on the variety of usage, and thus they acknowledge the need for other research to examine the role of enjoyment in behavior.

Users who perceive the use of mobile phone messaging as enjoyable are more likely to intend to continue using it. In addition, Koufaris, (2002) finds that shopping enjoyment plays a significant role in predicting consumer intention to return to a Web-based store. Furthermore, Lee et al., (2003) find that enjoyment not only directly influences behavioral intention but also indirectly influences it through attitude. Koufaris, (2002) found that shopping enjoyment could positively influence new Web shoppers to return to a site. Jarvenpaa and Todd, (1997b) found that online customers who perceive their shopping experience is enjoyable will increase their favorable attitude toward online shopping.

Wu and Liu, (2007) suggest that enjoyment is important antecedent to both behavioral intention and behavioral attitude, service providers have to consider the element of enjoyment to provide users with attractive services. When users achieve mobile phone gaming enjoyment, they are more likely to have positive attitudes toward playing mobile phone games and most important, they will be motivated to use the service frequently.

Definitions of perceived fun and perceived playfulness are quite similar to the concept of Perceived enjoyment. Igbaria, Schiffman and Wicckowshi (1994) indicated that perceived fun refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity. They found that system usage and perceived fun positively correlated with each other. Furthermore, Moon and Kim, (2001) discovered that the perceived playfulness had a positive significant impact on the intention to use the internet. On this basis, we expect that Perceived enjoyment affect E-CRM performance.

Generally, there are many reasons to studying enjoyment. According to Wu and Liu, (2007) the main reasons for studying enjoyment are; first, the impact of enjoyment on behavioral intention has yet to be examined in the online gaming context. Second, even with strong theoretical basis, Li et al., (2005) stated that the role of enjoyment in instant messaging and system usage have produced mixed findings. In other similar studies, Igbaria et al., (1995) found that there is no significant effects of enjoyment on system usage behavior, whereas Jarvenpaa and Todd, (1997) found a significant effect. Intrinsic motivation for using some mobile phone service as chatting, SMS, games and so on captured by the “enjoyment” construct, customer perceived fun and playfulness by using the mobile phone. Therefore, “enjoyment” reflects consumers’ perceptions regarding the potential entertainment of using mobile phone service. Based on our knowledge, very few researches have been done on the effect of perceive enjoyment on E-CRM performance.

2.5 E-service quality

During the 1980s, service quality received a great deal of attention as a key strategic factor for product differentiation to increase market share and boost profits (Phillips, Chang and Buzzell 1983; Buzzell and Gale, 1987). E service quality is another factor influence E-CRM performance, this research focused on the process in which consumers evaluate service quality.
E service quality is a new concept started on 2002. Ziethaml et al., (2002) introduced the concept of electronic service quality (e-SQ), which is defined as “the extent to which a website facilitates efficient and effective shopping, purchasing and delivery of products and services”. Furthermore, service quality can be defined also as “the difference between customer expectation for service performance prior to the service encounter and their perceptions of the service received” (Asubonteng, Mcleary and Swan 1996).

Many different understandings of commonly used terms SQ, was presented in the literature such as online service quality or website service quality, this problem due to the lack of formal service quality definition (Ziethaml et al., 2002). On the other hand, Zeithaml et al., (2002) introduced the concept electronic service quality (e-SQ) and their role in service quality delivery to customers. They provided the first formal definition of e-SQ. They define service quality as “the extent to which a website facilitates efficient and effective shopping, purchasing and delivery of products and services”.

The informational website is a simplest website, which provides information about a company and its products or services and generally offers contact information with different contact channels. Nowadays, many commercial websites are on a transactional level which offer payment functions and online reservation, and help customers choosing product and paying directly on the website. Transactional websites have also been found to be more efficient in attracting potential customers (Nysveen and Lexhagen, 2001a, b; Iliachenko, 2006).

Quality is related to customer satisfaction, retention and loyalty. Therefore, it is expected to be a determinant of success not only in a traditional environment, but also in an online market space (Wolfinbarger and Gilly, 2003). Service quality is important especially in the telecommunication industry. Wal, Pampallis and Bond (2002) conduct a research to investigate service quality in a cellular telecommunications company in South African in order to improve delivery of customer service. They stressed that the current state of the telecommunications industry in South Africa can be assessed using porters five forces model; namely, these are tangibles, reliability, responsiveness, assurance and empathy (Wal et al., 2002). These are widely used and proven model that potential competitive force.

With the internet and technology development, the web site has replaced the physical business unit. Perceived web site usability and new electronic environment is a very significant part of the corporate image and can affect shopping behavior. Today, web site design has been considered as a key factor when the organization provides services for its consumers use the Internet as a communication channel (Cristobal et al., 2007).

Perceived service quality is an overall judgment of a service that contributes to customer satisfaction, purchase intentions, and firm performance (Cronin and Taylor, 1992; Zeithaml et al., 1996). Many studies have been conducted to investigate the influence of service quality on customer satisfaction. Anderson, Fornell and Lehmann (1994) indicate that service quality has a positive effect on customer satisfaction and company’s profitability. It is clear that increasing customer satisfaction have direct effect on customer intention. Rust and Zahorik, (1993) assumes that the development of service quality leads to an increase in perceived quality and consequently increases consumer satisfaction and loyalty. The significance of service quality as an antecedent of customer satisfaction and eventually customer loyalty has been approved (Zeithaml et al., 1996; Rust, Zahorik and Keiningham 1995). Wang et al., (2004) iterated that customer
satisfaction contributes to more on E-CRM performance. Therefore, any variable that have possible impact toward customer satisfaction will also give a strong impact on E-CRM performance. Customer satisfaction is one of the major dimensions in E-CRM performance.

3. Methodology

3.1 Samples for the study

University students are selected as the respondents for this research. A stratified sampling was used to select approximately equal numbers of customers from each university. Questionnaires distributed to five universities in the northern, southern and central states of Jordan. 488 questionnaires returned and analysis. This brings the response rate of around 57 percent. All items were adopted from previous researches. Each of the items was accompanied by five-point response format, ranging from 5 = strongly agree to 1 = strongly disagree. Before the actual research, a pilot study was conducted to investigate the reliability and validity of the items, which are mostly adopted from the previous research. early responses are compared to late responses (Armstrong and Overton, 1977). According to a t-test analysis, these two groups of respondents had no significant differences across all of the variables. Accordingly, it seems that non-response bias did not appear to be a significant problem.

3.2 Measurement

The entire dimension used in this research is adapted from the previous research. For the purpose of the current study, the wording of the scale was modified slightly to match the domain of mobile phone users. The details are explained below in Table 1.

4. Findings

4.1 Correlation Analysis

Person correlation was used to describe the strength and direction of the relationship between two variables (Pallant, 2001). The values of the correlation coefficients (r) given in the table2 indicate the strength of the relationship between variables. The computation of the person correlation coefficient was performed to obtain an understanding of the relationship between all variables in the study. The value of the correlation coefficients (r) indicates the strength of the relationship between the variables.

Table 1: Sources of the Items to Represent the Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Questionnaire design</th>
<th>Previous alpha value</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-customer relationship</td>
<td>Likert scale 1-5</td>
<td>0.84-0.92</td>
<td>Wang et al. (2004)</td>
</tr>
<tr>
<td>management performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ease of use</td>
<td>Likert scale 1-5</td>
<td>0.92</td>
<td>Bruggen and Wierenga, 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Davis (1989)</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>Likert scale 1-5</td>
<td>0.87</td>
<td>Nysveen et al., 2005</td>
</tr>
<tr>
<td>Usability</td>
<td>Likert scale 1-5</td>
<td>0.91-0.96</td>
<td>(Lewis, J.R. 1995)</td>
</tr>
<tr>
<td>E-service quality</td>
<td>Likert scale 1-5</td>
<td>0.61-0.87</td>
<td>Yang Z, 2001</td>
</tr>
</tbody>
</table>

Majority of the antecedents are significantly correlated with ECRM
performance within medium to large r scores that above 0.35. According to Tabachnick and Fidell, (1996) and Pallant, (2001) the correlation between predictor and dependent variables must be below 0.7. If the score is more than 0.7, the variables must be deleted.

Table 2 Person correlations of study variables

<table>
<thead>
<tr>
<th></th>
<th>ECRM</th>
<th>USBL</th>
<th>EOUS</th>
<th>USFL</th>
<th>ESQ</th>
<th>ENJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECRM</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USBL</td>
<td>.51(**)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EOUS</td>
<td>.27(***)</td>
<td>.18(***)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESQ</td>
<td>.63(***)</td>
<td>.51(***)</td>
<td>.23(***)</td>
<td>.38(***)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ENJ</td>
<td>-.045</td>
<td>-.004</td>
<td>-.022</td>
<td>.066</td>
<td>.013</td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
Correlation is significant at the 0.05 level (2-tailed).
Electronic customer relationship management performance = ECRM, usability = USBL, Easy of use = EOUS, electronic service quality = ESQ, enjoyment = ENJ

4.2 Regression analysis

To determine the effect of E-service quality, ease of use, usability and enjoyment from the study. On the other hand, majority of the antecedents are statistically correlated with E-CRM performance with correlation values ranging from .27(***).63 (**) as shown in table 2.

