INNOVATION CAPABILITY, DISRUPTIVE TECHNOLOGY AND SME'S PERFORMANCE IN MALAYSIA

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ABSTRACT

The aim of this study is to examine the relationship between innovation capacity (IC), and firm performance (FP) mediated by disruptive technology (DT) among SMEs within Selangor, Malaysia. The theoretical model is based on the Resource-Based Theory and the Theory of Innovation. To answer the research questions, four hypotheses were formulated. They are; (i) There is a significant relationship between innovative capacity and SMEs performance, (ii) There is a significant relationship between innovative capacity and disruptive technology, (iii) There is a significant relationship between disruptive technology and SMEs performance, (iv) There is a significant relationship between innovative capacity and SMEs performance mediated by disruptive technology. Self-administrated questionnaires were distributed to 800 owner-managers of SMEs in Selangor. A total of 150 firms responded in this study. This study utilised the Partial Least Squares Structural Equation Modelling (PLS-SEM) to establish validity and reliability of measurement model and test the relationships. The results show a positive and significant relationship between innovation capacity and firm performance mediated by disruptive technology. Owner-manager of SMEs should emphasize innovativeness on all four (4) dimensions of innovations to ensure better firm performance. The results of this study also provides a better insight for various stakeholders to further understand the effects of IC and DT on SMEs performance. The study provides empirical evidence for theoretical relationship hypothesized in the research framework and also adds to knowledge on the importance of innovativeness in all aspects of firm's offering along with adoptation of disruptive technologies in predicting firm performance. The study is confined to firm operating in Selangor. It is recommended that future research should also include other state(s) in Malaysia.

Keywords: innovative capacity, disruptive technology, SMEs' performance,

ABSTRAK

Tujuan kajian ini ialah untuk mengkaji hubungan antara kapasiti inovasi (IC), prestasi firma (FP) perusahaan kecil dan sederhana (PKS) dan mengantara oleh gangguan teknologi di kalangan PKS di Selangor, Malaysia. Model teoritis adalah berdasarkan Teori Berasaskan Sumber dan Teori Inovasi. Untuk menjawab soalan penyelidikan, empat hipotesis telah di bentuk. Iaitu (i) Terdapat hubungan yang signifikan antara keupayaan inovatif dan prestasi PKS, (ii) Terdapat hubungan yang signifikan antara keupayaan inovatif dan teknologi yang mengganggu, (iii) Terdapat hubungan yang signifikan antara teknologi mengganggu dan prestasi PKS, (iv) Terdapat hubungan yang signifikan antara keupayaan inovatif dan prestasi PKS yang mengantara oleh teknologi yang mengganggu. Soal selidik kendiri telah diedarkan kepada 800 pemilik pengurus PKS di Selangor. Sejumlah 150 firma telah bertindak balas dalam kajian ini. Kajian ini menggunakan Model Persamaan Struktur Separa Separa (PLS-SEM) untuk membuktikan kesahan dan kebolehpercayaan model pengukuran dan menguji hubungan. Keputusan menunjukkan hubungan yang positif dan signifikan antara keupayaan inovasi dan prestasi firma yang di mengantara oleh gangguan teknologi. Pengurus pemilik PKS perlu menekankan inovasi dalam empat (4) dimensi inovasi untuk memastikan pretasi firma yang lebih baik. Hasil kajian ini memberikan gambaran yang lebih baik kepada pelbagai pihak berkepentingan untuk lebih memahami kesan kapasati inovasi dan gangguan teknologi terhadap prestasi PKS. Kajian ini memberikan bukti empirikal untuk hubungan teori yang dihipotesiskan dalam rangka penyelidikan dan juga menambahkan pengetahuan mengenai pentingnya inovasi dalam semua aspek penawaran firma bersama dengan penggunaan gangguan teknologi dalam meramalkan prestasi firma. Kajian ini terhad kepada firma yang beroperasi di Selangor. Adalah dicadangkan bahawa penyelidikan pada masa hadapan perlu di masukkan negeri lain juga di Malaysia.

Keywords: kapasiti inovatif, gangguan teknologi, prestasi firma PKS

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LIST OF ABBREVIATIONS

BNM	Bank negara Malaysia
BOS	Blue ocean strategy
CCM	Company commission of Malaysia (known as Suruhanjaya syarikat Malaysia)
DTI	Department of trade & industry
DV	Dependent variable
EFA	Exploratory factor analysis
EU	European union
EO	Entrepreneurial orientation
EPU	Economic planning unit
FAO	Food and agriculture organization
F&B	Food and beverages
GDP	Gross domestic product
HI	Human intellectual
ICA	Industrial coordination act
ICT	Information and communication technology
IO	Industrial organization
IP	Intellectual property
IPR	Intellectual property rights
IV	Independent variable
KMO	Keiser meyer-olkin
KTAK	Ministry of energy, water and communications
M&E	Machinery and equipment

MIDA	Malaysian industrial development authority
MITI	Ministry of trade and industry
MOF	Ministry of finance
MOSTI	Ministry of science technology and innovation
Myke Survey	Malaysian content knowledge survey
NAIC	North American industry classification
NPD	New product development
NSDC	National SME development council
NSI	National survey of innovation
OECD	Organization for economic co-operation and development
OEM	Original equipment manufacturer
OR	Original resources
OSLO Manual	OECD (Organization for economic co-operation and development) – guidelines for collecting and interpreting innovation data
PCA	Principal component analysis
PDP	Product development performance
PIP	Product innovation performance
RBV	Resource-based view
R&D	Research and development
RM	Ringgit Malaysia
US-SBA	United states-small business advocacy
SEM	Structure equation model
SmartPLS	SmartPLS statistical package

SMEs	Small medium enterprises
SMIDEC	Small and medium industries development corporation
SPSS	SPSS statistics software package
SSM	Suruhanjaya syarikat Malaysia
UK	United Kingdom
UNDP	United nation development program
URL	Universal resource locator
USA	United States of America
USD	United States dollar
US SBA	United States small business administration
UUM	Universiti utara Malaysia
VRIN	Valuable, rare, inimitable and non-substitutable
VRIO	Valuable, rare, inimitable and organization

LIST OF APPENDICES

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Chapter one (1) consist of background of the research, problem statement of the research, research questions, objectives of the research, motivation and relevant significance of the study, scope and limitation of the research, and concludes with organization of the thesis structure.

1.2 Background of Study

The thriving world's economic growth over the last few years has been aided and spurred by, the contributions of small firms in every country (OECD, 2008, 2015; EIM, 2010). Based on considerable contributions by the SMEs to the development of a country, many countries including Malaysian government had put in place various types of schemes, incentives, campaigns, assistance, and programs to further encourage more people to get involved into entrepreneurship particularly in SME sectors and enterprises. The impact of these efforts had positively resulted, in an increase of establishment of enterprises (micro, small and medium). Research by Deakins & Freel (2006) reported that, in terms of the establishment figure in the (United States of America) USA, more than 600,000 new firms have been established every year since early 1990s to 2002.

Despite increase of establishment, failure rate of these establishment are equally at alarming rate. In his research, Van Praag (2003) stressed, whilst the number of

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establishment is high, the survival of these firms is questionable. Many past surveys carried-out the world-over indicated high mortality or failure rates amongst SMEs, revealing closures, especially within the first five (5) years of their business operation (EIM, 2010 & US SBA, 2014). About approximately 30% of newly established firms in the (United Kingdom) UK ceased their business operation beyond fifth (5) year (Deakins & Freel, 2006) and that, 80% businesses failed within the first two (2) years of existence in Africa (FAIT Canada, 2004). Other researcher's findings further reveals (Baldwin *et. al.,* 2000) that, in Canada, only 77% of new entities survive in its first (1) year of business operation and about 36% of these firms remain in operation beyond their fifth (5) year. US SBA (2009) published that, 69% of newly incorporated firms in year 2000 survived for at least two (2) years and 51% remained operational after fifth (5) year. All the above findings indicated that, the incorporation of small firms may rather be relatively easy, nevertheless, many of these firms failed to prolong their business operation after a period of time.

Similar to any other economic blocks in the world, Small Medium Enterprises (SMEs) in ASEAN outnumbers the large enterprises, both in terms of, total number of firms and percentage (%) of employment in the ASEAN region. 96% of majority of the firms are SMEs and they make-up 50% - 80% of domestic employment (OECD, 2008). For instance, SMEs in the United States, which are known as small firms, makeup about 99.7% of total business establishment (US, Small Business Advocacy-SBA, 2014) and contribute no less than 50% share to the gross-domestic-product (GDP). According to

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Smale (2009), 51% of business establishment in the United Kingdom are SMEs, while Pettis (2010) reported 60% of SMEs in China.

Malaysian's SMEs contribute between 30% - 53% of the gross-domestic-product (GDP) and 19% - 31% of export (SME Annual Report, 2014/15). Aside from generating income and employment, SMEs also has a crucial role in gender and youth empowerment, as well as, addressing urban and rural poor through entrepreneurship promotion. Hence, the member states depend significantly on SMEs for their economic growth and development.

Nevertheless, SMEs are often hampered by various challenges such as, low level of innovativeness, inadequate capacity to adhere to standards and certifications, limitation towards access to finances, and minimal technology adoptions. SMEs in the global arena showed a mixed performance, with many countries wavering and continuing to recover slowly out from the 2008 and 2009 financial crisis, whereas development and growth of SMEs in other part of the world were mainly in line with their respective domestic economy's development and progress. On the long-term development of SMEs, the international community continued to discuss on affecting factors on a number of areas, in order to alleviate the constraints to SME growth and to promote long-term sustainability which include finance, internationalization to promote greater regionalization, technology adoption and raising awareness for greater Intellectual Property (IP) adoption, as well as, having business continuity plans (SME Annual Report 2014/15).

In the United Kingdom (UK), many SMEs had expected to increase their international activity during 2014, despite the gloomy outlook, according to a research report by the Western Union Business Solutions. The survey report, which included more than 1,000 UK SMEs engaged in international trade, revealed that, 83% of the respondents were confident about the UK's economic climate. As a result, they were likely to raise their global activities in 2015 onwards, with about 47% of them indicating an increased number of countries that they transact business within the last 12 months. The movement is expected to continue with more than quarter (34%) of United Kingdom (UK) SMEs with the view that, their international activity will grow in 2015 (SME Annual Report 2014/15). The survey also revealed that, UK SMEs were relatively more externally-oriented with a quarter (24%) of their revenue coming from exports, compared to other Western economies, such as, the United States (18%) and Canada (12%). Furthermore, the survey showed that, exports contributed a higher percentage of revenue for 38% of UK's SMEs (SME Annual Report 2014/15).

Research carried out by OECD (2009) and Blackburn & Jarvis (2010) highlighted that, large amount of job opportunities and total productivity was mainly contributed by the roles played by the SMEs. Findings by Almeidi & Jual (2012) further stressed that, SMEs are becoming more important in pursuit of the world economic and social development. According to Jones & Macpherson (2005), contribution by the SMEs to the national economies has been recognized in Asian countries, as well as, by the European over the past decades. Kamyabi & Devi (2011) maintained that,

contribution by the SMEs towards the development and growth of any economy is undeniable, both, in the developed and developing countries.

Similarly, numerous studies carried out on SMEs in Iran equally discovered similar findings. SMEs in Iran comparably generated large impact on generating employment, as well as, diversifying of their economy (Ale-Ebrahim *et al.,* 2010; Bayati and Taghavi, 2007; Zohari, 2008). Okpara & Wynn (2007) wrote that, widening interest in the field of management have benefited SMEs, owing to the strategic role of SMEs in advancing a country's wealth in terms of, elimination of poverty by creating and offering employment opportunities. Wennekers & Thurik (1999) suggested that, these sectors of economic activities are observed from various angles, such as, employment, social, political stability, yet equally, as enhancement of their innovativeness and competitiveness.

As reflected in Table 1.1, Malaysia is no exception as, the Company Commission of Malaysia (SuruhanJaya Syarikat Malaysia/SSM), through its five (5) yearly census publication, (SME Census 2011) reported that 97.3% of the firms were SMEs and this amounted up to 645,136 registered small companies in the country. Malaysian' SMEs contribute 35.9% to country's GDP, 65% of the nation's employment and 17.8% of the nation's exports. Hussain, Si & Ahmed (2010) found that, despite lower percentage in comparison to developed countries such as the 'United Kingdom' (UK) and the 'United States of America' (USA), yet it is measured, as quite high among the developing countries. Therefore, It is an irrefutable fact that Malaysian' SMEs leads a significant role in economic development (EIM, 2009; EPU, 2010).

Study by OECD (2015) showed that, SMEs make-up about 90% - 95% of the industries, generating about 60% - 70% of employment opportunities in most of the countries worldwide.

Table 1.1
SME: By Sector in Numbers.

Sector	Total Establishments (a)	Total SMEs (b)	Percentage (%) of SMEs over Total Establishments (b)/(a)*100	Total Employment by SMEs
Overall Total	**662,939**	**645,136**	**97.3**	**3,669,259**
Services	591,883	580,985	98.1	2,610,373
Manufacturing	39,669	37,861	95.4	698,713
Agriculture	8,829	6,708	76.0	78,777
Construction	22,140	19,283	87.1	275,631
Mining & Quarrying	418	299	71.5	5,765

Source: SMECorp, 2015.

Most governments the world over recognized the significance of SME's role in the economic development of a country. Again, the Malaysian government is no exception and under the (9) 'Ninth Malaysia Plan' (2006-2010), the development of strong and dynamic entrepreneurship community was the single most important economic agenda of the nation, where, the government has put great effort in the development of SMEs with various governments assisted programs (Central Bank of Malaysia, 2008). Under the (10) Tenth Malaysian Plan (2011-2015) achievements, RM1.606 billion ringgits to nation's GDP across all sectors at 7.5% growth per annum were contributed by SMEs. To further enhance performance and continuity, various strategies are formulated in the current (11) Eleventh Malaysian Plan (2016-2020) that will spur further economic growth. These strategies are equally aimed towards an

economy that will be driven by, high-value and knowledge-intensive activities. According to the (Bank Negara Malaysia/BNM) Central Bank of Malaysia (2008), the Malaysian government has recognized the contribution of SMEs as enormous to the economic divergence and that these firms have brought significant and positive impact to the whole economy of the country.

Owing to the importance of SMEs in the development of the nation's economy, the performance of SMEs has constantly become a center of interest among the researchers, academicians, universities, entrepreneurs, investors, trade organizations, and government agencies. Gartner & Shane (1995) and Thornton (1999) found that, the entrepreneurship is a growing phenomenon. Sathe (2003) further reveals that, the economy of the new world is entrepreneur oriented with the creation and rise of new businesses, hence hailing these entrepreneurs as the new champions of economic development and competitive enterprises.

On the other hand, findings by the 'Organization for Economic Co-operation and Development' (OECD, 2015) found that, the development of SMEs are often hindered by, lack of access to finance despite their important function in creating jobs and driving economic growth. Other various challenges facing SMEs in a globalized environment, also range from low productivity, lack of managerial capabilities, access to credit, difficulty in accessing technology; to heavy regulatory burden against SMEs (Lucky & Olusegun, 2012; Radam, Abu & Abdullah, 2008).

Within competitive environment, past findings by Wang (2003) pointed similar issues which are still in existence, such as, lack of managerial expertise, lack of financing, access to management and technology, low productivity, and tough regulatory adherence requirements. This challenging atmosphere and environment inevitably adds an increasing pressure on the operations of firms, which further threaten firms' profitability and their survival. Consequently, being equipped with competitive edge in order to remain operational, survival and sustain profitability is becoming increasingly critical for firms in SME sectors.

Nevertheless, few cases may be an exception, thus to regard and equate small business closures with failed businesses could gives wrong impression, and may be misleading. Bates (2005) findings reported that, based on U.S. Census Bureau's survey data, about 37% of year six (6) small business closures were considered, to be doing-well when decision were made to terminate business operations. Therefore, appreciating the motivation for discontinuance of small business is an important consideration in their economic contributions. Several findings as disclosed below provide a general scenario of issues and concern related to SMEs performance and potential outcomes, as well as, survivability of these firms. Findings from Korea by Jiyoung *at el.,* (2007) in their research on manufacturers and service industry relates that, support and assistance such as government funding on R&D performed by firms has no effect on performance and that government's R&D policy related to technology and human resources support has a positive effect on SMEs business performance, yet despite assistance provided by government, it do not guarantee positive performance and survival of SMEs.

The Malaysian government recognizes that, key success factor for SMEs is innovativeness, since the emergence of newer technologies and products have influenced the way businesses are conducted (NSDC, 2007). Oke *et. al.,* (2003) asserts that, encouraging creativity and innovation in entrepreneurship is also the agenda of governments in the member countries of the 'Organization for Economic Co-operation and Development' (OECD) and transitional, emerging and developing economies, as entrepreneurs are the means of growth, pooling capital for funding investment, innovativeness, along with, necessary skill-sets. Abrunhosa (2003) stressed that, while the impression of innovation has emerged as a key concept in many facets of our lives, knowledge about innovation as a process, and its determinants, is still lacking.

Since the 1990's, strong emphasis on innovativeness for competitiveness and ensuring long-term survival has be reported by many researchers (Ancona & Caldwell, 1992; Kim & Mauborgne, 2007), which suggest that, managers at every levels has to be anxious and be concerned about promoting innovation. Many existing and current researchers agreed that, managing innovation is essential for the survival of the businesses. According to Ismail & Abdmajid (2007), it involves extending and providing opportunities to employees' to explore and experiment, whereas management play supportive role through active encouragement of innovative behaviors of the employees.

With constant and quick changes in technology and environmental conditions, it calls for more regular and rapid innovations in new products and management, as well as, administrative processes, technologies, business methods and services that support them.

Harris (2002) & Husher (1984) states that, environmental innovation has a tendency of occurring in cycles, with relatively long periods (3 - 5 years cycles) of rapid innovations, afterwards, by a similar cycle of consolidation, to adapt business processes, apply lessons learned, adjust skills and resources, and so forth. Current environment of constant and rapid changes along with higher consumer expectation will result in an increased demand for specialized knowledge and skills among professionals, in addition to, the desire for innovation to secure competitive advantage among firms by the development and introduction of newer services, products, processes and organization.

It is acknowledged that, within most of the successful firms, especially the medium-sized and large organization, the innovation process is clearly documented through charts and maps, and is clearly communicated by words and practices. According to Glor (2004) & Meyer (1998), many studies on innovation processes have indicated the interdependence of social, economic, political, and cultural factors in determining the relative level of success of innovations. Bakar (2004) suggested that, innovation is a state-of-mind, way of thinking or a pervasive attitude, focused beyond the present on a vision of the future. It is important for a firm to foster and maintain an innovative culture among the workforce, in order to gain increased productivity, quality and yield from innovations.

Further to the above, as stated by Bernard (2018), industrial revolution known as industry 4.0 is driven by digital transformation in vertical and horizontal value chains and product and service offerings of the companies. Therefore, SMEs embarking on an innovative mind-set has to be complemented by further embracement of newer technologies, known

as disruptive technology (DT). Christensen (1997) concluded that, disruptive technology (DT) is termed for, an emerging technology out of a specific and niche market that, becomes dominant thus disrupts the stable-state of a market and often affect and force-out, existing leading and incumbent firms out of the market. Disruptive technology (DT) is a term coined and introduced by Joseph L. Bower and Clayton M. Christensen in year 1995. DT has since been popular item of research, (Paap & Katz, 2004; Danneels, 2004; Sood & Tellis, 2005; Carayannopoulos, 2009) mainly for the risk DT pose towards established and market leading companies.

Dominic & Wilhelmina (2012) in their study revealed, that managers or owners of SMEs in the developing countries are in-fact aware about the up-to-date technologies that they can utilize along with its potential benefits. The Internet is one of the technologies being utilized over traditional methods and utilization of these technologies is cheap, fast, efficient resulting in lower cost of business operations hence increases profitability. Therefore, in conclusion, disruptive technology changes the way businesses operate and has an influence on the success of SMEs performance. Similar views were shared by Adner (2002) by stating that, emerging new technologies are often valued by customers, generally for its most critical performance significance or value. To further elaborate details, the Internet is one of the technologies that, consumers and businesses are aware of and are making use of. It may not be broadly recognized, but in today's modern world, the Internet is the key to successful business operations.

In the 21st century, innovation is not limited to new products and or services. Many authors have distinguished different definitions and types of innovation. For example, Drucker (1985) stated that, innovation is the single most critical source of competitive advantage, enabling business to respond creatively to competitive threats and opportunities, which is the essence of entrepreneurship.

Any sort of innovations has to be supported by several strategic resources namely; physical, financial, reputational, organizational, man-power, intellectual and also technological resources (Amit & Schoemaker, 1993; Barney, 1991; Fahy, 2000; Puente & Rabbino, 2003), whereby firms are viewed in terms of their unique resources (tangible and intangible) which are the sources of competitive advantage. Barney's study on firm's resources was related to the resource-based-view (RBV) of the firm, which is the most important research area to have emerged in the strategic management field since it's formulation in the mid-1990s. RBV also argues that surviving firms can earn sustainable returns if they have superior resources. According to Barney (1991), a firm's competitive advantage and resources can be earned from resources that are;-

a) Valuable - enabling the firm to improve efficiency and effectiveness,

b) Rare - cannot be sourced by competitors,

c) Imperfectly imitable - because of the unique, ambiguous and complexity, and

d) Non-substitutable.

A wide number of literature agreed that, not all resources are similarly significant as factors for a firm's advantage. As stressed by Amit & Schoemaker (1993) and

Apintalisayon (2008), intangible resources are largely viewed as strategic assets that exhibits, value, rareness, inimitability and non-substitutability (VRIN). However, according to Barney (1995 & 1997), resources need to be, valuable, rare, inimitable or non-substitutable, and organizational (VRIO), whereby, the firm is well prepared, all set and has competent ability to utilize the resources and capabilities (in Barney's word;- 'where the firm is organized, ready, and able to exploit the resources and capability").

Taking into considerations of the various arguments presented, this study will concentrate on both, tangible and intangible resources and its contribution to innovation capacity within the context of Malaysian SMEs. In addition to the above, this study specifically explore, and focuses on the effect of, innovative capacity, in accordance to (OECD, 2005a) Oslo manual's definition (product, process, marketing and organizational), being mediated by, disruptive technology (Christensen, 1997) and its' relationship towards the performance of SMEs within the service sector, in Malaysian context.

1.3 Problem Statement

SMEs in Malaysia have to face several challenges, especially in the light of changing global markets, including the ability to compete globally and move up the value chain (UNDP, 2007). According to Avermaete, Viaene, Morgan and Crawford (2003), innovation is essential for small firms, since they need to continuously to introduce new products, develop new processes, make chances in organizational structure and explore new markets.

Further to the above and upon in-depth research of Malaysian SMEs' mortality, historical data revealed figures as shown in Table 1.2, and that the failure rate or mortality of SMEs are equally severe, based on report by then, the Ministry of Energy, Water and Communication (KTAK, 2006) as, there was at least 69% failure rate in year 2006. 'Suruhanjaya Syarikat Malaysia' (SSM), also equally known as 'Companies Commission of Malaysia' (CCM, 2007) published the following figures, on the number of businesses being closed-down effective year 2002 till year 2006.

Table 1.2
The number of businesses being closed-down from year 2002 – 2006.

Type of ownership	2002	2003	2004	2005	2006
Sole- proprietorship	45,468	42,397	41,881	41,205	25,869
Partnership	52,120	46,816	38,381	35,305	22,191
Private Limited	5,564	7,169	3,715	1,034	1,032
Total	**103,152**	**96,382**	**83,977**	**77,544**	**49,092**

Source: SSM/CCM, 2007.

The total number of business failures resulting in closure and business termination is extremely incredible, going beyond 100 thousand companies in year 2002. Though the trend reflects a down-ward decreasing pattern from year 2002 to year 2006, yet the recent years failure figures (Table 1.2 & 1.3 following pages) are alarming and this indicates the gravity of the situation, considering Malaysia as a small sized nation and that, the failure of firms in large quantity must be viewed seriously, from various perspectives, especially from the economic perspective.

1.3.1 Latest Statistics – Winding up and Striking-off of companies

Given the volatile economic environment and global uncertainties, in year 2015 the numbers of companies wound-up increased by 35.5% to 2,363 companies compared to 1,744 in 2014. A total of 2,107 companies were affected through voluntary action by members and creditors, whilst the rest were wound-up by court order. Based on Table 1.2, a total number of 2,851 companies (2012: 2,419 companies) were wound-up in 2013.

The number of companies dissolved through the "striking-off" process increased from, 29,180 in 2014 to 30,643 in 2015, representing an increase of 28.5%, (SSM, 2015). A total of 8,996 applications for striking-off were submitted voluntarily while the rest were initiated by the Registrar to remove dormant companies.

Table 1.3
Winding-up and Striking-off of companies.

Years	2015	2014	2013
Companies wound up	2,363	1,744	2,851
Companies Struck-off (S. 308)	30,643	29,180	23,849

Source: SMECorp, 2016.

1.3.2 Latest Statistics – Termination of Businesses

The number of businesses terminated in year 2015 increased by 31.5% to 35,450, compared to 29,966 in 2014. As shown in Table 1.4, 'Suruhanjaya Syarikat Malaysia's (SSM) records shows that, on an average, the number of businesses terminated per year over the last three years (2013 - 2015) stands at 26,859 (2014: 21,800) firms, which shows a 23.2% increase in the number of small businesses that were terminated (SSM annual report, 2015). On average, number of new businesses registered in 2015 was 364,

230. Despite high registration, the overall survival performance of small medium enterprises (SMEs) is deemed unhealthy and unsatisfactory.

Table 1.4
Termination of Business.

Year	No of Companies
2010	19,973
2011	20,121
2012	20,380
2013	18,161
2014	29,966
2015	35,450 (increased 31.5%)

Source: SMECorp, annual report 2016.

Contribution towards Malaysian economy in terms of GDP, job employment opportunities, productivity and value-added offerings are drastically affected by the high failure rate of SMEs in the country. The poor and weak performance of SMEs would further produce problems (economic and social issues) in regards to inflation, job unemployment, retrenchment and subsequently, bankruptcy of businesses, which could equally results in social illness and unrest.

Reasons for firm's terminations and shutting-down problems encountered by the SMEs, as discovered by Siringoringo *et al.* (2009) found that, it is due to concerns and challenges related with either the followings factors;- obtaining external financing, issues of sales and marketing, problems with general management and internal financial management. Ali Salman Saleh & Ndibisi (2006) & Mohd Khairuddin Hashim (2007) draw attention to the shortage of resources which affects the firm's performance. Lucky

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& Olusegun (2012) stated low productivity, lack of managerial capabilities, access to credit, difficulty in accessing technology and heavy regulatory burden against SMEs. Gilmore *et al.* (2006) highlighted similar findings, that is, resource constraints and limitation being key factors and recent findings by SMECorp (2014/2015) highlights weaknesses such as;- management and technology capability constraints, limited e-commerce and internet marketing, low value-add and not competitive, limited R&D and technology adoption, to name a few. Despite having various government assistance and programs targeting the new entry SMEs, the failure rate is getting higher (Chong, 2012). Findings also suggest that reason for SME closure is equally due to the fact that SME owners are not aware of the business challenges for SMEs in digital era (Thestar, 2017), industry revolution known as industry 4.0 (New Straits Times, 2017).

From the above findings and challenges faced by SMEs, it can be concluded that business failures are subjected to above varying factors, such as innovative capability, and technology adoption (SMEcorp, 2014/15) due to the advent of information technology and significant technological advancements contributed by industry trend and revolution known as industry 4.0, evolution in the digitization and automation of processes. Further, this failure rates estimated at 60% demands absolute attention from the authority (Nordin, Hamid & Woon, 2011; Chong, 2012; Husin & Ibrahim, 2013).

Performance of Malaysian SMEs is crucial for firm's survival and that, it is equally critical to the overall economy on the whole. Based on findings of Noor Hazlina & Pi-Shen (2009), failure rates of Malaysian SMEs are about three (3) times as compared to

other countries, such as Australia. Therefore, it is critical for Malaysian SMEs, to reduce vulnerability of global economic shocks and maneuver to enhance firm's performance in order to remain afloat and survive.

There were numerous previous researchers investigating factors contributing to SMEs performance, such as, on the following topics;- 'SMEs' Characteristics' (Khairuddin, 2001), 'Technology Strategies' (Noraini, 2002), 'Learning': (Ramayah, Mohamed, Muhamad & Ng, 2004), 'Entrepreneurial Orientation' (Oswald & Za'faran, 2006), 'Top Management Role' (Arawati & Za'faran, 2008), 'Internationalization' (Chelliah, Muhamad & Yusliza, 2010) and 'Strength and Weakness (Salikin, Wahab & Muhamad, 2013). These studies draw attention to, firms' various competitive advantage, which is an important factor of performance for Malaysian's SMEs. Researchers may not have treated innovativeness in much detailed therefore my research is aimed to investigate effects of innovative capacity and disruptive technology on its relationship on SME performance.

Based on SMECorp's (2014/2015) findings, I would argue that, the winding-up, striking-off and terminations of Malaysian SME businesses are because these SMEs failed due to the lack of innovation, or innovative capacity, as well as, lack of technology adoption and or disruptive technology (newer or up-to-date technologies) aiding on overall firm's performance. Further to the above, as mentioned by the CEO of SMECorp., Malaysia, Dato' Hafsah Hashim (2015), 'SMEs need to restructure their financial systems, improve management skills and emphasize on high quality product/services to ensure SME

survival'. The above insufficiency may have led to mortality statistics as shown in Table 1.2, Table 1.3 and Table 1.4. What is not specifically clear is the impact of innovation on SME performance, being measured from four (4) dimensions of innovation (product, process, marketing and organizational) along with disruptive technology acting as mediator. Disruptive technology as a mediator due to the fact that, SMEs are expected to move from traditional processes towards digital and technology driven approaches in innovativeness of product development, process innovation, marketing and organizational change.

The gaps observed from these various studies are, the lack of investigations in Southeast Asia and in Malaysia on;- i) Innovative Capacity, consisting of all four (4) dimensions as stated above, and its effect on SMEs performance, ii) Disruptive Technology and its effect as a mediator, as well as, explaining the relationship between innovative capacity and SME performance, iii) To provide a new insight to the relationship between Innovation and Technology adoption, and that, iv) To further provide validations and verification for generalization purpose on previous research findings. Two (2) particular researches that came close to similar investigation were by, Mok (2009), on innovativeness and the performance of SMEs, but focus of this research was on the manufacturing sector and Rosli & Syamsuriana (2013), on innovations and firm performance of SMEs in food and beverage, textiles, clothing and wood-based sub-industries. Mok (2009) investigated manufacturer with merely 121 respondents, whereas Rosli & Syamsuriana (2013), analysis were based on 284 respondents, respectively. Both the above research suggested further investigations, as findings showed weak relationship

between innovation and performance in their respective researched sector (Mok, 2009), and that, generalization may be deem vague due to small number of respondents. Furthermore, these studies were focused on limited dimensions of innovation, that is, innovation related to, either on, products, processes, and marketing omitting organizational innovation. Rosli & Syamsuriana (2013) concluded that, further research is necessary on, how product and process innovation is done in the SMEs.