Table 3 below provides evidence on the influence of the antecedent factors on E-CRM performance. With the F-statistic of 66.327 and Sig 0.000(a) provides evidence that the relationship between the independents and dependent variables is significant (R2 = .555; Sig = .000(a)). The R2 obtained indicates that the antecedent factors account for 55.5 percent of the variation in E-CRM performance. Of all the variables included in the regression equation, three variables emerged as significant predictors of E-CRM performance. These are E-service quality, ease of use, usability.

Table 3: multiple regression analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>B -.360</td>
<td>Std. Error .236</td>
<td>Beta</td>
<td>-1.526</td>
<td>.128</td>
</tr>
<tr>
<td>Usability</td>
<td>.149</td>
<td>.040</td>
<td>.129</td>
<td>3.725</td>
<td>.000 .668 1.496</td>
</tr>
<tr>
<td>Ease of use</td>
<td>.083</td>
<td>.030</td>
<td>.091</td>
<td>2.777</td>
<td>.006 .746 1.340</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>-.037</td>
<td>.028</td>
<td>-.038</td>
<td>-1.319</td>
<td>.188 .988 1.012</td>
</tr>
<tr>
<td>Electronic service quality</td>
<td>.254</td>
<td>.049</td>
<td>.211</td>
<td>5.211</td>
<td>.000 .490 2.043</td>
</tr>
</tbody>
</table>

Note: D V: ECRM R = .745(a); R Square = .555; F = 66.327; Sig = .000
5. Conclusions

This study proved that there are three antecedent variables that have a significant relationship with E-CRM performance, these factors are e-service quality, ease of use and usability. No significant relationship between enjoyment and E-CRM performance. The possible reason is that University students have many services to enjoy more than mobile phone service, such as, internet.

However, since there are so many other factors that might influence E-CRM performance besides the chosen factors, it would be useful and practical if they modeled and tested in an integrated framework and expanding the framework across industries and integrating more important factor that may influence E-CRM performance.

The results of this study give several implications for mobile service providers and marketing managers with regard to how to plan and market services that will be considered valuable by customers and used in the future. Furthermore, the present study considered as important grounds for formulating and implementing e-CRM performance in assessing service providers to assign proportionate amount of resources to achieve sustainable customer loyalty. In addition, results of this research will also go a long way in minimizing the observed inconsistency between; the service provider strategy and customers' perspective, which enable service providers to compare their customer perception of their offering strategy in relation to other providers and their customers to adjust their offering strategy.

Concerning the factors that influencing E-CRM performance. The present research suggests several factors as important determinants of E-CRM performance. Mobile phone service providers should strive to improve E-CRM performance in their efforts to attain higher level of customer loyalty. In summary, we believe that the current study provides beneficial implications for both services, computer games, sports, and libraries ....etc. Therefore, students use the mobile phone for other purposes as making and receiving calls, SMS service, discussing studying issues but not for enjoyment. Furthermore, most of the students use old types of mobile phone and this mobile phone have no facilities for internet serving. Therefore, they cannot enjoy the chatting or games service provided by the company. academic research and practitioners based on an insightful review of the existing work on some of the antecedents of E-CRM performance.

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Abstract
The study addresses the issues of skills enhancement that need be implemented in three distinct phases of enterprise development. Phase I is the developmental phase where potential entrepreneurs are provided with skills needed for venture take-off or start-up. Phase II is the enterprise creation phase while Phase III is the market development phase. This paper also discusses the multiple roles of the Techno Center during each of these distinct phases. Based on the analysis, the study found that there are gaps across industrial sub-sectors in term of various skills needed to create sustainable enterprise and entrepreneur development. Those gaps are cognitive, interpersonal, technical, creativity, computation, communication, intrapersonal, conceptual, managerial, analytical, technological, acoustic, design, self-management, innovative, basic managerial, supervisory, and marketing. The Techno Centre Enterprise Development Model highlights the central and multiple roles required of The Techno Centre in order to effectively provide support and services during various phases of enterprise development. The services include skill development, networking and linkages services; technology transfer and consultancy services; advisory services; and after-care services have different contents at different stages of the enterprise development.

Key words: technology park, sustainable enterprise, technology transfer

1. Introduction
As Malaysia step forward to achieve a developed country and as well as to achieve the objective of Vision 2020, Malaysia had extend its export market which was traditionally agricultural-based economy to manufacturing and production-based economy. At the same time, local market had increase simultaneously with current trend. This is base to Growth Domestic

Production, which had augmented to 8.8 percent per year for 8 years continuously in 90’s decade. The dynamic current economic growth in 90’s decade had situated Malaysia as an example among the developing countries. However, succeed is thorny to arrive at. Together with growing in manufacturing, attention also had been given to increase the usage of local resources as is to create job opportunities in the country.

The current economic growth indicates that economy currently is in the process of recovery after the recession. Therefore, all the economy activities will get back to usual as it before the recession period. Thus, to achieve the economic growth before recession, government had introduced several programs to encourage the production sector such as Vendor Development Program (VDP).
2. Supplier Development

Supplier development is a formal operation undertaken to elevate supplier performance and capabilities. (Hahn, et al. 1990; Hines, 1994; Hartley and Chai, 1996). Supplier development in a definition provided by Partnership Sourcing (1992) is "where the other’s success”. Watts and Hahn (1993) arguably states that the most important goal of supplier development programme is the improvement of product quality and because of that, many of the supplier development practices were quality related. Among the supplier development practices are as follows: importance of quality in the selection of suppliers, utility of data-based supplier rating system, reliance on few dependable suppliers, appropriate education provided to the suppliers, technical assistance provided to the suppliers, involvement of the buyer in the supplier's product development process, extension of long term contracts to the suppliers and clear specification provided to customer (buyer) and suppliers develop such a close and long term relationship that they two work together as partners. The principle is that teamwork is better than combat. If the end customer is to be best served, then the parties to a deal must work together and both must win. Supplier development works because both parties have an interest in each the suppliers. (Leenders 1966; Leenders and Blenkholm 1988; Burt 1989; Lascelles and Dale 1989,1990; Hahn et al. 1990; Newman and Rhee 1990; Galt and Dale 1991)

Forker, Ruch and Hershauer (1999) states that "for suppliers to reduce defects and production costs, cross organizational cooperation between the supplier's quality department and the buyers procurement department is essential." The supplier's quality department is chosen because it the one that will most likely to work with the buyer's procurement department in a supplier development programme. (Watts and Hahn 1993).

Source: Hahn et al. (1990).

Figure 1. Supplier Development Programme Framework
Pender (1993) promotes supplier development process to recognize and develop suppliers with the highest standards of quality. This supplier development process is strongly based on a clear quality policy with the sole objective (both on the part of buyer and supplier) of exceeding customer expectations.

Rusinak (1996), in a study of Australian industry, argued that a company’s competitiveness and future depends on the improvements that it and its supplier can make together. Focusing on supplier development and the Kaizen process can assist both buyer and supplier and provides significant benefits to the buyer.

How does a company go about in implementing a supplier development programme? Hahn et al. (1990) provided a more comprehensive model for supplier development programme. According to Hahn et al. (1990), "the basic objective of the purchasing function is to secure competent supply sources that will provide an uninterrupted flow of required material at a reasonable cost. This involves first the selection of competent suppliers in terms of technological, quality, delivery, and cost capabilities- and second, it requires working with them to upgrade their capabilities." He went on to say that the supplier development programmes, then, can be defined as any systematic organizational effort to create and maintain a network of competent suppliers.

3. Vendor Development Program in Malaysia

Vendor Development Program concept had been implemented widely in Malaysia, mostly in the automotive production industry which had been dominated by PROTON. Yet, a small number of publications had been published about VDP. Therefore, this section will discuss a number of key concepts for Vendor Development Program, mainly on the efforts from the perspective for entrepreneur development.

For the purposes of this section, VDP refers to the efforts carried out by an organization on how to develop and provide qualified vendors’ network or linkages, which can fulfill short-term and long-term needs. It will also include short-term and long-term collaborations between buyer and vendors to increase technical capabilities, quality, delivery and ability cost as well as to provide continuous progress.

Generally, the main goal for this program is to build the relationship, which gives a number of advantages to both parties to compete more effectively in the market. The main objective of VDP as had been determined by Ministry of Entrepreneur Development is to develop local entrepreneurs especially Bumiputera entrepreneurs of joint-venture companies to participate in business as component suppliers and producers, spare parts or similar equipments required by which are multinational companies and other anchor companies for the local market and/or export purposes.