Therefore, this study is aimed to specifically focus and concentrates on, the effects of innovative capacity, mediated by disruptive technology on the overall business performance of the SMEs within the service sector in Malaysian context by, investigating dimensions and measurements adopted in accordance to OECD's Oslo Manual (2005a), which encompasses;- innovations of Products, Processes, Marketing and Organization. The focus of this research on service sector is based on statistics reflecting 97.3% in table 1.1 on page 6 (SMECorp, 2015) suggesting service sector as the largest sector compared to other sectors in terms of total establishment and employs large percentage of employees. This research explores causal effects of innovative capacity, and adoption of disruptive technology, on SMEs performance is crucial and deemed as an important criterion revelation, for the survival, sustainability and successes of Malaysian SMEs. Theoretically, this research focused on a combination of the 'Resource-Based-View' (RBV) and 'Creative Destruction' theories, and that RBV in entrepreneurial perspective found to be relevant, as previous research mostly focused on strategic context, presenting resources as a crucial element to gaining a sustained

competitive advantage and superior performance (Barney, 2001; Fereira & Azevedo, 2007).

1.4 Research Question

As explained by Zikmund (2000; 2003), a research questions are a set of particular investigation or examination focused on by researcher within a set of certain boundaries of the specific study, thus proposes suitable methods employed for data collection and analysis purposes. Generally, researchers are encouraged to propose questions that would support the exploring of answers or solutions in order to provide potential and possible remedies to the research problem under investigation and examination. It is therefore the aim of this research study, to seek answers for the questions that has be proposed in order to resolve the identified research problem. The research questions drawn and developed for the research study are, to examine whether there is a relationship between innovative capacity and organization's performance, by examining the impact of these variables.

A number of research questions had been proposed for this study, in order to, provide better insight to the innovative capacity style that can be found described in the literature and the effects to the performance of the organization. In order to realize the objectives of the research, this research seek to address the following four (4) major research questions;-

a) Is there any relationships between Innovative Capacity and SME's Performance?

b) Is there any relationships between Innovative Capacity and Disruptive Technology?

c) Is there any relationships between Disruptive Technology and SME's Performance?

d) Are there any significant relationships between adoption of Disruptive Technology, Innovative Capacity and the success of the SMEs in Malaysian context?

1.5 Research Objectives

This research study is to examine factors that influence the continued existence or survival and subsequent growth of the SMEs through the lens of entrepreneurial approaches, by the incorporation of innovation, resulting in its effect on the performance of SMEs. Therefore, the objectives of this study are to determine the significance of innovative capacity with the incorporation and adoption of disruptive technology as mediator influencing overall status of SME performance. These determinant factors can be referred to, as guide ensuring success probability of SMEs in Malaysia.

Therefore, to realize the research objectives, the following are the focus area of the research study;-

i) To investigate the effects of Innovative Capacity on the performance of SMEs.

ii) To investigate the effect of Disruptive Technology towards the success of Innovative Capacity.

iii) To investigate the effect of utilization of Disruptive Technology on performance of SMEs.

iv) To investigate the relationship between Innovative capacity and if SMEs' Performance is mediated by Disruptive Technology.

1.6 Significance of Study

This study provides an exciting opportunity to advance our knowledge on understandings of the relationship between Innovative Capacity (IC), Disruptive Technology (DT) and SMEs firm performances (FP). All four (4) dimensions of innovation are being explored; namely product innovation, process innovation, marketing innovation and organizational innovation. Additionally, the study sheds more light on the mediating role of Disruptive Technology on the relationship between IC and performance of SMEs in Malaysia.

There are several important areas where this study makes an original contribution to; Main objectives of the study are, to contribute by empirically testing and providing new insights to the relationship between the above said variable, to the body of knowledge and managerial or practitioner's perspective within the Malaysian context. These insights on SMEs innovative capacity issues and concerns are crucial, as there are limited studies on such issues within the Malaysia context. The finding is expected to contribute to the enhancement of the study on SMEs performance in Malaysia. Equally, secondary objective is to provide valuable information on innovative capacity and adoption of disruptive technology, which could further guide firms and willing parties to embark on new business, and or, sustain an existing operating business. Empirical discovery shall give an insight into the need for SMEs, to continuously adapt to new disruptive technologies, which help firms' maintain their competitiveness.

Thirdly, due to lack of previous studies on service sector segment, this research is also specifically aimed at investigating these various variables mentioned (innovative capacity, disruptive technology and SME performance) within the service sector, as the service sector is the largest segment and GDP contributor within the SME industry. Additionally, promoting services or intangibles are far more challenging compared to tangible goods, therefore, findings are imperative for policy making and enhancement purposes, to further support SMEs within the service sector segment.

Ultimately, objectives are also aimed to shed significant contribution in terms of the empirical evidence, on the unique characteristics of service offering and small business firms. In practical sense, the findings will help government and its related agencies, in making policies related to SMEs in Malaysia. This helps in future planning, particularly in relation to the Malaysian economic development.

1.7 Scope of the Study

The study focuses on the SMEs in Malaysia, with a view to investigate the impact of Innovative Capacity (IC) on SMEs performance. Therefore, IC is the independent variable, while SMEs performance is the dependent variable. Mediating role of Disruptive Technology on the relationship between innovative capacity and SME performance is equally explored. The study was conducted in Malaysia utilizing survey research, and respondents to questionnaires are owner-managers of SME firms. The study focused on SMEs in service sector located within the State of Selangor, as

Selangor state houses 19% (SMECorp, 2015) or larger number of firms which is 97.3% respectively (SMECorp, 2015) within Malaysia.

Any conclusion accomplished by this study, will be bound only to the population under study. The sector bias exists due to the potential findings of the study will apply only to SMEs within the service sector specifically, as the study excludes other sectors, such as, the agriculture, manufacturing, construction, mining and any other sectors or industries.

Based on census conducted at every five (5) years interval in 2011 by SME corporation (SME, 2011), geography bias may appears in data collection too, as the majority of the firms or respondents are located in certain states in Malaysia, such as, Selangor (110,714), Wilayah Persekutuan, Kuala Lumpur (78,448), Johor (60,618) and Penang (36,899). Remaining states houses a small number of enterprises, namely, Perlis (4,484), and Labuan. The big difference between the numbers of enterprises across the state creates the problem of equality or biasness, in terms of, the number of respondents and this should be included in the study.

An additional potential limitation of this study is the response rate bias if the survey is administered personally by the interviewer, but, with an online survey approach, interviewer biasness is further eliminated. The calculation of response rate varies from different researchers and this has caused a lack of agreement on a standard method to be used by all parties involved, as highlighted by Wiseman & Billington, (1984).

Nevertheless, an online survey via the internet is the main mode and approach adopted, to solicit findings in order to ensure speed, quality and minimization of cost. Targeted respondents are from firms that are within Klang Valley territory, due the high number of SMEs concentration. Finally, the findings obtained concludes on, the effect of innovation capacity, and adoption of disruptive technology on SME performance, omitting above variable being integrated with following variables, entrepreneur's orientation, entrepreneur's characteristics, entrepreneur's openness, graduate entrepreneurs, and market orientation, which may be crucial aspect for future study.

1.8 Organization of the Thesis

This research paper is organized into (5) five chapters. Chapter I (Introduction) enlightens on the problems and offers an insight into the background of the problem and the research questions. Chapter II (Literature Review) further explores details pertaining to overall statistics and performance of small medium enterprises in Malaysia and further gives details on the related literature relating to SME performance, innovative capacity and disruptive technology. Chapter III (Research Methodology) explores on methodology employed discussing details on, research framework, hypotheses development, research design, data collection and analysis techniques, population and sampling method to be used, and relevant survey instruments that are adopted and or adapted. Chapter IV (Results and Discussion) further discusses and explores the respondent's survey feedbacks through statistical analysis and interpretation of findings. Chapter V (Conclusion) centers on discussion, conclusion and recommendation for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The review of literature for this research study in this chapter consist of the following main areas;- The first section begins with, a brief introduction on definition of SMEs and small business perspective, rationale of promoting SMEs in Malaysia, followed by, brief background, overall performance of SMEs in Malaysia. The third section area is on, SME performance (Dependent variable), innovation capacity (Independent variable) and disruptive technology (Mediator). The final section topic explores the underpinning theory related to the research study.

2.2 Definition of SMEs

Prior to further discussion on the definition of 'Small and Medium Enterprises' (SMEs), it is acknowledged that, the term 'small firm and or small businesses' being used interchangeably within this thesis is equally also referred to, as SMEs. Further acknowledgment is necessary for, it is rather difficult to get consensus on the universal definition of SMEs. Therefore, for the purpose of this research study, the definition offered by the Bolton Committee in UK is utilized to begin the discussion to define SMEs. Deakins & Freel (2006) provide the definition based on the Bolton Committee's definition as depicted in Table 2.1;-

Table 2.1
Bolton's Definition of Small Firms (The Economic Definitions).

The Statistical Definitions	
Manufacturing	200 employees or less
Construction, mining and quarrying	25 employees or less
Retail and miscellaneous	Turnover of (Pound Sterling) £ 50,000 or less
Motor trades	Turnover of (Pound Sterling) £ 100,000 or less
Road transport	5 vehicles or less
Catering	All; excluding multiple and brewery managed houses.

Source: Deakins & Freel, 2006.

Small firms are with the following features;-
   a) With a relatively smaller share of marketplace,
   b) Being run and operated by founders, owners or part-owners in own way, unlike via the means of a formalized management structure,
   c) Are not linked or part of a larger enterprises, hence, very much independent in nature.

The definition of 'small firm' by the Bolton Committee has drawn many comments especially when, it is referring to the economic definition (Bolton Committee, 1971). The European Commission (EC) has argued in both economic, as well as, analytical definitions and finally has come out with their own definition of small firm (European Commission, 2003). Due to such differences and the difficulties in making definitions in many other countries, as well as, in Malaysia, it is important to recognize that there is no common agreed definition of a 'small firm' worldwide.

Exact definition of what constituted a small business was somewhat challenging and difficult. Independent governing authorities the world over have recognized distinctive criteria for designating a firm's size to be categorized under small businesses. As listed

in the Small Business Act (US SBA, 1979) in regards to the North American Industry Classification (NAIC) system, federal government of U.S. has specified sizes' of business as a function of annual revenues or according to, the total staff in employment. The qualifying criteria ranges for annual revenues, from USD $750 thousand – USD $50 million yearly, and employs between the range of 100 – 1,500, as per NAIC's criteria (US SBA, 2007). Even though small businesses in the U.S. generally encompasses firms with lesser than 500 employees and with an annual revenue of USD $50 million or less, small businesses are reported to be the majority of U.S. employers, and hires the most of the private sector labor force, and make the bigger fraction of the (GDP) gross domestic product (US SBA, 2014).

Similarly, Blau (2009) assert that, definitions of small businesses by the executive arm of the European Union, which is similar to small businesses of U.S. as, an independent firms employing lesser than 250 employee. In the same vein, Scupola's (2009) research of Australian firms indicates small businesses employing 200 or fewer workers. Ai-Qirim (2007) study of New Zealand small business specifies small firms with lesser than 20 employees. These mixed definitions further create uncertainties on consistency in classifications of small businesses throughout the literatures.

Under the new Malaysian SME definition, the existing qualifying criteria, that is to say, sales turnover and employment remain, but the threshold has been increased to;-

a) Manufacturing sector: Sales turnover not exceeding RM50 million, OR, full-time employees not exceeding 200 staff.

b) Services and other sectors: Sales turnover not exceeding RM20 million, OR, full-time employees not exceeding 75 staff.

Detailed Malaysian's SME definition by category namely micro, small and medium is as listed in Table 2.2 below:

Table 2.2
Malaysian SME Definition by Category.

Size	Micro		Small		Medium	
	Sales Turnover (RM)	Employee	Sales Turnover (RM)	Employee	Sales Turnover (RM)	Employee
Manufacturing	< 300,000	< 5 employee	300,000 To < 15 Million	5 to < 75 employee	15 Million To ≤ 50 Million	75 To ≤ 200 employee
Services & Others			RM300,000 To < 3 Million	5 to < 30 employee	3 Million To ≤ 20 Million	30 To ≤ 75 employee

Note : < is less than; ≤ is not exceeding
Source: SMECorp, 2016.

Under the new definition, all SMEs must be entities registered with Suruhanjaya Syarikat Malaysia (SSM) or Companies Commission of Malaysia (CCM) or other equivalent bodies. It however excludes; i) Entities that are public-listed on the main board, and, ii) Subsidiaries of;-

a) Public-listed companies on the main board;

b) Multinational Corporations (MNCs);

c) Government-linked Companies (GLCs);

d) Syarikat Menteri Kewangan Diperbadankan (MKDs), and State-owned enterprises.

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2.2.1 Small Business Perspective

The review of literature in relation to small business perspectives is, to highlight and to form an appreciation of existing developments and information in relations to quantities and economic contributions' of small business, global impact of small business, and closure or discontinuance unpredictability of small business. The 'Small Business Administration' of United States (US SBA) acknowledges the significance of small business towards the country's economic power and its position and importance in the global marketplace. Ever since the formation of SBA (US SBA, 2014) in 1953, the agency has played an important role by serving and protecting the interest of small businesses, in order to further safeguard free competitive enterprise. According to data of year 2014, the US SBA (2014) stated that, there are more than 28.2 million small businesses in the United States, represented 99.7% of all employer firms, generated 63% of net new jobs annually, and created more than one half of the non-farm private gross-domestic-product (GDP). There are similarities of reported statistics to comparable free enterprise markets.

Likewise, based on findings of Quaddus & Hofmeyer (2007) and Scupola (2009) identifies that, small businesses rendered an important role in the Australia economy, mostly in terms of their contribution to employment and production. About 95% out of the 2 million actively operating businesses in Australia in year 2011 were small businesses and that, small businesses represented 96.7% of the total numbers of business and employed 70% of the total workforce. This view is supported by Blau (2009), who writes that, as for the Europe region, 99% of all European businesses were catered or

contributed by small businesses which numbered 23 million firms. The similarity of the foregoing statistics above further endorses the significance of small businesses effect on global economy.

In an investigation into small businesses, Forsman (2008) found that, universally, small and medium size business has been regarded as catalyst economic driving force, with limitation in resources and are wide-range in variety or form.

2.3 Rationale of Promoting SMEs in Malaysia

The vital role and significance of SMEs, for thriving the economic and market development in Malaysia is widely acknowledged. The benefits gained from SMEs in Malaysia encompass various aspects, such as, income tax's revenue, exportation of goods and services, employment creation along with, reduction of unemployment index percentage, mitigation of poverty, economic empowerment, and the wider supply of economic opportunities and wealth.

However, the most important factor and reason for encouraging SMEs in Malaysia is due to, the creation of employment and its contribution towards gross domestic product (GDP) of the economy. With fast growing labor force, many were seeking employment in the non-farm sector, hence, the way forward in alleviation of the concern of excess manpower was to launch programs which in turn, encourages the growth of SMEs. Since the 1990s, Malaysia economy has been rapidly shifting, from a commodity-based producing nation, to being a manufacturer of industrial products that are meant for

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exports. The SMEs continued to lead significant role in industrialization program. Census conducted on a five yearly basis by Company Commission of Malaysia (CCM/SSM) in 2011 revealed that 97.3% of firms were SMEs and that, SMEs contributed 35.9% to country's GDP and 65% of the nation's employment. Similar findings were discovered by Saleh & Ndubisi (2006), as at year 2000, SMEs had accounted for more than 80% of the total establishment in Malaysia. Within the said total, 12% were medium size firms and the balance majority of 88% are small-scale enterprises.

To further reinforced commitments by the Malaysian government to further assist and develop SMEs, during the Tenth Plan (2011 – 2015), the Government embarked on the Economic Transformation Programme (ETP) to further fuel economic growth and productivity, including further liberalized the services sector. The government autonomously liberalized the services sector and to boost investor confidence and enhance competitiveness. By 2012, 18 services subsectors were liberalized to allow up to 100% foreign equity. The economy witnessed sustained growth across major sectors. In addition, there were several achievements in terms of economic enablers, including strengthening SMEs, liberalizing regulations to increase the ease of doing business (Economic Planning Unit, 2016). Under the 11th economic plan (2016-2020) the Malaysian government has laid-out many agenda for further assistance towards SMEs and key focus areas are; Transforming services, Energizing manufacturing, Growing dynamic SMEs, Translating innovation to wealth, Modernizing agriculture and Transforming construction and Investing in competitive cities and regional economic corridors.

2.4 Background and Profile of SMEs in Malaysia

As Small and Medium Enterprises (SMEs) are perceived as the main pillar of the industrial development, therefore it is crucial and equally important to discuss the contribution and the development of SMEs to the Malaysia's economic growth. SME plays a key role towards the prosperity of the economy, and market development in Malaysia. Some of the crucial benefits obtained from SMEs Malaysia encompass varied aspects, such as, income, employment, distribution of wealth and economic opportunities, and most importantly, the alleviation of poverty, which reduces the disparity gap further.

Again, as reflected above, figures revealed by SME Census 2011 (SME annual report, 2015) stated that, 97.3% of business firms in Malaysia comprises of SMEs, contributing up to 35.9% of the nation's gross domestic product (GDP), employ's 65% of the nation's employment and accounts 17.8% of the nation's exports. The Malaysian government's targeted goal is for SMEs is to contribute to, 41% of Malaysian's GDP, 65% of employment and 23% of exports by 2020 (SMECorp, 2014; The Star Newspaper/Budget, 2016).

Breakdown of SMEs by sectors in numbers (Table 2.1), distribution in percentage (%) by sector and distribution in percentage (%) by various states (Table 2.2), and distribution in numbers by sector (Table 2.3) in Malaysia and distribution in % by sector and States (Table 2.4), are as reflected in the following pages (SME Census, 2011);-

Table 2.3
SME: By Sector in Numbers.

Sector	Total Establishments (a)	Total SMEs (b)	Percentage (%) of SMEs over Total Establishments (b)/(a)*100	Total Employment by SMEs
Overall Total	**662,939**	**645,136**	**97.3**	**3,669,259**
Services	591,883	580,985	98.1	2,610,373
Manufacturing	39,669	37,861	95.4	698,713
Agriculture	8,829	6,708	76.0	78,777
Construction	22,140	19,283	87.1	275,631
Mining & Quarrying	418	299	71.5	5,765

Source: SMECorp, 2015.

Table 2.4
SME: Distribution in % by Sector and Distribution in % by States.
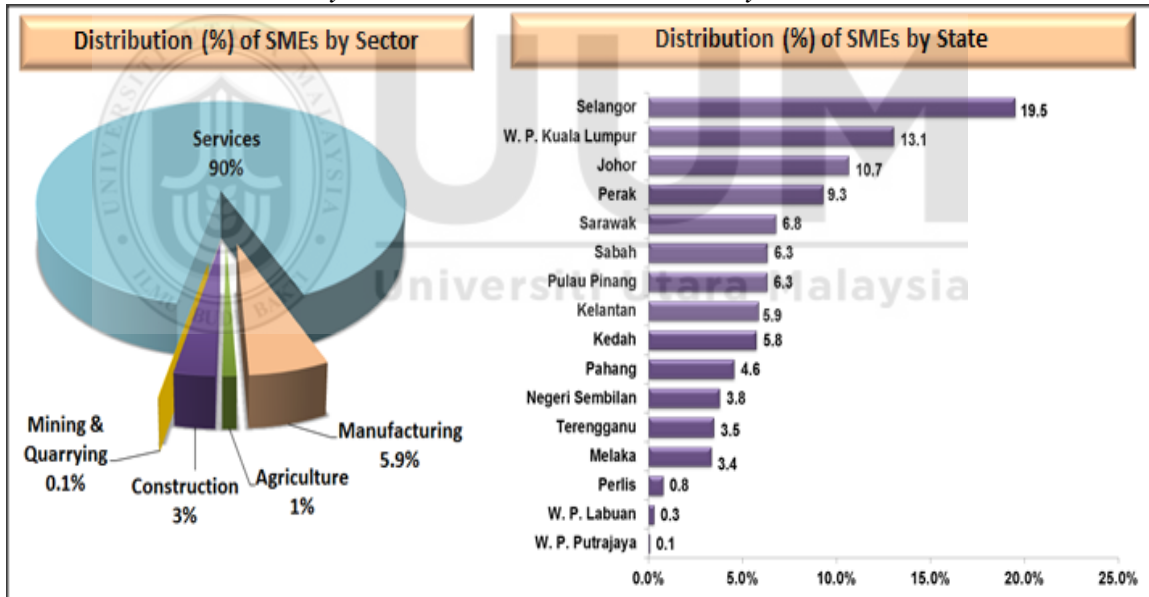
Source: SMECorp, 2015.

Table 2.5
SME: Distribution in numbers by Sector in State.

State	Services	Manufacturing	Agriculture	Mining & Quarrying	Construction	Total SMEs
Selangor	110,714	8,314	834	23	6,019	125,904
WP K. Lumpur*	78,448	4,201	5	2	2,023	84,679
Johor	60,618	4,828	994	27	2,407	68,874
Perak	53,322	3,833	962	84	1,827	60,028
Sarawak	40,608	1,977	322	19	904	43,830
Sabah	37,612	1,382	812	24	1,054	40,884
P. Pinang	36,899	2,614	269	7	1,035	40,824
Kelantan	35,372	1,814	326	30	281	37,823
Kedah	33,123	2,809	603	17	540	37,092
Pahang	26,815	1,305	630	13	699	29,462
N. Sembilan	21,633	1,495	435	11	968	24,542
Terengganu	19,882	1,782	196	37	617	22,514
Melaka	19,694	1,107	252	4	618	21,675
Perlis	4,484	291	63	1	214	5,053
WP Labuan	1,761	109	5	0	77	1,952
Total SMEs	580,985	37,861	6,708	299	19,283	645,136

* Includes WP Putrajaya

Source: SMECorp, 2015.

Table 2.6
SME: Distribution in % by size and by Sector.
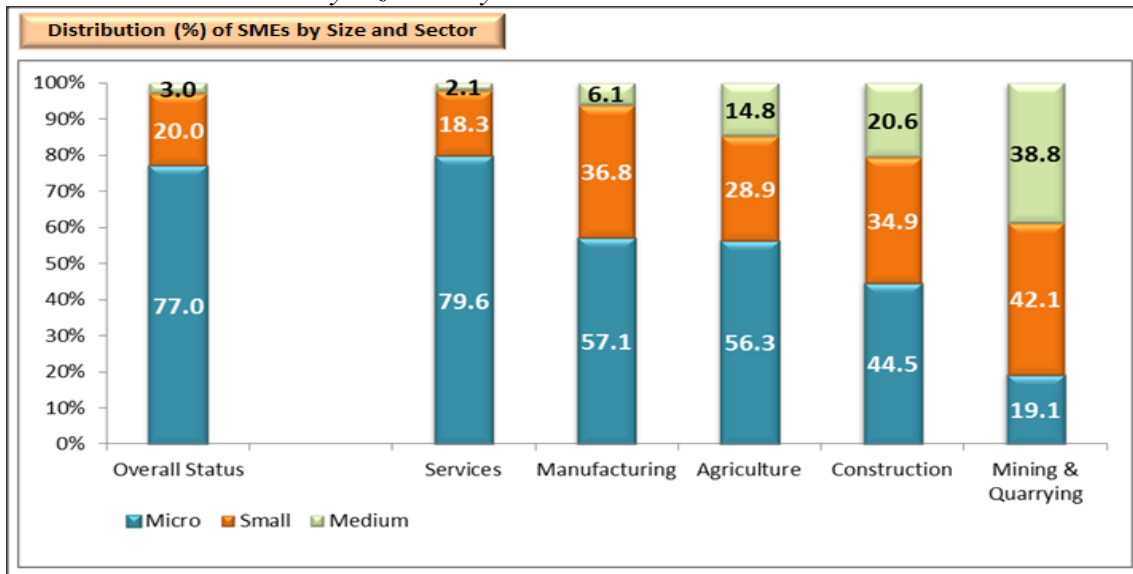
Source: SMECorp, 2015.

2.4.1 SME Corporation Malaysia (SMECorp)

Prior to conversion, it was formerly known as 'Small and Medium Industry Development Corporation Malaysia' (SMIDEC) in 1996. The SMIDEC was established with the objectives of providing various assistances and support to the SMEs to enable them, to survive and grow in a competitive business environment. Among the provision of assistance and support are, financial assistance, advisory services, infrastructure facilities, market penetration, information access, technology support and training and developments. Yet, the performance of the SMIDEC was mediocre, as it was not up to expectation and satisfactory, in addressing the needs of the SMEs. As a result, the role of SMIDEC was taken over by a new agency namely, SME Corporation Malaysia., on 2nd, October 2009.

The aim and mission of SME Corporation is, to ensure coordination and facilitate the growth and development of dynamic, innovative, and resilient SMEs through the provision of effective business services (SME Corp, 2010). Organization and provision of variety of developmental programs by SME Corporation is expected to contribute further to the growth of SMEs. The SMEs in services sector are encouraged to participate in the various development programs to strengthen their core business and performance. As an example, the 'Business Accelerator Program' (BAP) and 'Enrichment & Enhancement Program' (E2) offers business and technical advisory services with the objective to improve the overall performance of SMEs.

In addition, the introduction of 'SME Innovation Awards' and 'Enterprise 50 Award' is considered as a mode to grant recognition to SMEs for outstanding performance in their respective businesses. The award for the category of Best Innovation Award in services sector would inculcate and inspire the spirit of SME owner-manager to promote innovation and creativity in the business environment. The healthy competition among SMEs equally encourages quality improvement for the services that they offer to their end-user, and clients. Such a totality offerings further increases the satisfaction level of the clients, and further boost the SMEs to increase their sales revenue and overall business and SMEs performance, respectively.

2.5 Performance of SMEs in Malaysia (Growth Trends 2010 – 2014)

Based on previous research and findings of Saleh & Ndubisi (2006), prior to the growth trends 2010-2014, some of the domestic and global challenges faced by Malaysian's SMEs in obtaining economies of scale and competing internationally were as follows;-

   a) Low level of technological capabilities,

   b) Lack of skilled man-power,

   c) Low level of ICT and Technology penetration,

   d) Low level of Research & Development (R&D),

   e) Considerable orientation towards domestic markets,

   f) A growing increase of intense global competition,

   g) High percentage (%) of bureaucracy within governmental agencies, and

   h) Difficulties faced sourcing for and of funds.

Despite being faced with diverse challenges, it is noted that Malaysia SMEs possess various strengths and weaknesses (Hashim, 2004; SMECorp, 2014/15). The following Table 2.7 provide listings of the various strengths and weaknesses of Malaysian's SMEs;-

Table 2.7
SME Strengths and Weaknesses.

The Strengths of SMEs	The Weaknesses of SMEs
1. Economic output.	1. Lack of capital and difficult obtaining financing and credit facilities.
2. Offer employment opportunities.	2. Scarcity of skilled workers and difficulty in retaining manpower.
3. Regional income generation.	3. Low value-add and not competitive.
4. Savings.	4. Low value-add and not competitive.
5. Training.	5. Management, technology constraints and limited capability in R&D.
6. Stimulate competition.	6. Limited access to domestic and global markets.
7. Support and assistance to large firms.	7. Limited use of application of new technology, internet marketing and e-commerce.
8. Promote innovation and agility.	
9. As a seed-bed from which large firms grows.	8. Limited access to advisory services.
	9. Limited marketing and promotion strategies.
10. Breeding ground for new venture And entrepreneurs.	10. Lack of international certifications for Exports

Source: Adopted from Hashim (2004) and SMECorp (2014/2015).

The significance of SME to the Malaysian economy also has been extensively acknowledged and recognized, as stated in the preceding pages. Therefore, SMEs plays a critical, as well as, an important role for the nation's economy and that SMEs are regarded as the main pillars for industrial development for Malaysia. SMEs have

facilitated transformation of the economy and that, their contribution in the development of the nation's economic growth is well recognized. According to SMEcorp's annual report (2014/15), statistics indicated that, the long-term growth trend of SMEs in Malaysia since 2004 has remained, with SMEs GDP growth continuously outpacing that of the overall economic growth of the country. In the period 2010 – 2014, based on the newly revised 2010 prices, the average compounded annual growth rate (CAGR) of SMEs was at 8.3% as reflected in Table 2.8, which was higher than the CAGR of the overall economy of 5.4%. As a result, SME contribution towards Malaysian GDP increased from 32.2% in the year 2010 to 35.9% in the year 2014.

Table 2.8
SME GDP share by Key Economic Activity (constant 2010 prices).

	SME Contribution to GDP			**SME GDP Growth**
	2010 (% share)	**2014 (% share)**	**Increase / Decrease in share**	**CAGR1 2011 -2014**
Overall2	32.2	35.9	3.7	8.3
Construction	0.9	2	1.1	28.9
Services	19.6	21.1	1.5	7.3
Mining & Quarrying	0	0.1	0.1	39.3
Agriculture	4.3	4.5	0.2	6.7
Manufacturing	7.2	7.8	0.6	7.5

Source: SMECorp, 2014/2015.

1. CAGR refers to compounded annual growth rate.
2. Total value-added after taking into account import duties.

Further to the above, contribution, as well as, performance by SMEs to GDP for the period of 2010 – 2014 was derived from all economic sectors, especially in construction and services.

As stated in the foregoing pages, government's commitment towards SME sector as reflected in 10th economic Plan (2011 – 2015) and the 11th Plan (2016-2020) has resulted in the following achievements and expected to further drive and boost SME sector with the expected target forecast as stated in Table 2.9 below.

Table 2.9
Major indicators for SMEs, 2010 – 2020

Item	2010	2015	2020	Tenth Plan Achieved	Eleventh Plan Target
Contribution of SMEs to GDP (RM billion in 2010 prices)	262.9	371.9	578.6	1,605.8	2,420.8
Annual growth rate (%)	8.3	9.3	9.3	7.5	9.3
Share to GDP (%)	32.0	35.0	41.0	33.4	38.4
SMEs exports (RM billion in 2010 prices)	100.3	147.8	243.7	634.0	995.0
Share to total exports (%)	15.7	19.0	25.0	17.3	22.4
Share to total employment (%)	57.1	59.0	62.0	57.8	60.7

Source: Economic Planning Unit; Department of Statistics Malaysia; and SMECorporation, Malaysia (2016).
Note: 2020 numbers are forecasted.

In conclusion, Malaysian SMEs plays an important and vital role towards country's economic contribution and that, the Malaysian government equally emphasized its commitment through budget allocations in its Tenth and Eleventh Malaysia Plan, 2011-2015 and 2016-2020, respectively.

2.6 SME Performance, Innovative Capacity, and Disruptive Technology

As the research is focused on Innovative Capacity, Disruptive Technology and its effect on SME Performance, it will be indeed interesting to appreciate various studies and

related theories to these key variables. In developing the foundation of this study, previous studies on innovative capacity and firm performance theories were reviewed, as a basis of this study.

As reflected in chapter one (1), Table 2.10 gives a brief overview of past studies on SME performance conducted with Malaysian context.

Table 2.10
Few of Past Studies related to SMEs' Performance and Challenges.

Year	Title	Researchers
2001	SMEs Characteristics	Khairuddin
2002	Technology Strategies	Noraini
2004	Learning	Ramayah, Mohamed, Muhamad & Ng
2006	Entrepreneurial Orientation	Oswald & Za'faran
2008	Top Management Role	Arawati & Za'faran
2010	Internationalization	Chelliah, Muhamad & Yusliza
2013	Strength & Weakness	Salikin, Wahab & Muhamad
2013	Financial Constraints	Wahab & Muhamad
2014	Product/Service Quality	Arawati, Zandi & Bahmani

Source: Rahman, Yaacob & Radzi (2016)

As for the measurement criteria on innovative capacity, following dimensions/indicators are employed, which are adopted and adapted from OECD (Oslo Manual, 3rd edition, 2005);-

I)   (a) Product Innovation, (b) Process innovation, (c) Market Innovation and (d) Organizational Innovation.