In general, PROTON Vendor Development Program objectives also includes:

- To accelerate the country industrial process
- To provide open up market to the vendors
- To develop competent support industries
- To increase local product usage
- To reduce dependency toward imported sources
- To create stable supply
- To control rising prices
- To guarantee quality requirements
- To encourage the technology transfer from foreign country to local company
- To reduce administrative tender process work loads.
Agencies that involve with the implementation of Vendor Development Program are:

- Ministry for Entrepreneur Development
- Anchor companies
- Financial institutions
- Vendor companies
- Other government agencies such as SIRIM, MARDI, MIEL, PUNB, etc.

VDP gives priority to the company, which have participated in providing those programs. The Malaysian anchor company that provide VDP are PROTON, Sapura, SHARP, SONY, Land and General Bhd., MATSUSHITA, Philips and JVC, Hitachi, PERODUA, EPE Power Corporation Berhad., MOTOROLA Penang, SGS-Thompson Muar, Copal Precision and RC Centronic Electronics.

Upon the implementation of the VDP, the anchor companies experienced several advantages such as:

- Local product price advantage compared to imported goods
- Capability to control price changes
- Advantages in ensuring supply through frequent inspection as well as monitoring of the vendor site and during receiving of goods
- Capability to have continuous supplies
- Decreasing the level of stocks especially when Anchor Company implements the Just In Time (JIT) system.
- Standardized designs, specification and manufacturing compared with using annual tender process.
- Continuous supply can be assured as the supplier willing to increase their investment as the long term contract justify such action.

- Being registered under the Company Act 1965
- Has paid-up capital of between RM 100,000 to RM 2.5 million
- Have at least 70% local participation through equity and senior management by Malaysian.
- Has skilled and experienced workers/labors in related industry
- Has 3-5 years cash flow, assets, technology increment and management
- Can accept instruction, facilitation and consultation service.

The VDP has clearly provided many advantages to the participants involved including the anchor company and related vendors. There is a program known as “Tripartite Arrangement” that involved Ministry of Entrepreneur Development, Anchor Company and financial institutions to provide the financial sources needed. The banks that are involved in this program are Perwira Affin Bank, MAYBANK, Bank Pembangunan, Bumiputra Commerce Bank, D&C Bank and MIDF.

The effectiveness of VDP efforts to develop Bumiputera entrepreneur is clearly indicated by the increasing number of Bumiputera vendors that participate in the programs. For instance, at an early stage there are only 27 Bumiputera vendors participate. Then the number has increased to 45 vendors in 1993, 71 vendors in 1995 and 85 vendors in 1996 respectively. Therefore, the increment is 19.7 percents.

There are many VDP that had been organized by several companies like PROTON, Perodua, Land and General Bhd., Hitachi and Motorola Penang. PROTON initiated the program that had been the first to be implemented and is one of the successful VDP. Thus, this paper will use PROTON VDP as reference in following.
4. **Benefits of “Shared Resources” in Vendor Development Program (VDP)**

- Risk Reduction – Reduce F/C
- Lower total capital investment
- Faster entry and payback
- Economics of scales – lower A/C (large volume)
- Lower cost (share competitive advantage)
- Complementary technologies – technology synergy
- Access to government fund
- International expansion
- Value chain added
- Breakdown technological complexity
- Breakdown technological uncertainty.

By using the PROTON VDP as a benchmark, VDP can support Bumiputera entrepreneurs through:

- Structural changes
- Technical capability and product quality
- Product development
- Network, support, and market linkages
- Pricing and delivery system
- Vendor association
- Upgrading overall competency compared to international manufacturers or producers.

VDP also developed Bumiputera entrepreneurs by providing support in term of:

- Jump-start/ initial step in venture creation
- Technology
- Finance (like “Tripartite Arrangement” program).

The main constraints in implementing and increasing vendor development programs are:

- Vendors ability to design/create good business planning
- Lacking in knowledge with regards to the anchor company as requirement and terms of supply
- Failure to fulfill factory audit and quality control standardization
- Low commitment in terms of attitude, capital and time.

Therefore, to enhance the VDP program, the agencies involved especially anchor company and vendors have to create reciprocal relationship through:

- High level of trust
- Adopting an open/transparent approach
- Maintaining close communication
- High level of commitment.

5. **Objective**

The main objective of this study is the development of a conceptual framework for the proposed Techno Centre from the business perspective after taking into account successful experience elsewhere. In addition the study also suggests roles for the proposed Techno Centre in entrepreneurship and vendor development.

6. **Methodology**

Information was obtained from primary and secondary data. The secondary data was sourced from publications such as industry reports and previous studies. The primary data was obtained through field survey and interview using structures and semi structured questionnaires. The key sources of primary data were gathered from SMIs around the Kulim High Tech Park areas. The data will be processed and analyzed using statistical and other approaches. The presentation of the information obtained was made in line with the objectives of this study.
7. Findings of the Study

This section analyzes the skills required for managerial and professional staff, scientist/researcher, engineers and designer, non-professional technical and supervisory staff, sales staff, factory workers, clerical and supporting administration staff. The second part of this section also analyzes the management service and training needs and service area needs by industry group.

8. Skills Requirement

8.1 Skills Required for Managerial and Professional Staff

The study indicates the skills needed according to profession. The study finds that 45.6% of managerial skills are required for managerial and professional staff followed by conceptual background (16.2%), analytical and intrapersonal (10.3%), computation (5.1%) technical (4.4%) and others skills. However, only 0.7% of creativity skills required for managerial and professional staffs.

8.2 Skills Required for Scientist/Researcher

The study reveals that among scientist/researcher, managerial and analytical skills are placed as the most important skills (30%) rather than computation skills, conceptual background and cognitive.

8.3 Skills Required for Engineers and Designer

Among engineer and designer the skills that most required are design (20.9%), technical skills (20%), technological (15.7%), conceptual background (3.8%) and others. The smallest percentage goes to computation skills (1.7%).

8.4 Skills Required for Non Professional Technical and Supervisory Staff

Moreover, the study shows that basic managerial skills contribute the highest percentage of 36.5% to the skills required for non-professional technical and supervisory staffs whilst supervisory contributes the lowest percentage of 2.9%. Innovative, self-management and technical (computer) skills show the percentage of 3.8% required for non-professional technical and supervisory staffs.

8.5 Skills Required for Sales Staff

For sales staff the skills required are accounted for communication skills (46.2%), followed by marketing skills (28.2%) conceptual background (7.7%), supervisory (6.4%), interpersonal and analytical (3.8%), motivation (2.6%) and computation skills (1.3%).

8.6 Skills Required for Factory Workers

For factory workers the skills required are mostly basic skills. The study shows that basic operation skill is required most (28.3%) cognitive (product knowledge) (18.2%), conceptual (17.2%), interpersonal and self-discipline (15.2%), supervisory (8.1%), analytical (6%), computation skills (4%) and communication (3%).

8.7 Skills Required for Clerical and Supporting Administration Staff

The study indicates skills required for clerical and supporting administration staff which 18.9% is accounted for administrative skills, 15.3% is accounted for accounting skill, 9% is accounted for communication skills and 7.2% is accounted for intrapersonal appearance.

9. Management Services and Training Needs Within Industry Groups

Table 1 shows the survey result for management service and training needs by five industry groups, such as E&E, Chemical & non-metallic, Mechatronics, Biotech, and ICT. The areas of management service and training needs by industry group are industrial management, financial management, accounting, marketing, ICT,
human resource management, quality control, TQM, Export management, technology, economics studies, market studies, and project appraisal/feasibility studies.

**Table 1. Management Services and Training Needs Within Industry Groups**

<table>
<thead>
<tr>
<th>Area</th>
<th>Industry group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Automotive (%)</td>
</tr>
<tr>
<td>Industrial management</td>
<td>N/A</td>
</tr>
<tr>
<td>Financial management</td>
<td>N/A</td>
</tr>
<tr>
<td>Accounting</td>
<td>N/A</td>
</tr>
<tr>
<td>Marketing</td>
<td>38.5</td>
</tr>
<tr>
<td>ICT</td>
<td>30.8</td>
</tr>
<tr>
<td>Human resource management</td>
<td>N/A</td>
</tr>
<tr>
<td>Quality control</td>
<td>69.2</td>
</tr>
<tr>
<td>TQM</td>
<td>N/A</td>
</tr>
<tr>
<td>Export management</td>
<td>N/A</td>
</tr>
<tr>
<td>Technology</td>
<td>53.8</td>
</tr>
<tr>
<td>Economics studies</td>
<td>N/A</td>
</tr>
<tr>
<td>Market studies</td>
<td>N/A</td>
</tr>
<tr>
<td>Project appraisal/feasibility studies</td>
<td>38.5</td>
</tr>
</tbody>
</table>

**Table 2. Service Area Needs Within Industry Groups**

<table>
<thead>
<tr>
<th>Area</th>
<th>Industry group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Automotive (%)</td>
</tr>
<tr>
<td>Technical project guidance</td>
<td>57.1</td>
</tr>
<tr>
<td>Advise on selection of equipment, machinery and raw materials</td>
<td>57.1</td>
</tr>
<tr>
<td>Seminars/workshop on technical subjects</td>
<td>78.6</td>
</tr>
<tr>
<td>Energy conservation</td>
<td>21.4</td>
</tr>
<tr>
<td>Pollution control</td>
<td>21.4</td>
</tr>
<tr>
<td>Safety awareness</td>
<td>78.6</td>
</tr>
<tr>
<td>Scaling-up</td>
<td>21.4</td>
</tr>
</tbody>
</table>

The results of the survey indicate that the needs for industrial management service training are high in all industrial sectors. Other services and training that highly needed are quality control, human resource management, and the marketing skills. However, there are differences in training need across industry groups (refer to Table 1).