II)   Similarly, measurement criteria Disruptive Technology, the following dimensions/indicators are employed;-

       (a) Technology Sensing Capability, (b) Technology Response Capability and (c) Technology Investment.

Finally, for the measurement for SME performance, the following measure according to several indicators are utilized and adopted to gauge the overall performance;-

III)   (a) Sales Growth, (b) Business Turnover, (c) Employment Growth, (d) Gross Profit Growth, (e) Return on Assets (ROA), (f) Return on Investment (ROI), (g) Innovation and Learning, (h) Market Share Growth, (i) Net Income, and (j) Overall Business Performance.

2.6.1 Brief overview of SMEs Performance Worldwide

The word performance is not new, despite the frequency of usage yet, its meaning is relative. In many small business literatures, SMEs performance has be researched upon by a number of researchers and that most research investigating SMEs performance with a varied number of variables. Moullin (2007) states that, SMEs' performance is seen and viewed as, how firm delivers value to its stakeholders, as well as, their customers.

Similarly, Neely et. al., (1995) states that, firm performance is a concept often discussed in studies, yet has no single definition. Firm performance may be defined as the process of quantifying activity and action of firm which leads to achievement of its goals and objectives, through satisfying its customers and stakeholders. These achievements are through an efficient and effective performance of business operation as compared to its competitors (Neely, 2005). Therefore, firm's performance can be defined as the measurement of how well its goals and objectives are achieved (Penrose, 1959). This study defines SMEs firm performance as the ability of firm to effectively and efficiently exploit available resources to ensure survival, yet fulfill customer satisfaction and contribute towards creation of employment.

Research by Kampschroeder, *et al.,* (2008) highlights the undesirable wave of economic fallout of failed small businesses. Similarly, Liao *et. al.,* (2008) & US SBA (2009) relates that, small businesses experienced discontinuance due to growing challenges, strong competition from large firms and globalization, as statistics reveals that, only 76% of startups stay operational beyond two (2) years, 47% beyond four (4) years, and only 38% beyond six (6) years, respectively. Similarly, Tan *et al.* (2009) stated that, between 50% - 80% of small businesses fails within a short span of operation.

According to US SBA Office of Advocacy (2009), in 2008, Arizona State level year-to-date third quarter discontinuance of small businesses exceeded new startups by 13.75% and that, small business reductions surpassed expansion by 44.7%. US SBA (2009) findings further highlights that, in 2006, Arizona's non-farm small business owners made-up approximately 1.8% of U.S. small business employers. It further reveals that, in year 2006, small business employers in Arizona State totaled about 107,500 firms, accounted for 97.4% of the State's employers, and employed 48.8% of the State's private sector workforce. Figures released by the U.S. Census Bureau (2008) stated that, Arizona's small businesses totaled about 106,800 firms, suggesting a decrease in small business economic vitality.

As for strategic orientation of firm, Timothy & James (2007) pointed out that, the 'resource-based-view' (RBV) is firmly rooted in the strategic choice tradition and argues, very generally that, firm performance is the result of appropriate strategies enacted with the proper resources and capabilities present in the firm. Whereas, Covin & Slevin (1989)

argues that, entrepreneurial oriented firms seem to perform best in hostile environments. Accordingly, environmental uncertainty pushes management to examine resources and capabilities hence expand the geographic space of markets served or capture greater existing market. Environment uncertainty lead SMEs to process improvements to lower costs, or product improvement to better meet customer's needs. SMEs internationalization is a response to inquiries, relationship building activities at gaining cooperation or access to targeted new market. Innovation capability is internally-oriented strategies (process improvement) and positively contributed towards firm's performance. Externally-oriented strategy (management experience with, possession of unique product and competitive advantage) is positively related to performance.

In terms of strategies for SMEs to compete successfully, Fateh *et al.,* (2011) in their exploratory case studies through qualitative content analysis findings on Swedish hidden champions reported that, smaller size firm react to challenges uniquely and these firms has a positive influence on innovation performance. Private ownership of these champions equally revealed a positive influence on innovation performance (known as PUSH factor). Yet again, a closer relationship with customers as well, has a positive influence on innovation performance. Findings from the service sector also indicated, SME's strong dependence on suppliers, therefore, building of services together creates value for customers. Competition is said to too, have a positive effect on innovation strategy, which in turn affects the innovation performance. Many other factors that have similar positive effects on innovation performance are, such as, high involvement of human resource (HR) practices, informal organizational structures, knowledge

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management, integrative leadership through delegation and empowering people, and finally, informal networking with partners which is linked to innovation process (known as the PULL factor).

Similar to Timothy & James (2007) views, strategic orientation as suggested by Laurence *et al.,* (2013), that an improvement of strategic position of the firm is through the analysis and exploitation of environmental information, and taking a future oriented approach when applying firm resources. Their findings suggests a significant link between, strategic orientation and SME firm performance, in terms of profit growth, return on equity and return on assets.

In the same vein, Saul & Berman (2006) highlighted that, firms with technology-driven business strategies can spur innovation and growth. Their findings further reveals that, innovation emerges where market insight and technological insight intersect, a process that is often easier to harness within the small entrepreneurial firm than in the larger, more established organization.

Despite innovative firms are said to indicate improved performance, yet there are many other challenges these SMEs faced, which results in SMEs' poor performance. Findings discovered by Anthony (2014) in his study of SMEs in Africa revealed that some of the challenges are;- (a) Access to financial support due to high criteria and credit rating and collateral requirement, and high interest rate imposed, (b) Inadequate application of essential business management practices, (c) Lack of Marketing skills, (d) Utilization of

conventional technology (lack of necessary knowledge on modern technology and it's benefits), and (e) Poor corporate governance.

According to Alenka (2014) on 'Determinants of SMEs performance' at the 7th, international scientific conference, New York, argues that attitude of owner-manager of firms is an important factor as well, and goes to suggest that, entrepreneurs who are open to ideas and views, are individuals with positive mental strength that has three (3) dimensions;- i) engages in learning, ii) in search of and for novelty, and iii) constantly seeking feed-backs. The findings were based upon 713 firms surveyed and analyzed with AMOS statistical tool. Therefore, openness to change, openness to novelty, idea and opportunities, and openness to feedback (seeking opinions and suggestions) and learning are the key factors towards fostering firm performance. Being receptive towards learning something new, to seek for new business opportunities and to gather feedback to their ideas for improvement, is a positive influence towards firm performance.

Overall, evidence presented in this section suggest that, there seems to be some confirmation to indicate that, strategic firm orientation, and innovativeness along with assistance from external support somewhat reflect positively on firm's survival and overall performance.

2.7 Definition of Innovation in Brief

As indentified by Roberts, Baker & Walker (2005), innovation originates from the Latin word known as 'innovare', suggest to mean, being new, to take something new, doing existing things in a new way, or doing something new in response to changes. Hamel

(2003) & Tidd *et. al.,* (1997) wrote that, innovation is also part evolution and part adaptation. Rogers & Shoemaker (1971) relates, innovations are organizational adoptions of ideas that are new to a firm or an industry. Burgleman & Madique (1988) asserts that, innovation results from processes involving aspects of the relationship between, the availability of technologies, the entrepreneurial capabilities of organization, and the characteristics of the market. Typically, these processes are initiated by business in response to the identification of programs of action that no longer satisfy performance criteria (March & Simon, 1958; Utterback & Abernathy, 1975). Utterback & Abernathy (1975) wrote that, this situation gives rise to a search for alternatives that meet performance objectives, followed by an evaluation of these alternatives in light of product or process needs.

In addition, according to Hamel (2003), true innovation is based on the recognition that a business concept represents a dozen or so design variables, all of which need to be constantly revisited and constantly challenged. Drucker (1985) concluded that, innovation is a specific tool of entrepreneurship and a firm that is not experimenting with new business concepts is probably living on borrowed time. From an organizational perspective, a fitting definition for innovation is as given by Luecke, Richard & Katz (2003):

> "Innovation is generally understood as the introduction of a new thing or method. Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services". (p. 1)

On the other hand, Schumpeter (1934) was the first to make a distinction at different types and forms of innovations, by specifying the following characteristics;-

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a) The creation of a new product or alteration in some of its attributes,

b) The development of a new method of production,

c) The opening of a new market,

d) The securing of a new source of supply and,

e) A new organization of industry.

Kanter (1983) basically follows the Schumpeterian mode of reasoning. Her views are, even though the majority of people would regard innovation as being scientific in nature, yet there are many other kinds of changes that adds-up as innovations. Within recent years, the studies and discussion on innovation types (Lee & Kang, 2007; Matthews, 2009; Walker, 2007), shares the same view as most previous studies, but with differences in terms of organizational innovation, such as, the creation of zones for enterprises, new laws on taxation, problem-solving task forces and quality circles.

Briefly, as identified by OECD (Oslo Manual, 3rd edition, 2005a), innovation is defined as, the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. The manual further adds that, four main types of innovations are distinguished as;- Product innovations, Process innovations, Market innovations and Organizational innovations.

2.7.1 Innovative Capacity

Findings of few researchers (Rosser & Taylor, 2008; Galston, 2010; Heffes, 2009; US SBA, 2009), strongly advocates that, strengthening and expanding small business's innovative capabilities has to be top priority, in order to, address the decline of U.S.'s leading role in technology due to lesser employees, and entrepreneurs embarking on professions in engineering, mathematics and competitive science technology. As stated by Blau (2009), in order to boost and assist small business and new or young startups to build-up innovative capacity as a solution towards closing of its research gap with the United States, the European Commission designed and approved the European Union's (EU) Small Business Act in 2008. This positive development was further emphasized by Barba-Sanchez & Martinez-Ruiz (2009) on European small business contribution towards social-economic and regional development.

Research by Li & Mitchell (2009) concluded, by agreeing on the competitive dynamics of knowledgeable Chinese worker spread-out as a representation towards stimulation of radical innovations by small businesses within the developing economies. On the other hand, Oke *et al.,* (2007) stated that, small businesses in the United Kingdom and in other parts of more developed economies are inclined to concentrate more on leveraging return-on-investment (ROI), therefore support's incremental innovations than radical innovations. These findings are further supported by Uddin's (2006) research on innovation diffusion in Bangladesh, which is said, to lead towards sustained small business growth globally. Strong universal consideration for innovations and technology leadership therefore validates further the economic worth of small business's innovations.

As explained by Utterback (1996), most product innovation takes place at the early stages of the industry life cycle, when numerous designs are tried and tested before the product becomes established in the product portfolio. Beyond a specific time period, the product reaches a phase of dominant design. Thereafter, the rate of product innovation decreases as mindsets are constrained by the dominant design, and the relative importance of process innovation increases across the sector as companies try to find better and more cost-effective ways to produce a marketable product. Over the life-cycle of the product, the scope of process innovation decreases, as the optimum configuration of production process is achieved, as depicted in Figure 3.1 Further, innovation can be classified as either radical innovation or incremental innovation as depicted in Figure 3.2 on following page;-
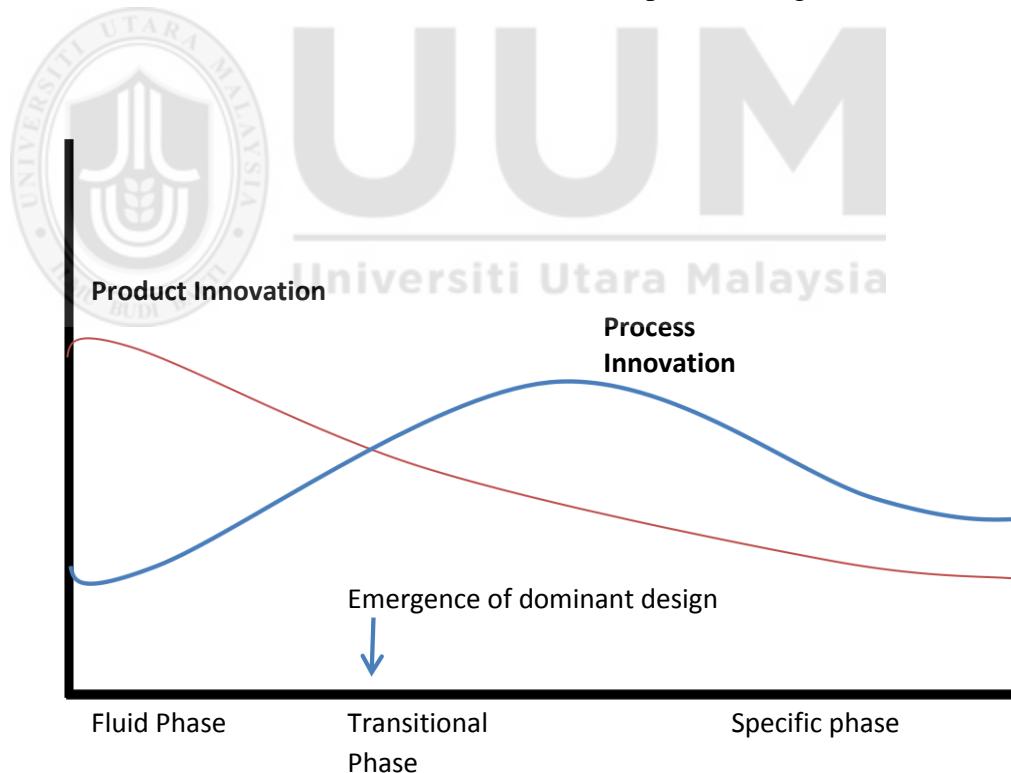
Figure 2.1
Product and Process Innovation.
Source: Utterback, J. M. , Mastering the dynamic of innovation. 1996, Harvard, Business School Press, USA.
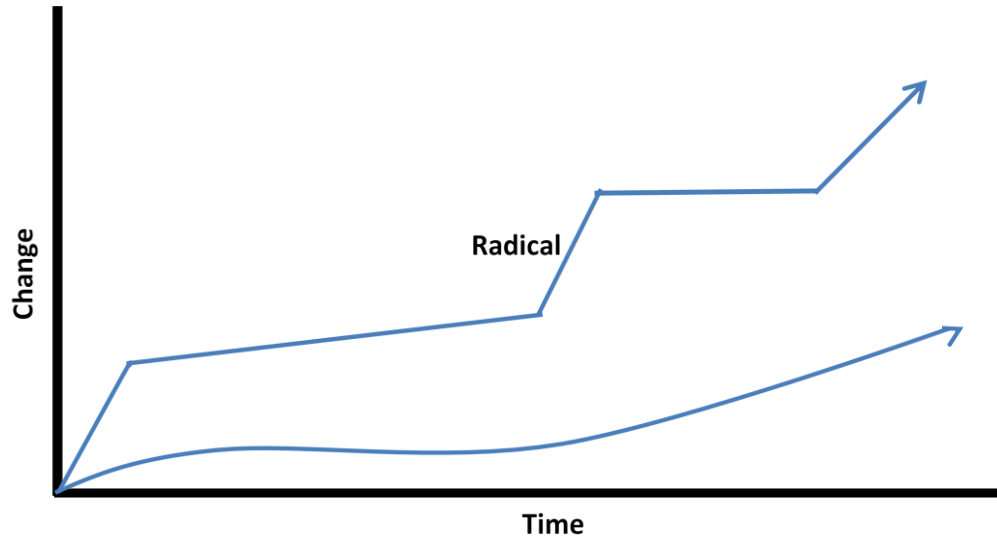
Figure 2.2
Radical and Incremental innovation.
Source: Adopted from Utterback, 1996.

Firm's innovativeness increases as a result of, external environmental change, and that, these competitive environment changes will have an effect on firm's market orientation and that, results indicates' that, measure of firm performances are positively associated with firm's innovativeness and market orientation (David *et al.* (2007). Research of 384 SME firms in six (6) European countries by Hans *et al.* (2012) found that, European SMEs generally do not have a specific department meant for innovation or a proper innovation procedure. Alongside with corporate culture, specific department for innovation or formal process, review of existing products and coupled with large employee size, tend to significantly affect innovation. Their study also revealed that, two (2) of the main reasons obstructing innovation are, due to shortage of funds and time coupled with, poor support from the government institution of innovation within the SMEs.