**10. Service Area Needs by Industry Group**

Table 2 shows that service area needs by five industry group, such as E&E, Chemical & non-metallic, Mechatronics, Biotech, and ICT in areas of technical project guidance, advise on selection of equipment, machinery and raw materials, seminars/workshop on technical subjects, energy conservation, pollution control, safety awareness, and scaling-up.

The service area needs across industry group are different. For example, technical project guidance are highly need in Mechatronics industry. Safety awareness service is needed in all industry groups.
11. Enterprise Development Action Plan Model

Based on the analysis and findings of the study, there are gaps across industrial sub-
sectors on various skills needed to create sustainable enterprise and entrepreneur
development. Those gaps are cognitive, interpersonal, technical, creativity, computation, communication, intrapersonal, conceptual, managerial, analytical, technological, acoustic, design, self-management, innovative, basic managerial, supervisory, and marketing.

To address these issues, we suggest that the enterprise and entrepreneur skills enhancement be implemented in three distinct phases. Phase I is the developmental phase where potential entrepreneurs are provided with skills needed for venture take-off or start-up (Figure 2). Phase II is the enterprise creation phase (Figure 3) while Phase III is the market development phase (Figure 4). The following sections will discuss the multiple roles of the Techno Center during each of the distinct phases.
During the early period of the enterprise’s existence, the role of the Techno Centre could be that of a mentor. It will provide incubator facilities and support for the entrepreneur to jump-start his venture. The entrepreneur will need training in a number of skills. For example, the skills development that would be required would be such as technical, innovative, conceptual, and creativity. Besides that, Techno Centre will provide facilities and services like the business premises, equipment, and administrative services. For technology transfer, Techno Centre could participate in technology adoption and patent acquisitions decisions. In addition, Techno Centre’s role in networking and linkages could be that of a fund-linker. The Techno Centre also could provide after-care services such as business counseling and advisory services such as company registration and business planning.

In Phase III, the venture would have reached a relatively matured stage where it could need support to develop its market and other potential. The role of the Techno Centre would be that of a cluster facilitator or coordinator. Techno Centre could still provide skills development services to the entrepreneur such managerial, marketing, conceptual, and development skills. Besides that, Techno Centre will continue to provide the facilities and services like logistics, premises, equipment, and engineering & design. In technology transfer, the Techno Centre will provide services in patents, licensing and other commercialization activities, and advise on technology upgrade. The networking & linkages activities would cover product market development, fund linker, promotion, and trade mission. Techno Centre could also continue to provide after-care and advisory services such as legal, business planning, accounting and financial services.

The Techno Centre Enterprise Development Model in Figure 4, highlights the central and multiple roles required of The Techno Centre in order to effectively provide support and services during various phases of development of the targeted users of the Techno Centre. These services are skill development, networking and linkages services; technology transfer and consultancy services; advisory services; and after-care
services have different contents at different stages of the enterprise development.

Lastly, for access to facilities and equipment, it appears that there many opportunities for formalizing collaboration with businesses and is likely to grow in importance in the coming years.

Emerging trends provide some suggestions with respect to issues the Techno Centre should address:

- Ensure routine testing contributes to the Techno Centre overall mission. Adopt policies for the Techno Centre to allow routine testing and as a source for outside income.
- Systemize an approach for informing businesses of the unique facilities and equipment. If businesses are not aware of the unique equipment and facilities available at Techno Centre, it is difficult for them to access it.
- Develop customized protocols for allowing businesses to easily access the appropriate technical and administrative staff, facilities and equipment.
- Compile a directory of unique equipment and facilities having the potential for being of interest to business. Publicize this information on the web and in other marketing documents.
- Investigate approaches to assisting Techno Centre strategic business partners in addressing Techno Centre’s need to upgrade facilities and equipment. This service could become part of an overall agreement between Techno Centre and those firms with which the Techno Centre wishes to establish a sustained, long-term relationship.
- Form a Technology Transfer Oversight Committee (TTOC) to give attention to this mechanism, reviewing and revising the Techno Centre policies as warranted in conjunction with relevant institute, centers, and departments. The TTOC can provide broad parameters within existing policy to provide guidance for business collaboration. The TTOC could also investigate approaches for encouraging both business and faculty to expand collaboration in the future.

References


The Implementation of Balance Score Card for Performance Measurement in Small and Medium Enterprises: Evidence from Malaysian Health Care Services

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ABSTRACT

The needs for SMEs to measure their performance is to improve their service to customers, employees, societies and stakeholders. The purpose of the study was to investigate the implementation of Balance Score Card as the performance measurement system in SMEs. In this study, 1000 mailed questionnaires were sent to health care services in Malaysia. Out of this, only 105 responded and data collected were analyzed. Using factor analysis with varimax rotation technique, the study found four factors with eigenvalue value more than 1.0. Those factors that explained total variance of 69.346 percent, indicated the four components of BSC implemented by SMEs in Malaysian Health Care Services. Those components are as follows: learning and growth, mission and vision, customer and internal business perspective.

Key words: Balance Score Card, Performance Measurement, Small and Medium Enterprise

1. Introduction

Small and Medium Enterprises (SMEs) have played a crucial role in economic development in Malaysia. Their contributions to the economic and employment in the country are undeniable. SMEs have been progressively developing as the engine of growth for the Malaysian economy. It is now recognized that SMEs make a significant contribution to the socio-economic and political infrastructure of developed and developing countries (Matlay and Weshead, 2005). Normah (2006) in her survey found that 99 percent or 519,000 of the total SMEs establishments are in the main economic sectors of manufacturing, services and agriculture and 86.5 percent represent the services sector. Being a key component of the government’s economic growth strategy, a more competitive and resilient SME sector needs to be developed. Porter (2006) claimed that healthy and growing SME sector is recognized to be vital for sustainable competitive advantage and economic development at local, regional and national levels.

It is increasing recognized that SMEs tend to be the main source of employment in an economy. SMEs also stimulate private ownership and entrepreneurial skills; provide broad based sources of growth whilst also acting as incubators for developing domestic enterprises into large corporation. In researches by Robinson and Pearce (1984); Abdullah (2000) and Wang et al. (2006), they agreed that SMEs stand out in many important industries such as retailing, service
and construction and from crucial forward and backward links in the supply chain of large scale capital intensive manufacturing industries, for instance automotive, mining, marine and defense. In addition, the existence of SMEs alongside large firms gives competitive and structural balance to industries and marketplaces or else it will be dominated by only few large players (Beaver & Jennings, 2000; Peacock, 2004). SMEs position themselves to cater the segment that compliment the presence of large industries. In other words, SMEs often occupy fragmented or niche markets which large firms either cannot economically enter or are reluctant to enter because of "unattractive" risk-return considerations (Brouthers at el., 1998).

Another important feature of SMEs is, even though SMEs have limited resources, they are capable to produce new products and innovations. This enables them to in participate in the competitive setting. This is emphasized by Acs and Audresch (1990) that generally SMEs have limited resources for research and development (R&D) investment, they contributed positively and disproportionately to innovative activities. Perhaps as a result of the association with entrepreneurial activity and innovations, SMEs serve an important "seedbed" role for the growth of the industries and the establishment of future large companies (Howard, 1997).

The overall importance of SMEs is summarized by Ibielski (1997 quoted in Hashim & Abdullah 2000) as follows

"[SMEs] are mighty minnows, reflecting the competitive spirit that a market economy needs for efficiency; they provide an outlet for entrepreneurial talents, a wider range of consumer goods and services, a check to monopoly inefficiency, a source of innovation, and a seedbed for new industries; they allow an economy to be adaptable to structural change through continuous initiatives embodying new technologies, skills, processes or products."

In recognition of this, the Government has made the development of SMEs a high priority area. This is reflected in the national development agendas, namely Ninth Malaysia Plan (9MP) and the Third Industrial Master Plan (IMP3), in which the key strategies for SME development are outlined for the 2006-2010 and 2006-2015 period respectively. The Census of Establishment and Enterprises 2005 found that most of business establishment (99.2 percent) is SMEs of which about 80 percent are micro enterprises. The Census results also showed that SMEs are major source of employment, offering for over 5.6 million jobs and accounting for 56 percent of total employment. However SME contribution to the economy is still low – SME contributed only 32 percent of gross domestic product and 19 percent of the total export value.

### Table 1. Macro Performance of SMEs

<table>
<thead>
<tr>
<th></th>
<th>2003 (%)</th>
<th>2005 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMEs’ contribution to GDP</td>
<td>31.9</td>
<td>32.0</td>
</tr>
<tr>
<td>SMEs’ contribution to employment (excl. Govt.)</td>
<td>55.8</td>
<td>56.4</td>
</tr>
<tr>
<td>SMEs’ share of total exports</td>
<td>18.9</td>
<td>19.0</td>
</tr>
</tbody>
</table>

Source: Data estimated based on the Census 2005’s profile and other relevant data

According to Venkatraman and Ramanujam (1987), the performance of SMEs; their growth and profitability is fundamental to the overall health of the economy. Although not all small firms pursue growth goals, their mere survival and provision of job for the owner-managers and/or their families add to the economic wellbeing of a nation (Kotey and Meredith, 1997). Herewith, it is important for the SMEs to measure their performance not only to know how the business is performing but also to enable it to perform better. Thus, the
The ultimate aim of implementing a performance measurement system is to improve the performance of an organization so that it may better serve its customers, employees, owners and stakeholders.

### 1.1 Background of Study

In Malaysia, there has been numerous support programmes provided by the government agencies and institutions aimed at fostering the development of SMEs. These support programmes can be broadly divided into five aspects among which are: financial and credit assistance; technical and training assistance; extension and advisory services; marketing and market research and infrastructure supports. Despite the fact that there are as many as 12 ministries and 40 government agencies such as Ministry of Entrepreneur and Cooperative Development (MECD), Ministry of International Trade and Industry (MITI), Majlis Amanah Rakyat (MARA), Small and Medium Industries Development Corporation (SMIDEC), Malaysian Industrial Development Finance Berhad (MIDF) and institutions that are involved in providing support programmes for SMEs, the accessibility of these supports to SMEs and how far SMEs make use of them are indeed difficult to ascertain.

For 2006, a total of 245 programmes involving financial commitment of RM3.9 billion have been identified for implementation to accelerate the development of SMEs (SMIDEC, 2007). These are aimed at strengthening the enabling infrastructure to support SMEs development. A well-developed financial infrastructure is able to meet the diverse financing needs of SMEs and is essential to support the competitiveness and continuous growth of SMEs.

Financing is a both demand and supply issue which is subject to the acceptability of a certain level of risky by the financier in return for an acceptable level of returns. SMEs generally fail to fulfill the institutional requirements for standard accounting and other financial information. Without complete financial and accurate updated information, it is difficult for financier to evaluate the performance of the SMEs and this can affect the evaluation of risk. Furthermore, the uses of solely financial information in evaluating performance measurement of SMEs were made obsolete in the information era.

A performance measurement system enables an organization to plan, measure and control its performance according to a predefined strategy. In short, it allows a business to achieve desired results. Performance measurement literatures have found that the traditional performance measures, such as profit, return on investment (ROI), sales growth were insufficient for decision making, planning and controlling operations in today’s rapidly change and hyper-competitive environment. They explained the results of past transaction and ignore what the future benefits could be. Having performance measurement employed in the organization, the SMEs are at better chance to obtain assistance which was formed to help SMEs.

### 1.2 Statement of Problem

One of the pertinent issues faced by SMEs is lack of accessibility to capital and credit facilities for the purpose of start-up and expansion. They failed to obtain finance mostly due to their failure in providing sufficient business information; financial guarantees as well as they are insufficiently informed or poorly advised about the appropriate sources of finance. Other reason is the time taken for the loan to be process.

“I am sure no bank will want to delay unnecessarily in giving out loans unless there are specific reasons. I can share with you that people have told me that it took so long to clear a loan but when I checked it was due to incomplete documentation” (Dr. Ng, 2006).
Due to the incomplete documentation, financial providers found difficulties in assessing the performance of the SMEs. Therefore, it is important for the SMEs to maintain rigorous business and financial records and submit complete information. Ennew and Binks, (1995), and Lattimore et al., (1995) agreed that SMEs are lack of necessary information and knowledge which hamper them to approach the financiers. The inability for SMEs to get the financial assistance will hinder them to grow and develop. As a result, it would affect the performance of SMEs.

Due to the problem, the need for better performance measurement and proper reporting on SMEs performance is highlighted. Balance Score Card (BSC) is recommended to be adopted by the SMEs. BSC translate the strategy to operational terms. SMEs could benefit the use of BSC in promoting growth, tracking performance, providing focus on what is important to the company, aligning goals and accountability.

1.3 Research Objective

This study attempts to contribute to the body of knowledge in the area of performance measurement systems by focusing on issues relating to multiple performance measures which are conceptualized according to the BSC framework. The scorecard provides an enterprise a view of an organization’s overall performance. Finally, it is intended by this study to create awareness on the part of owners/managers of the need for long term planning, especially the application of BSC in managing SMEs in order to ensure their continuous survival.

1.4 Scope of Research

The research covered small and medium private sector health services establishments in Melaka, Negeri Sembilan and Johor. These included the medical services and dental services. The medical services comprised of general medical clinics and specialist medical clinics. Specialist medical clinics comprised ear, nose and throat clinics, orthopedics clinics, eye specialist clinics, child specialist clinics, etc.

The private clinics are for-profit entities that provide modern inpatient care. Private practitioner consultation is the most widely used service in the private sector by the healthcare recipients. These are outpatient treatment facilities mostly setup by individual physicians, where payment is based on fee for service direct cash payment. Ambulatory private care is mainly provided by full-time general practitioners and supplemented by private practice of government doctors (Gruen et al., 2002).

2. Theoretical Background

2.1 Performance Measurement

Researchers have focus on performance measurement because critical evaluation of measurement approaches has been seen as a way to improve understanding of the underlying construct (Cameron & Whetten, 1983; Venkatraman & Ramanujam, 1986). Venkatraman & Ramanujam (1986) viewed ‘business performance’ that includes financial and operational performance and is a subset of the overall concept of organizational effectiveness, as a main domain of the performance concept in strategic management. Neely et al., (1995) defined performance measurement as

“… the process of quantifying effectiveness and efficiency of action. Effectiveness is referred to the degree of which stakeholder requirements are met, while efficiency measure shows the company’s resources are used when providing a certain degree of stakeholder satisfaction.”

Traditional financial measures such as return on investment (ROI), net profit, sales growth, and market share fail to capture the true picture of a firm’s value proposition
because they focus on the past. They consider the results of past transactions. Traditional financial measures are only part of the information that managers need to successfully guide their organizations through highly competitive marketplaces.

In early 1990s, Robert Kaplan and David Norton (1992) developed a management and development tool called Balanced Scorecard (BSC). It includes financial and non-financial measures, more specifically five perspectives that comprise mission and vision, financial, business process and learning and growth. Firms adopting the BSC usually increase the number of performance measures they use and identify a much broader group of measures than those they traditionally used.

### 2.2 Balanced Scorecard

The BSC is one of the most influential ideas of the twentieth century according to Harvard Business Review (Niven, 2002). BSC is a strategic performance measurement system. It was developed to guide organizations to achieve breakthrough results by embedding strategy at the heart of the organization. The concept was significantly different than any existing performance measurement system and generated considerable excitement.

BSC is a multi-criteria strategic performance and measurement tool. The BSC measures an organization’s performance from five key perspectives: financial, customer, internal business, learning and growth and mission and vision. Figge et al., (2002) state that;

“The concept of the BSC is based on assumption that the efficient use of investment capital is no longer the sole determinant for competitive advantages, but increasing soft factors such as intellectual capital, knowledge creation or excellent customer orientation become more important.”