There is none agreed definition for "Open-Innovation' as pointed out by Enkel *et al.,* (2009) by stating that, firm embraces, external ideas, as well as, internal ideas and that the following three (3) main processes could result in positive impact on firm's innovativeness;-

a) Outside-in process – firm build its knowledge-base by inter-firm relationship with customers, suppliers and or, partnering with external institutions (Universities),

b) Inside-out process – utilization of selling or licensing out 'Intellectual Property' (IP) by transferring innovative ideas to the market, in order, to generate and accelerate profits,

c) Coupled process - partnership or co-operation with mainly complementary partners, through supply-chain, clusters, alliances, co-operation and joint-ventures.

Small Business Economic Publication (SBE, 2009) suggested that, research & development (R&D) has positive relations to productivity, nevertheless, in-house research & development do not capture most aspects of innovation, as innovation often arise through other avenues, particularly in and for SMEs. If support is rendered, then R&D was not found to be important for all categories of SMEs and start-ups, hence, only selected class or groups of SMEs to be targeted. Based on the above, R&D and innovation are risky and costly activity, therefore R&D policy making for SMEs might be regarded and considered appropriate. In general, SMEs are very diverse and that, policy-makers should steer clear of collective consideration and that R&D policy is not enough, thus be complemented along with other policies. It is argued that (SBE, 2009), these policies ought to tackle a variety of objectives, such as, that it; (1) Must facilitate access to other innovative inputs, in addition to R&D, (2) Support company-wide innovation, (3)

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Encourage skill-enhancement and human resources practices, (4) Promote innovative networking and rewarding supplier-user relationship, and (5) Generate and create the needed framework conditions to facilitate spillovers from bigger firms, universities and or, research centers for SMEs.

Empirical evidence based on quantitative data from Finland's 708 firms with less than 50 employees on, R&D benefits between manufacturer and service sector conducted by Helena & Hannu (2011) on the innovation capacity of enterprises using 3 variables; 1) R&D investment, 2) Capabilities level of innovation, and 3) External input into innovation development gained through networking, indicated that, manufacturing R&D investment has statistically significant investment, yet again, manufacturing sector has the higher value of capabilities accumulation. As for external inputs, both sectors namely, the services and manufacturing have benefitted, by networking through resource acquisition and collaboration activities. Accordingly, the most frequently developed innovation forms are incremental in nature, which was diversified into all innovation categories;- products, services, processes, production methods and modes of actions. The next most frequent form of radical innovation categories were, products, services and the modes of actions.

Findings obtained from 836 responses in New Zealand, between incremental and radical innovation by Elisabeth *et al.* (2012) discovered that, firms that drive markets leverage through radical and disruptive innovation, and these firms have the tendency to shape the needs of existing and potential customer, thus altering market structure. Their findings

also suggested that, firms with entrepreneurial orientation (EO), that is, firm's innovativeness, pro-activeness and risk taking nature are often inclined to develop both driving markets and market driven innovations, while firms with market orientation (MO), that is, creation of superior value for customers are often inclined to develop market driven innovations. EO firms are inclined to focused on a long-term R&D, acquires new resources, empowers employees for contribution towards firm's innovative process, searches for and pursue new opportunities for expansion and growth in new markets.

Further finding from research conducted by Aysa (2012) on Turkish firms' innovative determinants, found that, patent intensity increases with firm size but export intensity however decreases with age and capital intensity. Trademark intensity increases with firm's age (one reason for such discovery is because contract manufacturing is widely done by Turkish firms). Based on the findings of Pooran (2013) in his study of UK SMEs, states that, global competitiveness of UK's SMEs are highly dependent on the accumulative effects and inter-relationship between two (2) key elements − that is, the ownership cum organization structure and R&D capacity, along with, an open innovation practices, as well as, the abilities of firms to attract government grants for product development and R&D. There is a need for SMEs to collaborate with Universities and other firms, in order to convert their creations into innovative products through 'Open Innovation' (firm use external ideas as well as internal ideas) hence further achieve and sustain competitive advantages.

Empirical results from investigations of SMEs in Portugal and Spain by Cristina *et. al.,* (2013) indicated that, there were differences between firms within these countries, in terms of innovation capacities across products, organizational innovation and, the marketing of current products into new markets. In the case of Portuguese firms, leading factors of innovation were the relationships with suppliers, with clients, and the level of commitment to R&D. As for Spanish firms, most significant factors of innovation were the availability of local labor supplies, R&D expenditure, firm size, consultants, skilled human resources, transportation infrastructure and the availability of capital for investment. Innovation inhibitors for the Spanish firms were, firm age (young companies), weak innovation friendly climate, local labor supplies, client relationships and the lack of investment in R&D. Where-else, Portuguese companies reported that, the lack of state support and weak innovation friendly climates. Findings further suggested that, the relationship between innovation and financial performance was statistically validated, which confirmed that the introduction of greater numbers of product innovations did drive higher overall turnover.

Whereas, study conducted by Minna (2014) based 2,400 SME firms on, innovation capability consisting the following aspects; (a) Participatory leadership culture, (b) Idea generation and Organizing structures, (c) Work atmosphere and well-being (d) Know-how development, (e) Regeneration, (f) External Knowledge, and (g) Individual activity revealed mixed results. She concluded that, findings showed that three (3) aspects of innovation capability, namely ideation and organizing structure, participatory leadership

culture, and know-how development has some effect on different aspects of firm performance (financial and operational performances).

A broader perspective has been adopted by Mayanyn & Maria (2016), as in their research through literature review on innovation argues that, innovation does not necessarily involves' high technology or a great amount of economic resources. Innovation is about doing things differently and producing a positive impact on products or processes. Innovation is the realization of something new. It is a product, a process, a marketing method or even an organizational change to make a difference and improve the activities of the enterprise. It adds value for the customer. This improvement ultimately will have a positive economic impact within the organization. Implementation of innovation strategies is not an easy task for MSE (Micro & Small Enterprises), as they face limited access to technology, and to economic resources.

In the same vein, additional aspects of innovation are as what Gabriela & Mircea (2013) claims, that is, innovation is not just R&D, as that is, only one aspect. They stated that, if you innovate your manufacturing process or your organization structure, you have truly innovated as well. In order to innovate, the following guide is suggested;- a) If your firm is unsure where your firm's existing innovation program stands, embark on the free innovation audit. The audit provide detailed organization's overview, (b) Define the desired results by quantifying goals, either by number of new products or the sales figure, (c) Decide how to recognize and reward successes, and failures are learning experience, (d) Protect your intellectual property by filing and secure patents/trade-

marks/copyright/design, (e) Develop a standardized guideline for new product development strategy that examine quality or a structured repeatable process, capability and capacity for managing projects.

Finally, for innovation to flourish, Kalin (2014) wrote that, it requires an 'intensive networking practices' which includes partnerships and joint research with laboratories and the universities. It entails a practice of developing an ever-expanding network of knowledge and technological capabilities and that, these small innovative firms are patent-intensive, which provided a competitive edge ensuring partnership and growth.

In view of all that has been mentioned so far, one may suppose that, innovation and innovativeness either directly or indirectly affects firm's performance positively and that, innovation comes in through varying approaches, and are subject to entrepreneurs and firm's strategic orientation.

2.8 Definition of Disruptive Technology in brief

Christensen (1997) concluded that, disruptive technology (DT) is termed for, an emerging technology out of a specific and niche market that, becomes dominant thus disrupts the stable-state of a market and often affect and force-out, existing leading and incumbent firms out of the market. Disruptive technology (DT) is a term coined and introduced by Joseph L. Bower and Clayton M. Christensen in year 1995, and that DT has since been popular item of research, (Paap & Katz, 2004; Danneels, 2004; Sood & Tellis, 2005; Carayannopoulos, 2009) mainly for the risk DT pose towards established

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and market leading companies. Table 2.11 below shows a few examples of disruptive technologies of the past 30 years.

Table 2.11

Few examples of Disruptive Technologies.

Dominant Technology (Incumbent)	Disruptive Technology (New entrant)	Disruptive Attribute	Period of Disruption
ARPANET / Facsimile / Telegraph	Internet	Scale-free networks, Fast, Cheap	1980's
Workstation/Typewriter /Television	Window Operating System/Personal Computer (PCs) /Laptops	Cheap, for everyone, Weight	1980's
5.25 inch disk drive	3.5 inch disk drive/Thumb-Drive	Size, Weight (laptops), Mobility	1980's
Chemical Photography	Digital Photography	Capacity, Development	2000's
Compact Cassette	Compact Disc	Sound quality, Capacity	1990's
Discman	Mp3 players	Portability, Capacity	2000-2005
Internet	Mobile Internet /WiFi	Real-time, Seamless connection, Inexpensive	1998 onwards (3G network)
Public-Phone/Telecoms /Cell or Hand Phone/Pocket camera/Calculators	Smart Phone	Integration of video, Camera, Voice and Communication.	1980's-1990-2000's

Source: Data comes from various sources- in magazines, books and online (2015).

Christensen (1997) further explains by stating that, it is often their customers themselves that, tell the incumbents that they do not value the new features. Tellis (2006, p. 34) agreed with the following extracted quote: "[…] *the disruption of incumbents – if and when it occurs - is due not to technological innovation per se but rather to incumbents' lack of vision of the mass market and an unwillingness to cannibalize assets to serve that market."*

From the above elaboration, the following definition for DTs is derived (Christensen, 1997);-

"A disruptive technology is a technology that disrupts the status quo of both the market position of the dominant technology and the competitive market layout by having an alternate perceived performance mix, which is valued more by the customer than the one of the dominant technology".

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Historically, the displacement of sailing ships by steamships, horses by wagons by the automobiles, railroads by airlines for passenger travel and by trucks for freight, all were cases of disruptive technology. Contemporaneously, online retail stores are displacing brick and mortar retailers, laptops displaced desktops, and smart phone displaced cell phones, Dot-matrix printers gave way to inkjet printers to laser printers, each higher level of technology offering greater efficiency (Rebecca et. al., 2015). Technopedia.com defines disruptive technology as an enhanced or completely new technology that replaces and disrupts an existing technology, rendering it obsolete. It is designed to succeed similar technology that is already in use and that disruptive technology applies to hardware, software, networks and combined technologies.

Therefore, as listed in Table 2.11, disruptive technology is constantly evolving and that, these technologies are altering the way businesses are conducted at home and across borders, further adding value to firm's existing offerings resulting in better efficient and effective business operations, lowering cost and enhancing performance and profits.

2.8.1 Disruptive Technology

Features and benefits of newer emerging technologies according to Adner (2002), are often valued by the customers, generally for its most critical performance significance or value. After a while, however, the perceived performance mix of the technology begins to shift and change, when the primary basic features or functionality threshold is reached. As a start, disruptive technologies emerge out as an inferior product serving a specific market. However, upon maturity and along with the changes in its perceived performance

mix, these technologies start to over-perform the leading technology by appealing to the mainstream market. Following this development, these new technologies quickly sets a new standard thus phasing of older technologies and its producer out of the market. Established firms are often ignorant against the potentials of disruptive technology due to its initial inferiority and low perceived performance mix. Established firms often assume that these technologies can only serve a specific need and market, and that most of their customers may not value its use.

To further elaborate details, disruptive technologies are as illustrated in the above Table 2.11 above, therefore, as pointed-out by Dominic & Wilhelmina (2012), the Internet is one of the technologies that, consumers and businesses are aware of and are making use of. In my opinion, it may not be broadly recognized, but in today's modern world, the Internet is the key to successful business operations. Therefore, it is imperative that many business owners should utilize the Internet instead of using conventional and traditional methods. SME owner need to be aware of the up-to-date technologies available for consumption for their businesses, which provide varied benefits, such as, utilization of these technology lowers cost, increase efficiency, and ultimately enhance quality of products and services. Despite the glaring facts and figures, most people are ignorant of recent technologies that could be used in their businesses. For that reason, this knowledge aids researchers to further explore and obtain information on awareness of technologies that may be adopted and be used in business operations. To further add, such knowledge is important to assist researcher to determine whether SME owners do in-fact have

knowledge of the up-to-date technologies being utilized in existing modern business environment.

Marnix (2006) study through review of literatures reveals, basic limitations to successful disruptive innovation begins largely from several inhibiting factors; lack of ability to unlearn outdated mental models, a successful business model or leading design, organization climate of avoiding risk, poor management of innovation process, poor follow-up and follow-trough capability and failure to develop compulsory internal or external infrastructure.

The above statement is further supported by Chang *et al.,* (2010), as they asserts' that firms seeking to develop disruptive innovations has to be receptive to consumers' context and be highly skilled at translating cues into 'job-to-be-done' product objectives. Foreign MNC should be open to opportunities, collaborate with SMEs in order to meet the demands of resource-constrained consumers in the bottom of the pyramid. Higher automation of manufacturing process or access to such capability through partnership cuts production cost drastically. Internal R&D coupled with the capability of exploiting existing technology in a new context is important to the development of disruptive innovations.

Findings by Saul & Berman (2006) states that, by the 2010 onwards, more than 90% of the innovation in the automation industry will be electronic related and that, when factoring in technology, know-how is often sufficient. Many innovation-based strategies

are based on the unique market application of an existing integrated set of technologies rather than requiring technological breakthrough.

There and again, as stated earlier, Dominic & Wilhelmina (2012) in their study revealed, that managers or owners of SMEs in the developing countries are in-fact aware about various technologies that they can utilize along with its potential benefits. As pointed-out, the Internet is one of the technologies being utilized over traditional methods and utilization of these technologies is cheap, fast, and efficient resulting in lower cost of business operations hence increases profitability. Therefore, in conclusion, disruptive technology changes the way businesses operate and has an influence on the success of SMEs performance.

Similarly, recent findings by SMECorp (2014/2015) highlights weaknesses such as technology adoption affects performance and despite having various government assistance and programs targeting the new entry SMEs, the failure rate is getting higher (Chong, 2012). Findings also suggest that reason for SME closure is equally due to the fact that SME owners are not aware of the business challenges for SMEs in digital era (Thestar, 2017), industry revolution known as industry 4.0 (New Straits Times, 2017).

From the above findings and challenges faced by SMEs, it can be concluded that business failures are subjected to varying factors, such as innovative capability, and technology adoption (SMEcorp, 2014/15) due to the advent of information technology and

significant technological advancements contributed by industry trend and revolution known as industry 4.0, evolution in the digitization and automation of processes.

The evidence presented in this section suggests that, with newer technologies known as disruptive technology, interrupting the ordinary, traditional and conventional ways, resulting in various modes of interactions has forever changed the way we work and communicate, further made it possible for mobility and for people to connect to corporate network and collaborate from anywhere. It is imperative for SMEs to adopt disruptive technology as fact is that, disruptive technology does add-value to businesses, by enhancing efficiency and effectiveness of business operations and quality of products and or services, resulting in better firm performance.

2.9 Theoretical Review – Underpinning Theory

Within the area of strategic management, main concerns are basically on how firms produce and attain better performances. There are many theoretical approaches for examining existing resources and firm performance, hence, this study adopts the RBV theory as main theory to explain the relationship between the independent variable and firm performance. Schumpeter's theory of innovation is equally adopted to support the RBV theory.

2.9.1 Penrose and Barney – Resource-Based-View (RBV)

A considerable amount of literature has been published on firm performance. These studies adopt RBV theory to explain the effects on firm performance. The foundation of the RBV theory can be traced back to the initial works emphasizing significant of

resources in enhancing firm performance (Penrose, 1959). Penrose (1959) is associated

and regarded as, one of the initial key contributors to the theoretical highlights of the

'Resource-Based-View (RBV), (Kor & Mahoney, 2000; Rugman & Verbeke, 2002). The

heterogeneity or diversity approach explains that, firms achieve competitiveness not due

to their resources, but for their distinctive competence in better utilization of their

resources. Penrose (1959) goes on to state that, the productive services of resources must

be discovered over time, as entrepreneurs interact with resources and make subjective

decisions about resource allocation, deployment and maintenance. He also stressed that,

the condition of a firm should not be considered just as a unit, but equally, as a group of

resources.