### 2.3 Small Medium Enterprises (SMEs)

Malaysia adopted a common definition of SMEs to facilitate identification of SMEs in the various sectors and subsectors. This has facilitated the government to formulate effective development policies, support programmes as well as provision of technical and financial assistance. An enterprise is considered an SME in each of the respective sectors based on the annual sales turnover or number of full-time employees as shown in the table below:

### Table 2. SME Definitions in Terms of Annual Sales Turnover

<table>
<thead>
<tr>
<th>Sector Size</th>
<th>Primary Agriculture</th>
<th>Manufacturing (including Agro-based) &amp; MRS</th>
<th>Services Sector (including ICT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>Less than RM200,000</td>
<td>Less than RM250,000</td>
<td>Less than RM200,000</td>
</tr>
<tr>
<td>Small</td>
<td>Between RM200,000 &amp; less than RM1 million</td>
<td>Between RM250,000 and less than RM10 million</td>
<td>Between RM200,000 and less than RM1 million</td>
</tr>
<tr>
<td>Medium</td>
<td>Between RM1 million &amp; RM5 million</td>
<td>Between RM10 million &amp; RM25 million</td>
<td>Between RM1 million &amp; RM5 million</td>
</tr>
<tr>
<td>SME</td>
<td>Not exceeding RM5 million</td>
<td>Not exceeding RM25 million</td>
<td>Not exceeding RM5 million</td>
</tr>
</tbody>
</table>

Source: Small and Medium Industries Development Corporation (SMIDEC, 2007)

### Table 3. SME Definitions in Terms of Full-Time Employees

<table>
<thead>
<tr>
<th>Sector Size</th>
<th>Primary Agriculture</th>
<th>Manufacturing (including Agro-based) &amp; MRS</th>
<th>Services Sector (including ICT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>Less than 5 employees</td>
<td>Less than 5 employees</td>
<td>Less than 5 employees</td>
</tr>
<tr>
<td>Small</td>
<td>Between 5 and 19 employees</td>
<td>Between 5 and 50 employees</td>
<td>Between 5 and 19 employees</td>
</tr>
<tr>
<td>Medium</td>
<td>Between 20 and 50 employees</td>
<td>Between 51 and 150 employees</td>
<td>Between 20 and 50 employees</td>
</tr>
<tr>
<td>SME</td>
<td>Not exceeding 50 employees</td>
<td>Not exceeding 150 employees</td>
<td>Not exceeding 50 employees</td>
</tr>
</tbody>
</table>

Source: Small and Medium Industries Development Corporation (SMIDEC, 2007)
2.4 Health Services

The definition of health services adopted in this thesis is based on the recommendation of the ‘Malaysian Standard Industrial Classification (MISC) and definition used by the Ministry of Health, Malaysia (Health Economic Census, 2006).

2.1.1 Medical services

Refer to the services given medical doctor and surgical specialist, physicians, physiotherapists, radiologists and other professionals and para-medical practitioners on own account. Included are services provided only by establishments operated by doctors (issued with annual practicing certificates) registered with the Malaysian Medical Council (MMC) maintained under Medical Act 1971 (Amendment) 1993.

2.1.2 Dental services

Refer to the provision of dental and surgical services including fabrications of dentures by dentists on own account. Included are services provided only by establishments operated by dentist (issued with annual practicing certificates) registered with the Malaysian Dental Council (MDC) maintained under the Dental Act 1971.

3. Statistics Data

3.1 Response and Sample Characteristics

The researcher sent 1000 questionnaire to the target population. Out of this, only 105 questionnaires were returned which was equivalent to 10.5 percent of the total respondents. As mentioned in the previous chapter, even though this type of survey is preferable for the wider area coverage and cost-effective, it is known for the low response rate.

Responses to the question regarding gender revealed that male doctor/entrepreneur accounted for 75.2 percent and female doctor/entrepreneur comprised 24.8 percent of the responses. Age of the company is important due to the company’s experiences and maturity.

A total of 41 percent of the responses claimed that they have been operating for more than 21 years. Alongside, 27.6 percent have been in business for 16 to 20 years and 26.7 percent of the companies have been in business for 11 to 15 years and 4.8 percent were operating below 10 years time.

The study showed that sole proprietor dominated the types of business with 73.3 percent, followed by private limited company (20.0 percent) and the joint venture 6.7 percent. This showed that all of the respondents are from small enterprises. It is important to understand the type of ownership as this will lead to the result of the decision made by the owner.

Table 4. Company's Establishment

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 10 years</td>
<td>5</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>28</td>
</tr>
<tr>
<td>16 to 20 years</td>
<td>29</td>
</tr>
<tr>
<td>21 years and above</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
</tr>
</tbody>
</table>

From the responses, 73.3 percent of the respondent stated that they use their own capital to operate the business. This is followed by 26.7 percent of respondent using loan equity.

Table 5. Type of Ownership

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own capital</td>
<td>77</td>
</tr>
<tr>
<td>Loan equity</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
</tr>
</tbody>
</table>

In terms of the amount of capital, 46.7 percent affirmed that they invested RM50,000 to RM100,000 to the business.
An amount of 26.7 percent invested below RM50,000 and 17.1 percent invested RM100,001 to RM200,000. Out of this, 9.5 percent invested more than RM200,000 in order to operate the business.

The companies were also asked about who managed their account. A total of 49.5 percent of the respondents claimed that they appointed accounting consultant to keep their account. Some of the respondents assigned qualified staff, where 14.3 percent have qualified full time staff while 12.4 percent engaged qualified part time staff to do their account. Other than that, there were respondents who take into service non-qualified staff.

**Table 6. Account Keeper**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting consultant</td>
<td>52</td>
<td>49.5</td>
</tr>
<tr>
<td>Qualified full-time staff</td>
<td>15</td>
<td>14.3</td>
</tr>
<tr>
<td>Qualified part-time staff</td>
<td>13</td>
<td>12.4</td>
</tr>
<tr>
<td>Non-qualified full-time staff</td>
<td>18</td>
<td>17.1</td>
</tr>
<tr>
<td>Non-qualified part-time staff</td>
<td>7</td>
<td>6.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>105</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Around 17.1 percent hired non-qualified full time staff while 6.7 percent engaged non-qualified part-time staff. The decision on who keeps the accounting record would lead to the result, whether the accounting information are kept following the accounting standard. Approximately, 65.7 percent affirmed that their accounts are kept within the accounting standard while 34.3 percent stated that they do not keep their accounting information according to the standard.

**3.2 Descriptive Statistics**

Descriptive analysis on the four components are displayed in Table 7. The Table shows that responding organization place a major weight on internal business perspective (mean = 4.008), followed by customer perspective (mean = 3.988), mission and vision (mean = 3.985) and learning and growth perspective (mean = 3.933). All the Cronbach Alpha coefficients exceeded the lower limit of acceptability, which is usually considered to be 0.70 (Nunnally, 1978).

**4. Data Analysis and Results**

**4.1 Sampling Appropriateness**

It is important that all statistical assumptions for factor analysis are considered so as to make sure the analysis is appropriate. Among the first consideration before conducting factor analysis is the issue regarding sample size. According to Hair et al., (1998) as cited in Izaidin et al., (2008), a researcher would not factor analyze a sample of fewer than 50 observations, and preferably the sample size should be 100 or larger. The rule of thumb, the minimum is to have at least five times as many observations as there are variables to be analyzed, and the more acceptable size would be to have a ten-to-one ratio (Hair et al., 1998; Tabachnick and Fidell, 2001 as cited in Izaidin et al., 2008).

**Table 7. Descriptive Statistic**

<table>
<thead>
<tr>
<th>Component</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>3.771</td>
<td>4.210</td>
<td>4.008</td>
</tr>
<tr>
<td></td>
<td>0.863</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer</td>
<td>3.838</td>
<td>4.238</td>
<td>3.988</td>
</tr>
<tr>
<td></td>
<td>0.805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission</td>
<td>3.724</td>
<td>4.219</td>
<td>3.985</td>
</tr>
<tr>
<td></td>
<td>0.907</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial</td>
<td>3.181</td>
<td>3.743</td>
<td>3.386</td>
</tr>
<tr>
<td></td>
<td>0.851</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>1.038</td>
<td>4.257</td>
<td>3.225</td>
</tr>
<tr>
<td></td>
<td>0.900</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In this study, the sample size is 105 which are above the sample criterion of 50 samples. The initial number of independent variable items to be analyzed was 30 but later was reduced to 21 which exactly met the minimum items-observations ratio criterion. The items were dropped in the following analysis due to low loading.

Another mode of determining the appropriateness of factor analysis is to examine the entire correlation matrix. The Bartlett’s test of sphericity is a statistical test for the presence of correlations among variables, should be significant (p<0.05) for the factor analysis to be considered appropriate (Hair et al., 1998; Pallant, 2005 as cited in Izaidin et al., 2008).

The distribution in the populations ought to be normal in factor analysis. This assumption applies for all variables and all linear combinations of the variables. It is tested by Bartlett’s test that the data derived from multi-variable normal distribution (Tavancl, 2002), which revealed 1712.0 (p<0.000). The degree of freedom is 210.

Another measure to quantify the degree of inter-correlations among variables and the appropriateness of factor analysis is the measure of sampling adequacy (MSA). Sampling adequacy is measured by the Kaiser-Mayer-Olkin (KMO) statistics. KMO varies from 0 to 1.0. A value of 0 indicates that the sum of partial correlation is large relative to the sum of correlation. A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974), recommends accepting values greater than 0.5 as acceptable. Table 8 shows the Kaiser values and descriptions.

<table>
<thead>
<tr>
<th>Table 8. Kaiser Value and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;0.9</td>
</tr>
<tr>
<td>&gt;0.8</td>
</tr>
<tr>
<td>&gt;0.7</td>
</tr>
<tr>
<td>&gt;0.6</td>
</tr>
<tr>
<td>&gt;0.5</td>
</tr>
<tr>
<td>&lt;0.5</td>
</tr>
</tbody>
</table>

For this study, the value of KMO is 0.9, which falls into the range of being marvelous. With Bartlett’s Test of Sphericity and KMO tests, it indicates the validity of the scale is enough for factor analysis.