This is in common with the core competencies concept in RBV, which explains firms'

competitive success is based on their competencies (Ritter & Gemunden, 2004). Bain's

(1959) industrial organization (IO) theory equally supports the heterogeneity of firms'

resources, especially those assets that are legally protected, for instance, patents, or trade-

mark, which are unique to individual firms. Based on the findings of Feinberg (2007) and

Hill & Deeds (1996), states that, the theory focuses on probing the outcome of

concentration, size of firm and entry barriers, as the determinants of firms' success.

Barney (1991) and Penrose (1959) wrote that, a firm's entrepreneurial growth

development consist of two (2) forms of heterogeneity: (a) Resource heterogeneity –

resources of firms differ from one another, which influences their strategies, explaining

sustained differences in profitability among firms; and (b) Productive services

heterogeneity - firms with comparable collection of resources differ considerably in their entrepreneurial productivity.

Foss *et al.,* (2006) explain that, the heterogeneity of 'productive services' is at the heart of entrepreneurial creativity, since it involves converting resources to entrepreneurial services. Their argument has been supported by Tokuda (2004), who stated that, the main sources of competitive advantage is not the heterogeneity of resources and capabilities alone, but also the heterogeneous perceptions and abilities of the entrepreneurs. According to Galbreath (2004), this is in contrast with the neoclassical theory of perfect competition that prevailed from the 1930s to the 1950s, which suggests that, firm resources are essentially homogeneous, perfectly mobile, transferable between firms, and places emphasis on the optimization of tangible resources rather than intangible resources in production.
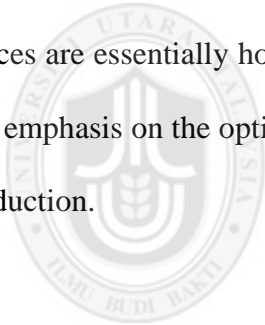
As explained by Barney (1986, 1991) & Wemerfelt (1984), the resource-based-view (RBV) stresses on the firm, on its exceptional collection of resources, but Clulow (2007) further added that, all resources have the potential to aid the firm with a sustained competitive advantage. Based on the findings of Wright *et. al.,* (2003), it can be argued that, many previous RBV literatures frequently emphasized on resources as a, stable concept that can be identified at a point in time and will endure over time. Ferreira & Azevedo (2007) goes on to state that, most research on RBV often focused on strategic context, advocating resources along with capabilities as fundamentally key factor, in gaining a sustained superior performance and competitive advantage. The present study

will represent the function of entrepreneurship in RBV by highlighting the importance of innovative capacity as a resource capability.

As Casson (2004) & Teece *et. al.,* (1997) points out, the RBV focuses on the importance of human resources, as reflected in the competencies and capabilities in the performance of the firm. Collis & Montgomery (1994) and Fahy (2000) further assert that, better performance is often the result of developing a competitively distinctive set of resources, along with deployment through a, well-developed-strategies. Similarly, Salaman *et. al.,* (2005) & Teece *et. al.,* (1997) stated that, strategists who embrace the RBV equally stressed that, competitive advantage is an outcome of aligning skills, objectives and other factors with organizational systems, structures and processes to achieve capabilities at the organizational level.

Into the bargain, Barney (1991) assets that, firms with a bundle of resources that are, valuable, rare, inimitable and non-substitutable (VRIN) can implement value-creating strategies that are not easily duplicated by other firms. Barney further adds that, however, it is quite difficult to find a resource which satisfies the entire VRIN criterion except in a monopolistic type of company.

In recent times, a number of quantitative studies have been published to bridge the gap between the RBV theory and organizational practice, and there are also robust studies that discuss the impact of resources on firms. As explained by Matlay & Harry (2005), major characteristics of the RBV about firms' competitiveness are directly related to the current debate on the impact of firm-specific resources to the overall performance of

smaller firms. As for the theories that contributed to the development of the RBV, Table

2.12 on the following page presents a historical view of these underpinning theories and

their contributions to the RBV.

Table 2.12
Historical view of the underpinning theories and their contribution to the RBV and
Entrepreneurship.

Author	Contribution to RBV (Resource Based View)
(Barney, 1991;	Suggests that to be sources of competitive advantage, resources must be valuable, rare, inimitable and non-substitutable.
Rumelt,1987;	Individual resources as unit of analysis.
Wernerfelt, 1984)	Focuses on state (equilibrium) where firms earn sustained competitive advantage.
	A strategic resource to one firm is also a strategic resource to another firm. Usually no distinction between resources and their services.
(Nelson & Winter, 1982; Schumpeter, 1934, 1942)	Technological innovation and "creative destruction" is the basis of competitive advantage.
	Managerial action and entrepreneurialism influence firm success rather than market power or industry structure.
	Firm viewed as collection or bundle of resources and hierarchies of activities governed by routines and rules.
(Penrose, l959)	Firm as collection or bundle of resources.
	Firm's growth is based on the effective use of resources and limited by managerial resources.
	Entrepreneurship exercised by team, emphasizes alertness as well as judgment.
	Services rather than resources are stressed.

Sources: Adopted from Foss et al., (2006) and Galbreath (2004)

2.9.2 Schumpeterian Theory of Innovation

Innovation theory originated from the discipline of economics. Schumpeter (Joseph Alois Schumpeter) is regarded, as the founding father of the theory of innovation dynamics. In his work on, '*The Theory of Economic Development*' (1934), Joseph Schumpeter examined the European industrial structure of the late 19th century, at that particular time period, it was vastly dominated by small firms. Schumpeter (1934) believed and quoted that, innovations are imperative for economic growth, commercial profit, thus public wealth. Schumpeter's theory of economic development departs from the realm of quality improvements to that of, the routine-based behavior of managers.

Schumpeter (1939) definition of innovation as, new production functions, evolved as the future standard of performance, widely referred to, by decision makers in the economic system. According to Andersen (1994), the Schumpeterian model emphasizes exchange, while production is treated as a black box, which can be characterized fully, in terms of new production function. Current standpoint is that, the Schumpeterian theory of economic development incorporates product innovation as an economic activity, which serves to sustain or enhance a firm's performance. In addition, according to Shefsky (1994), Schumpeter claimed that, successful entrepreneurs should have the creativity to spark new and profound ideas.

Schumpeter (1934) also discovered that, entry to the market was relatively easy and simple for firms with new technology to exploit and further emphasized the role of new firms as drivers of innovation. It should be noted that innovation, in the sense coined by Schumpeter is, an economic concept rather than a technological one, and despite how

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spectacular technological invention may be, it is not innovation, if it do not creates growth or pure profit in the market economy. Furthermore, Schumpeter (1934) equally distinguished different types of innovations, such as, 'development of new product', 'modification of existing ones', 'market innovation', 'sourcing and organizational innovation' and 'process innovation', which he then classified them in two major categories; product and process innovation.

According to findings by Liao *et. al.,* (2008), based on resource-based-view (RBV) of budding entrepreneurs suggested that, technology knowledge and financial resources were the major reasons for business discontinuance. Further review of literatures further uncovered a gap in knowledge, on and of disruptive technology in relation to innovative capacity, and adoption by small businesses for economic sustainability.

Schumpeter (1942) in his book titled, 'Capitalism, Socialism and Democracy', further introduced the term known as, 'creative destruction' to indicate, a process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the mature one, incessantly creating a new one (Aghion & Howitt, 1992). According to Foster & Kaplan (2001), creative destruction is an influential, as well as, a powerful economic concept since it can explain various dynamics of industrial change, including the transition from a competitive to a monopolistic market.

Creative destruction as explained by Aboulnasr *et al.,* (2008) is through radical product innovation, threatening to destroy current market positions and create vast new market

opportunities. Schumpeter (1942), in the same book, suggested that large firms may invest a large percentage of their excess and loose resources in innovation, since they hold the market power to appropriate the returns from innovating. With regards to innovation, Kim & Mauborgne (2007) found that, deployment of a new strategy for firm's survival is called "Blue Ocean Strategy" (BOS), equally referred as, the re-constructionist strategy. Schumpeter's creative destruction theory inspired this strategy. The backbone of re-constructionist strategy is, value innovation.

Further, according to Kim & Mauborgne (2007) again, innovation (be it in product, service or delivery) by BOS method advocates, creation and enhancement of value for the market, at the same time, eliminating or reducing features or services that, are less valued by the existing or future potential market. The advocates of BOS rejects the conservative insights of various strategy writing, consulting and scholarship, which centers on beating competition by following a low cost or a differentiated strategy, and proposes that, firms should look outside their present paradigms to find new value propositions.

In my opinion, product innovation refers to the creation of a totally new item or product hence, the innovator is in the position to acquire dominance. The OECD (1992) categorized innovation into product and process innovation, but distinguished technological innovation, as part of innovation that contains both product and process innovation. Product innovation can be described as either, major or incremental innovation. It further defines major product innovation as, a product whose intended use, characteristics, performance, design properties and attributes, or use of materials differs

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significantly from previously manufactured products and that, incremental product innovation, refers to existing and current products whose performance has been considerably improved.

The study integrates the above two (2) theories (by Schumpeter, Penrose and Barney) which indicates the importance of a firm's internal resources as the firm's capabilities, subject to their uniqueness and their ability to create competitive advantage for the firm. Determinant of firm's success and its' competitive advantage would be based and be dependent on, product and service, as well as, marketing and organizational innovation and that, these innovative capacity and capabilities equally indicates the portion of the firm's overall performance based on the effective use of the firm's resources. Similarly, Malaysian SMEs, known for its scarcity of resources, need to have innovative capabilities and capacity that are, valuable, rare, inimitable and non-substitutable (VRIN), rightly suits and in accordance to RBV theory.

2.10 Summary

The foregoing pages highlights the crucial and important role of SMEs in Malaysia and its' related contributions towards the country's GDP, mitigating poverty, employment generation and industrial development. Suffice to crucial and important role of SMEs, these firms are susceptible to various affects and challenges. On the other hand, government and its relevant agencies are committed to ensure that this industry segment is further supported through various programs and budget allocations in 10th (Developing SMEs as an engine of growth and innovation), and 11th (Growing dynamic SMEs),

Malaysian Plan, to assist strengthen and reap better value, benefits as well as, creation of economic wealth. Following chapter present findings from literature on varied challenges faced by SMEs along with study's variables investigating remedial strategies ensuring survival, sustenance and further growth of SMEs performance.

If we were to look at any nation, productivity is absolutely the most important factor in determining a host list of outcomes, such as, determines wealth, determines wages, determines return on capital, determines the standard of living, and determines whether a particular geographic like the Asian region, Australia, USA, or UK would prosper. The challenges today are to develop the capacity for innovation, in order to drive productivity growth into the future. It is building within nations the ability for firms, to be innovative and to produce new products, new services, new processes that increasingly are the next important stage of development, particularly in advanced nations.

In the words of Gilbreth, on his Memorial Lecture (1999) at the 'World Productivity Congress, Edinburgh', "*The challenge facing advanced nations and economies is, how to build the capacity for improving tomorrow's productivity - innovative capacity. World's economy has a critical problem that is just being recognized: in the advanced nations, there is a slowing of growth of the workforce. Country, after country, will simply run out of workers. This is particularly true in the advanced industrial nations like Japan, the US, and many of the European nations*".

Following were the suggested four (4) different elements that really combine to create innovative capacity;-

1) Quality contribution by technical, scientific personnel, coupled with strong basic scientific infrastructure of higher education system, and the supply of risk capital and so forth.

2) Customers playing sophisticated role with sophisticate needs, demanding for better sophisticated products and services.

3) Innovation demands an attractive 'climate', to encourage the needed levels of investment required for innovative activities. Key component for such demand is protection of and for Intellectual Property (IP).

4) Intensity of competition for dramatic influence towards Innovation. Innovation emerges increasingly out of local rivalry. Last but not least, innovation requires a cluster of a group of related and supporting firms such as, a geographical concentration in a particular country or region within a country.

In conclusion, this chapter presented various important success factors that, influence the success among SMEs and that, by adopting innovative capacity and disruptive technology, an improved model that is modified and adapted for SMEs success may be developed. Developing a practical model for the success of SMEs is the main importance of this research study and RBV and Creative Destruction theories in combination are used as the underpinning theory for the study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter provides a description on how the research was carried out and the methodology employed to test the hypotheses. The chapter is divided into few main areas or sections. The first section begins with an introduction and research framework is based on background of the study and problem statement highlighted in chapter 1. The second section discusses the hypotheses development, followed by the third section, on research design and unit of analysis. The fourth section is on operational definition. The fifth section is on instrument employed for measurement of variables. The sixth section is on population and sampling, thereafter followed by, data collection procedure. The last section is on technique of data analysis, and the chapter ends with a summary.

3.2 Research Framework

Figure 3.1 shows the research framework for the study and that, by developing the conceptual framework, it serves to act as guidance to ensure the following objectives are fulfilled;- i) research questions are further fine-tuned, ii) selection of the appropriate measurement methods and, iii) selecting, as well as, determining the appropriate statistical analyses. The model suggests a framework that can be used to assess the relationship between innovative capacity, mediated by disruptive technology and their subsequent effects on SMEs performance. This current study considers a model (Figure 3.1) that propose some independent variable (X) is correlated with some dependent

variable (Y) due to its influence directly on dependent variable, and equally justifying changes in the dependent variable.
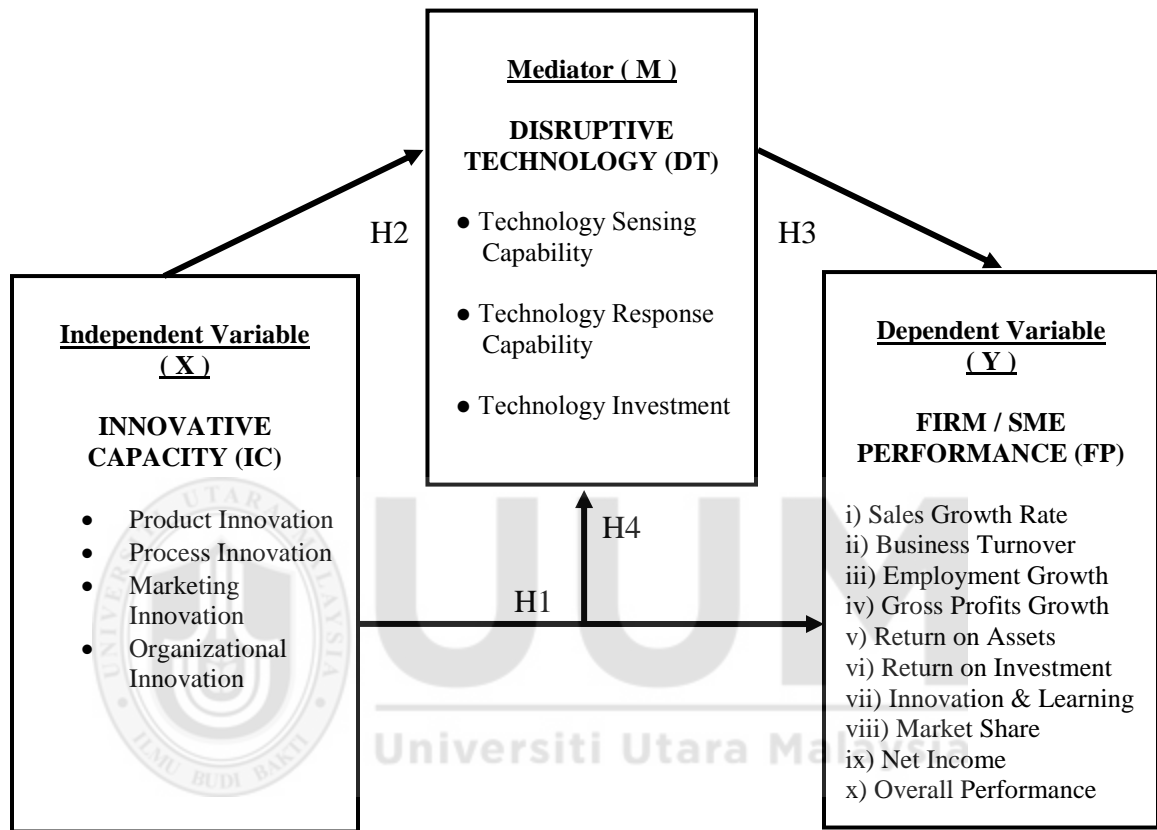
Figure 3.1
Research Framework.