Table 9. KMO and Bartlett's Test

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | 0.866 |
| Bartlett’s Test of Approx. Chi-Square Sphericity df | 1712.0 210 |
| Sig. | 0.000 |

4.2 Factor Extraction

Factor analysis was performed to check if there is any multicollinearity between variables or inter-relationship principal component. Varimax rotation method was use to determine any underlying component for each variable. It is the most common rotation employed. It tries to produce factors that are as simple as possible by minimizing the variance loadings across the items within factors. Without the rotation, the factors has been identified but difficult to interpret (de Vaus, 2002).
This rotated solutions distinguishes items between factors that lead to high factor loadings becoming higher, lower factor loadings declining and there is no cross loading. This process makes it easier to see item that belong to the factors by identifying the loading values where the higher loading the more that item belong to that factors. An examination of actual that load on each factor also shows that the components are interpretable (de Vaus, 2002). All the items in the questionnaire will be group into several components with eigenvalues greater than 1.

Factor analysis Principal Component Analysis was used and 4 factors with eigenvalue more than 1.0 were gathered and 21 items with factor loads above 0.50 were obtained with Varimax Rotation Technique. These items seem to be covering all four factors. The variance these four factors explain are given respectively as follows: first factor explains 19.822 percent of the variance, second factor explains 19.404 percent of it, third factor explains 17.665 percent and the fourth one explains 12.455 percent. Total variance explained by these four factors is 69.346 percent.

With total cumulative percentage of variance of 69.346 percent, which is above the 60 percent, it satisfied the common satisfactory level in social sciences study (Hair et al., 1998). Thus, the scale developed has construct validity. The retention decision of each item was based on factor loadings were greater than or equal to 0.50. Convergent validity is by each factor having multiple-question loadings in excess of 0.50. The loadings are comparable to Hoque and James (2000).The communalities of the four factors described regarding the items varied between 0.520 and 0.889. Gorsuch, Lee and Comrey suggest that the more variance rates obtained after the analysis are, the stronger the factor construct of the scale is (Tavancl, 2002).

From the questionnaire, two items on mission and vision section, three items on customer perspective section, two items on internal perspective section and two items on learning and growth perspective section were dropped and will not used in further analysis due to low loading. Table 17 presents the result from the rotation where details of items loaded under each four factors can be clearly seen.

Factors are named taking into consideration the meanings of the items. The first factor includes 5 items and is named Learning and Growth. The five items that vary with learning and growth perspective are i) staff understands job objectives and responsibilities, ii) knowledge and skills

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staffs understand job objectives and responsibilities</td>
<td>0.844</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge and skills acquired through training</td>
<td>0.834</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company evaluates service for better performance</td>
<td>0.789</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company develops quality mindset of staffs</td>
<td>0.659</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company provides training and development for staffs</td>
<td>0.652</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear mission and vision</td>
<td>0.851</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers think the company is good</td>
<td>0.700</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission and vision developed by owner</td>
<td>0.684</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company has well structure management team</td>
<td>0.667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staffs understand mission and vision</td>
<td>0.613</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company gives better services</td>
<td>0.558</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission and vision aligned with organization culture</td>
<td>0.557</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company ensures staff satisfaction</td>
<td>0.692</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------------------------------------------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company able to retain employees</td>
<td>0.663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company maintain relationship with suppliers</td>
<td>0.648</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company keeps long-term relationship with customers</td>
<td>0.620</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting time is short</td>
<td>0.610</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company maintain good credit</td>
<td>0.557</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company uses information technology (IT)</td>
<td>0.656</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company upholds good billing accuracy</td>
<td>0.543</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training improves performance</td>
<td>0.768</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>4.163</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage variance explained</td>
<td>19.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Absolute values less than 0.5 were suppressed.

acquired through training, iii) company evaluates service for better performance, iv) company develops quality mindset of staff and v) company provides training and development opportunities to the staffs.

Third factor includes 6 items and is named customer. The six items that vary with customer perspective are i) company ensures staff satisfaction, ii) company able to retain employees, iii) company maintain long-term relationship with suppliers, iv) company keeps long-term relationship with customers, v) customer’s waiting time is short and vi) company maintain good credit.

Finally fourth factor includes 3 items and is named internal business. The three items that vary with internal perspective are i) company uses information technology, ii) company upholds good billing accuracy and iii) training improves performance.

5. Conclusion

From the finding, it showed that BSC is applicable in the Malaysian SME context. This is proved by the factor analysis and the reliability test done in the study. Conclusively, the adoption of four BSC components which are learning and growth; mission and vision; customer and internal business, are applicable for non-financial SMEs’ performance.

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Technology Commercialisation in a Developing Country: Current Condition and Its Challenge in Indonesia

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Abstract
Innovation is considered the main engine of economic growth in both developed and developing countries. Despite the important role of innovation, little has been understood about technology transfer becoming a commercial success in developing countries, especially in the Indonesian context. The purpose of this paper is to identify technology commercialisation activities in Indonesia. Based on secondary data sources, an analysis of the current state regarding the issue is constructed. The findings in this paper suggest that technology commercialisation in Indonesia is initiated at the levels of university, government research institution, and corporate. This study provides insights for policy makers, business leaders, and university administrators into the appropriate roles of institutions and organisations in promoting and assisting technology commercialisation activities of their respective inventors.

Key words: Technology commercialisation, developing country, university, government research institution, corporate

1. Introduction

1.1 The Importance of Technology Commercialisation for Reducing Indonesian Poverty

The Knowledge Based Economy (KBE) has become dominant in the 21st century, proving to increase a nation’s competitiveness. KBE refers to the use of knowledge and technologies as the main driver for growth and sustainability to produce economic benefits. The degree of KBE in a particular country is reflected in its Knowledge Economy Index (KEI). One of the main indicators for KEI is the economic regime and its performance (Ristek, 2008). UNDP (2008) shows that although Indonesia’s Poverty Index is steadily declining, the people of this republic still lag behind neighbouring countries. Indonesian Poverty Index in 2005 is 18.2%. The World Bank Institute (2008) exemplifies the fact further. Though recorded average economic growth gains more than 4% each year, 9.9% of the Indonesian workforce is unemployed.

The World Bank Institute (2008) has developed a methodology known as Knowledge Assessment Methodology (KAM) which can be used to benchmark countries, and to identify potential strengths and weaknesses of their transition towards KBE. The four pillars of KAM are similar to those of KEI, namely i) regime and economic performance, ii) education and human resources, iii) information and communication technology, and iv) national innovation system (NIS). Based on this methodology, we could make an initial observation that the slump in Indonesia’s regime and economic performance can be attributed to deficiency in each of the next three pillars, especially the final pillar (NIS) concerning innovation. Indonesia’s budget for research is approximately 0.07 percent of GDP, providing stark evidence of this
A study by Levit (2001) concludes that there to be no doubt that NIS is an important factor which determines national competitiveness. A functioning NIS in a country can be evaluated from the intensity and effectiveness of interaction and interconnection among its elements i.e. R&D institutions, universities, and industries, and the performance of supporting organisations such as those providing venture capital.

1.2 Research Questions

The following key questions are addressed in this study:

- Who are the key players of technology commercialisation in Indonesia?
- What are the main relevant initiatives/activities of technology commercialisation in Indonesia?
- What are the challenges of technology commercialisation activities in Indonesia?

1.3 Methodology

The present study was primarily based on a desk research of relevant existing studies, statistics, selected articles, policy documents, and expert opinions. A search for data regarding the current Indonesian condition in technology commercialisation by means of the internet with various keywords was done. Some Indonesian organisation websites which might relate to technology commercialisation were reviewed. The data collected were organised on the basis of key players as their activities related to technology commercialisation in Indonesia. The actors’ analysis was undertaken to describe the current state of technology commercialisation in Indonesia and its challenges. Next, technology commercialisation activities in India and China were presented as a benchmark.

2. Indonesian Technology Commercialization Mapping

Based on our desk research, three main sources of innovation think-tank in Indonesia can be identified, which are universities, government research institutions and corporate. Their technology commercialisation activities are described below.

2.1 Universities

One of the general policies of Indonesian universities is that research be conducted to develop knowledge in areas that are prospective and universal in order to improve the welfare of mankind. More particularly, the research should develop technology applicable to the building of the national economy’s strength. Aside from their ‘Tri Dharma’ mission (education, research and society empowerment), universities are now expected to produce technopreneurs who are able to develop competitive industries in the country for this era of globalisation.

Four of Indonesia’s leading universities, which are University of Indonesia (UI), University of Gajah Mada (UGM), Bogor Institute of Agriculture (IPB) and Bandung Institute of Technology (ITB), have already started their technology commercialisation activities. IPB and ITB have established their Intellectual Property Right (IPR) office (IPB, 2009; ITB, 2009), while UGM includes IPR activities within their Institute for Research and Society Empowerment (LPPM) office (UGM, 2009) and UI includes these activities within their office in the Directorate for Research and Society Empowerment (DRPM) office (UI, 2009). IPB, ITB and UGM also have their business incubator for accommodating their students, alumni and staff who are challenged to start their own businesses. Furthermore, UI started to realise its long-term vision of developing science parks since 2007. The science park will integrate all of its research, development and commercialisation activities.
2.2 Government Research Institutions

The Ministry of Science and Technology (RISTEK) appears as the key government player, with responsibilities including the formulation of relevant national policies and coordination of their implementation. Some other ministries (e.g. Department of Agriculture, Department of Industry and Department of Forestry) have their own research institutes. A clear coordination mechanism among ministries has not yet been developed. It is also important to note that the formulated research priorities previously noted are only partly reflected by their implementation in the research landscape, i.e. it will be difficult to follow the political directions, if the research capacities are limited in certain fields.

Generally Indonesian research has something to offer, its GCI (Global Competitiveness Index) being ranked 39th among 134 countries world-wide for quality of research institutions (World Economy Forum, 2008, p. 204). Among the most relevant research institutions reporting directly to the President, the Indonesian Institute of Science (LIPI) appears most involved in innovation-related activities. It holds a “Centre for Innovation”, is responsible for the small and medium enterprise (SME) support program IPTEKDA (Implementation of Science and Technology at Region), organises the “National Young Innovator Awards” and conducts S&T research for sustainable development. One of the most notable innovations from LIPI is Marmut Listrik LIPI known by its acronym, “Marlip”. Marlip is a battery-powered car which has resulted from extensive research at Centre for Research for Electricity and Mechatronics (P2 Telimek) conducted since 1998. This patented innovation has more than 80% of local content and being available in 8 variants (Kompas, 2008).

2.3 Corporates

Although Indonesia has transformed slowly from its agricultural base to become industrially prominent, industrial development still depends on foreign direct investment and foreign R&D. The majority of foreign companies in Indonesia only develop its manufacturing factories or setup its distribution office using Indonesia as its market. Only a few of them develop its R&D in Indonesia. At the same time only few Indonesian entrepreneurs develop technology based companies which have their own R&D facilities. In the automotive sector, no Indonesian national cars are in the market, all being foreign branded cars whose companies build their factories in Indonesia. While in the personal computer and notebook sector, no Indonesian brands are in the market as well. In the electronics sector, only one Indonesian manufacturer has its product in the market which is PT Hartono Istana Teknologi under the Polytron brand. Whereas in the software development sector, some software house already exists in Indonesia to supply Indonesian internal need.

3. Technology Commercialization Challenges

Transfer of technology from public R&D institutions to industry, especially by means of commercial mechanism, is a challenging task. LIPI (2006) shows the rising trend of patent being commercialised from public R&D institutions in Indonesia (2 patents in 2000, 7 patents in 2001, 6 patents in 2002, 8 patents in 2003, and 21 patents in 2004) although the relative percentage is still lower than that in the U.S.

One of obvious problem is that marketing was not designed from its inception by wide spread research neither did it result from program of an institutions. It is conducted only at the end of research activity, marketing has become an unwanted burden for researchers since it is not within their competency. Many researchers are not aware
of any industry need not related to their activities, since very limited contact has occurred between researcher and industry/market. R&D marketing should become the responsibility for all level of managements in the R&D organisation; it should not become the total responsibility of researchers who produce the technology or the results (Luxmore, 2000).

The effort to protect intellectual property yielded from research activities is very limited, most of research results being published only for benefit of the scientists. Such matters finally cause difficulties for marketing research results (RAMP-IPB, 2006). Lack of government incentives for industries causes them, especially large industries, to be unwilling to attempt utilisation of local research results and local technology, furthermore they have no incentive to invest and conduct research for themselves. They do becoming more willing to buy available technology from other countries (Spurling, 2002, RAMP-IPB 2006). Small and medium industries are more enthusiastic about using local technology and research results, unfortunately their budget is limited license purchase, so they seek free technology (RAMP-IPB, 2006). This causes limited collaborative research funds or limited royalties that could be received and spent by public R&D organisations. In the final analysis, most of the R&D budget should be provided by the government in the interests of results and budgetary efficiency.

4. Lessons from Other Developing Countries

Best lessons regarding the commercialisation of technology arguably come from the United States. Commercialisation of R&D and its results has been an important mechanism for economic growth in the U.S. as well as providing them with strategic advantages (Liu and Jiang, 2000; Wayne, 2003). However this study will focus on its benchmark countries, China and India. These two countries have been selected because they are developing countries which share similar characteristics to Indonesia, have huge number of population and share rapid economic growth over the last ten years.

4.1 China

China once had a very pragmatic approach: attracting Foreign Direct Investment (FDI) for cheap mass production, then gradually establishing indigenous R&D capabilities, launching pilot operations and scaling up successful operations. China was virtually trading market access for technologies, however that country’s competence and industrial vigour has led to it’s currently losing the competitive advantage of being a “low cost country”. If the country wants to maintain its economic growth, it will have to improve its own innovation capabilities. Being fully aware of the threats, China has taken steps towards building a high-performing innovation system. It has mobilised resources for S&T exceptionally rapidly on an unprecedented scale and is now becoming a major R&D player (OECD, 2007). Fast growth and high savings rates enabled the country achieve this.

Already in 1998 China has established a comprehensive National Steering Group for S&T and Education in the State Council as the highest coordination mechanism of the innovation system (Wang, 2007). The State Council has already established more than 50 S&T Industrial Parks to enhance international competitiveness in selected research priorities. These parks are filled with research centres, incubators and mainly foreign-funded businesses. As they have not yet sufficiently initiated indigenous innovation, Ministry of Science and Technology (MOST) now plans to raise the quality of these parks with the goal of establishing “world class” S&T parks in China by 2010 (MOST, 2007). In China, universities have been given considerable freedom to engage in profit seeking businesses. Such university-run enterprises can be either scientific/engineering
businesses or non-scientific business such as shops. Technology transfer and licensing from universities is also on the rise. In addition to technology transfers, contractual research, consultancy and enterprise incubation are widely encouraged as a means whereby university researchers work with private businesses. What is remarkable about the funding of scientific research in Chinese universities is the high proportion of funding from private companies, a total of 40%. This shows a very high level of readiness on the part of Chinese businesses to pursue University-Industry collaboration (Yujian, 2006).

4.2 India

India wants to be a “knowledge super power” by 2020 and has a fair chance reaching that goal. After the information technology (IT) revolution, the intellectual capital of India has attracted Multi-National Company (MNCs’) R&D centres so that 225 of the “Fortune 500 companies” today have their R&D centres in India. The biotechnology revolution could be next because India is fast becoming a top global innovator for high-tech products and services. Growth has been driven by rapid expansion in export-oriented, skill-intensive manufacturing and services, and has seen further rises in local demand due to rising incomes (Herstatt, 2008).

India’s innovation infrastructure is growing further, the main institutions include the prestigious and very successful Indian Institutes of Technology (IIT), which have been doubled this year with 8 new IITs. Together with the Indian Institutes of Sciences (IIS), the Indian Institute of Science (IISc) and the recently created Indian Institutes of Information Technology (IIIT), they have largely benefited from the rising investment of MNC in R&D in India through industry-university partnerships, mainly in the field of electronics and IT. Indian academic institutions became aware of the importance of protecting and disseminating their knowledge through patents rather recently and the trend seems to be continuing (World Bank, 2007; Ganguli, 2006).

5. Concluding Remarks

Indonesian technology commercialisation has already occurred in three types of organisations in Indonesia (university, government research institution and corporate). However its performance is relatively low, in term of quantity or value, when compared with that of India and China. The R&D budget available is relatively small, therefore Indonesia should focus on very limited sectors as occurs in India where the current focus is on IT with the future having biotechnology as its focus. Indonesia government should also encourage its corporate sectors to have its own R&D or outsource its R&D needs to an Indonesian university or a government laboratory as has been achieved in China which has successfully established Industry – University partnerships. The government should give incentives to industries which show a willingness to outsource R&D to Indonesian universities or government laboratories. On the other hand, universities and government laboratories should concentrate on researching industry’s needs, than researching the preference of particular scientists.

6. Proposed Research Agenda

Various approaches have been used to study the technology development process. Ravasi and Turati (2005) used a case study approach to investigate the development of two inventions by the same corporate entrepreneurs, one successful and the other unsuccessful. Cooper and Kleinschmidt (1986) also analysed a successful and an unsuccessful new product using case studies of 13 generic development activities. A logical step in this developing research area would be to investigate the technology development process and its commercialisation in Indonesia using case studies of two groups of inventor – academic
Research questions might be asked a prelude to more definitive research, perhaps employing a more generalisable either qualitative or quantitative research methodology: What extent are the steps similar? How do they differ? Can we use them to better understand the similarities and differences of processes followed by corporate and academic inventor? In general, how does the effect of the various elements differ between the academic and corporate arena, since clearly the barriers, challenges, and drivers to create and commercialise innovative technologies also appear to be different?

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