According to Mackinnon *et al.,* (2002) that, psychologists refers this condition as X → M → Y relationship known as 'mediation' of 'indirect effect' of X on Y through M. Howell (2002), summarized the criteria to undertake mediation process as follows;

    i.   X must be correlated with Y (Direct Effect – c);

    ii.   X must be correlated with M (Indirect Effect – a);

    iii.   M must be correlated with Y, holding constant any direct effect of X on Y (Indirect Effect – a);

iv.   When the effect of M on Y is removed, X is no longer correlated with Y (full

mediation) or the correlation between X and Y is reduced (partial mediation).

The dependent variable is 'Firm Performance' of the SMEs as measured by the sales growth rate, employment growth, gross profits, return on assets and overall performance. The independent variable is 'Innovative Capacity' in accordance to OECD's recommendation (Oslo Manual, 3rd edition, 2005a), mediated by 'Disruptive Technology' measuring innovation of products, processes, marketing and organization, contributing towards effective and efficient management of the business entity. The research findings and results for the approach as depicted in figure 3.1 above are discussed and illustrated in Chapter four (4) of this thesis.

3.3 Hypothesis Development

In accordance to the objective of this study and the available facts from the literature, the following hypotheses were developed;- Hypotheses H1, H2, H3 and H4 is based on the objective as stated in this study, which is concerned with the direct and indirect relationship between the independent variables, mediator and dependent variable. Dimension of IC is represented by;- Product innovation, Process innovation, Marketing innovation and Organizational innovation. Intervening variable of DT is represented by Sensing capability, Response capability and Technology investment. Dependent variable is Firm performance representing SME organizations.

3.3.1 Relationship between Innovative Capacity and SMEs Performance

A number of empirical studies testing the impact of IC on firm performance have reported that IC enhances firm performance. As stated by Schumpeter (1950), innovation is an important source of competitive advantage, and a determinant of superior business performance. This observation is strongly supported in the empirical studies of organizational innovation, focused on the relationship between innovation and business performance (Damanpour, Szabat & Evan, 1989; Han *et al.,* 1998). The reason behind this relation is that, innovations acts as a 'coping mechanism' for environmental uncertainty (Damanpour & Evan, 1984; Han *et al.,* 1998). Firms with high innovation capability encourage their members to develop innovative offerings, in order to cope with environmental change, consequently, leading towards better and superior performance. Since, a direct positive link between innovation and business performance has been frequently established in extant literature (Damanpour *et al.,* 1989; Han *et al.,* 1998).

Therefore, as per OECD's Oslo (2005a) manual's definition, element of innovation is being categorized as, product innovation, process innovation, marketing innovation and organizational innovation, further breakdown based on the above definition is elaborated prior to the suggested hypothesis.

3.3.1.1 Product Innovation

Based on the findings of Gopalakrishnan & Damanpour (1997) & Langley *et. al.,* (2005), product innovation is defined as, the creation of a new product out of new resources or materials (totally new product) or the modification of existing products (alteration to

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enhance existing version of current product) to fulfill customer satisfaction. Similarly, the definition also refers to, the introduction of new services or product in order to satisfy existing market or consumers or to create new markets (Wang & Ahmed, 2004; Wan *et al.,* 2005). Myers & Marquis (1969) stated that, exploitation of new ideas will result in innovation of new products. Similarly, Craig & Hart (1992) stressed that, product innovation provides and increases variety of choices for products.

A broader perspective has been adopted by Camison & Lopez (2010) who argues that, one of the many sources of competitive advantage of an organization is through product innovation. With innovation, quality of products could be enhanced, which in turn, it contributes to firm performance and ultimately, to a firm's competitive advantage (Garvin, 1987; Forker *et al.* 1996). Hult *et al.* (2004) pointed out that, product innovation safeguards or act as a shield for firm from market risks and competitors. Based on the findings of Bayus *et al.* (2003), product innovation had positive and significant link with organizational performance.

OECD (Oslo Manual, 3rd edition, 2005a) definition specifies product innovation as, the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilize new knowledge or technologies, or can be based on new uses or combination of existing knowledge or technologies. Product innovations include both the introduction of new goods or services,

and significantly improvements in the functional or user characteristics of existing goods and services. New products are goods and services that differ significantly in their characteristics or intended uses from products previously produced by the firm. The first microprocessors and digital cameras were examples of new products using new technologies. The first portable MP3 players, which combined existing software standards with miniaturized hard-drive technology, was a new product combining existing technologies.

The development of new use for a product with only minor or major changes to its technical specifications is a product innovation. An example is the introduction of a new detergent using an existing chemical composition that was previously used as an intermediary for coating production only. Significant improvement to existing products can occur through changes in materials, components and other characteristics that enhance performance. The introduction of ABS braking, GPS (Global Positioning System) navigational systems, or other subsystem improvements in cars is an example of a product innovation consisting of partial changes or additions to one of a number of integrated technical subsystems.

Product innovations in services can include significant improvements in how they are provided (efficiency and speed), the addition of new functions or characteristic to existing services or the introduction of entirely new services. Examples are significant improvements in Internet banking services, such as greatly improved speed and ease of use, or the addition of home pick-up and drop-off services that improve customer access

for rental cars. Providing on-site rather than remote management contact points for outsourced services is an example of an improvement in service quality

3.3.1.2 Process Innovation

Generally, process innovations are the reengineering of, and enhancement of internal operation of business processes (Cumming, 1998). This process innovation consist various parts of a firm's operations, such as, management, manufacturing, technical design, research & development (R&D), and business activities (Freeman, 1982). Similarly, Oke *et al*. (2007) stated that, process innovation relates with the improvement in or creation of techniques and the development in process or system. Zhuang *et. al.,* (1999) agreed that, innovation in technology, skill, techniques, system and procedure, which is used in the process of converting or to transform inputs into outputs. In a production activity, process innovation can be referred to as, improved or new methods, devices, tools, and knowledge in creation of a product (Gopalakrishnan & Damanpour, 1997; Langley *et al.,* 2005; Wan *et al.,* 2005; Oke *et al.,* 2007) .

OECD (Oslo Manual, 3rd edition, 2005a) specifies process innovation as, the implementation of a new or significant improved production or delivery method, which includes significant changes in techniques, equipment and or software. Process innovation can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. It include new or significantly improved methods for creation and provision of services, which involve significant changes in equipment and software used in services-oriented firms or in the

procedures or techniques that are employed to delivery services. An example is the introduction of GPS tracking devices for transportation services, the implementation of a new reservation system in a travel agency, and the development of new technique for managing projects in a consultancy firm. Process innovation also cover new or significantly improved technique, equipment and software in ancillary support activities, such as purchasing, accounting, computing and maintenance. The implementation of new or significantly improved information and communication technology (ICT) is a process innovation if it is intended to improve the efficiency and or quality of an ancillary support activity. Production methods involve the technique, equipment and software used to produce goods or services. An example of new production methods are the implementation of new automation equipment on a production line or the implementation of computer-assisted design for product development. Delivery methods concern the logistics of the firm and encompass equipment, software and technique to source inputs, allocate supplies within the firm, or deliver final products. An example of a new delivery method is the introduction of a bar-coded or active RFID (radio frequency identification) goods-tracking system.

3.3.1.3 Marketing Innovation

As explained by Johne (1999), in order to meet a customer's buying preference, therefore market innovation is about market selection and market mix. Firms has to continuously be engaged in market innovation due to state-of-the-art marketing tools, such as the internet making it possible for competitors to reach potential customers across the globe instantly. Likewise, Rodriguez-Cano *et al*. (2004) asserts that, market innovation plays a

crucial role in fulfilling market needs and at the same time, responding to market opportunities. Therefore, any market innovation has to be directed at meeting customers' demand and satisfaction (Appiah-Adu & Satyendra, 1998).

Research by Sandvik (2003) further concludes that, market innovation has a positive effect on sales growth of a firm. Similarly, according to Johne & Davies (2000), market innovation would augment sales through the increasing demand for products, which in turn yields additional profit to innovative firms. This view are supported by Otero-Neira *et al*. (2009), who discovered strong evidence that, market innovation positively influenced business performance.

OECD (Oslo Manual, 3rd edition, 2005a) specifies marketing innovation as, the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion and pricing, aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales. The distinguishing feature of a marketing innovation compared to other changes in a firm's marketing instruments is the implementation of a marketing method not previously used by the firm. It must be part of new marketing concept or strategy that represents a significant departure from the firm's existing marketing methods. The new marketing method can either be developed by the innovating firm or adopted from other firms or organizations. This new marketing method can be implemented for both new and existing products.

Marketing innovations include significant changes in product design that are part of a new marketing concept. Changes such as, in product form and appearance that d not alter the product's functional or user characteristics, which also include changes in the packaging or products such as foods, beverages and detergents, where packaging is the main determinant of the product's appearance. An example of a marketing innovation in product design is the implementation of a significant change in design of a furniture line to give it a new look and broaden its appeal. Similarly, via an introduction of a new flavor for a food product in order to target a new market segment or a new bottle design for a body lotion intended to give the product a distinctive look and appeal.

New marketing method in product placement, primarily involving introduction of a new sales channels, methods used to sell goods and services to customers which deals mainly with efficiency. Examples of marketing innovations in product placement are the introduction for the first time of a franchising system, of direct selling or exclusive retailing, and of product licensing. New marketing methods in product promotion involve the use of new concepts for promoting a firm's good and services. Examples are, the first use of a significantly different media or technique – such as product placement in movies or television programmes or the use of celebrity endorsement. Branding such as the development and introduction of a fundamentally new brand symbol, intended to position the firm's product on a new market or give the product a new image. Yet, the introduction of a personalized information system such as, loyalty cards, to tailor the presentation of products to the specific needs of individuals.

Innovation in pricing involves the use of new pricing strategies to market the firm's goods and services. Examples are the first use of a new method for varying the price of a good or service according to demand or the introduction of a new method which allows customers to choose desired product specifications on the firm's website, then to see the price for the specified product.

3.3.1.4 Organizational Innovation

As identified by OECD, (Oslo Manual, 3rd edition 2005a), organizational innovations is, the implementation of a new organizational methods in the firm's business practices, workplace organization or external relations and that organizational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies. Distinguish features of organizational innovations are, implementation of new methods (in business practices, workplace organization or external relations) that has not been used before in the firm and is the result of strategic decision taken by the management. Organizational innovations in business practices involve the implementation of a new method for organizing routines and procedures for conduct of work.

These include, for example, the implementation of new practices to improve learning and knowledge sharing within the firm. An example is the first implementation of practices for codifying knowledge such as, establishing databases of best practices, lessons and

other knowledge, so that they are now more easily accessible to others, and implementation for employee development and improving worker retention, such as education and training systems. Other examples are the first introduction of management systems for general production or supply operations, such as supply chain management systems, business re-engineering, lean production, and quality-management systems.

Innovation in workplace organization involve the implementation of new methods for distributing responsibilities and decision making among employees for the division of work within and between firm activities, as well as, new concepts for the structuring of activities, such as the integration of different business activities. An example or organizational innovation in workplace organization is the first implementation of an organizational model that gives the firm's employees greater autonomy in decision making and encourages them to contribute their ideas, achieved through decentralization of group activity and management control or the establishment of formal or informal work teams in which individual workers have more flexible job responsibilities.

New organizational methods in a firm's external relations involve the implementation of a new ways of organizing relations with other firms or public institutions, such as the establishment of a new type of collaborations with research organization or customers, new methods in integration with suppliers, and the outsourcing or subcontracting business activities in production, procuring, distribution, recruiting and ancillary services. The literature presented above leads to the development of the following hypothesis:-

> **H1: There is a relationship between Innovative Capacity and SMEs Performance - (Innovative capacity – SMEs Performance).**

3.3.2 Relationship between Innovative Capacity and Disruptive Technology

Firms that are technology oriented appear to have the will and ability to acquire and exploit better technologies for superior performance (Gao *et. el.,* 2007). Similarly, Zhou & Li, (2010) stressed that the performance of firms can be enhanced through adaptive capability by enhancing their technological capacity. Christensen (1997) states that disruptive technology (DT) is an emerging technology out of a specific and niche market that, becomes dominant thus disrupts the stable-state of a market and often affect and force-out, existing leading and incumbent firms out of the market.

As explained by Adner (2002), DT is often valued by, generally for its most critical performance significance or value. Over time, the perceived performance mix of the technology begins to shift and change, when the primary basic features or functionality threshold is reached. As a start, DT emerge out as an inferior product serving a specific market. However, upon maturity and along with the changes in its perceived performance mix, these technologies start to over-perform the leading technology by appealing to the mainstream market. Following this development, these new technologies quickly sets a new standard thus phasing of older technologies and its producer out of the market. Established firms are often ignorant against the potentials of disruptive technology due to its initial inferiority and low perceived performance mix. Established firms often assume that these technologies can only serve a specific need and market, and that most of their customers may not value its use.

Likewise, Dominic & Wilhelmina (2012) holds the view that, disruptive technology has got an impact on SMEs success and that education and government intervention are the main factor that influence SME adaptation to recent or up-to-date technology. Their findings were concluded from 109 respondents, as majority of the respondents supported the statement that disruptive technology has got an impact of the profitability levels of their businesses, as it is reflected in their financial statement in preceding years after the adaptation of such technologies. Therefore, disruptive technology plays a significant role on the success of SMEs and appears to be beneficial to business success.

Further, Chang *et al.,* (2010) highlighted that, firms seeking to develop disruptive innovations need to be sensitive to consumers' context, and be highly skilled at translating cues into 'job-to-be-done' product objectives. Foreign MNC collaborating with SMEs should be open to opportunities that likely to meet the demands of resource-constrained consumers in the bottom of the pyramid. A high level of automation in the manufacturing process drastically cuts production cost and or access this capability by forging partnership. An in-house R&D capability that specifically includes the capability to exploit existing technology in a new context, is critical to developing disruptive innovation.

Similar arguments are echoed by Mayanyn & Maria (2016) in their literature review concludes that, innovation does not necessarily involve high technology or a great amount of economic resources. Innovation is about doing things differently and producing a positive impact on products or processes. Innovation is the implementation

of something new. It is a product, a process, a marketing method or even an organizational change to make a difference and improve the activities of the enterprise. It adds value for the customer. This improvement ultimately will have a positive economic impact within the organization. Implementation of innovation strategies is not an easy task for MSE (Micro & Small Enterprises), as they face limited access to technology, and to economic resources.

The literature presented above leads to the development of the following hypothesis:-

H2: There is a relationship between Innovative Capacity and Disruptive Technology - (Innovative Capacity – Disruptive Technology).

3.3.3 Relationship between Disruptive Technology and SME performance

As stated above, firms that are technology oriented appear to have the will and ability to acquire and exploit better technologies for superior performance (Gao *et. el.,* 2007). Similarly, Zhou & Li, (2010) stressed that the performance of firms can be enhanced through adaptive capability by enhancing their technological capacity. Dominic & Wilhelmina (2012) in their study revealed that, managers or owners of SMEs in the developing countries are in-fact aware about the up-to-date technologies that they can utilize along with its potential benefits. The Internet is one of the technologies being utilized over traditional methods and utilization of these technologies is cheap, fast, efficient and reduces the overall costs of business operation, which in turn increases profitability.

As explained by Adner (2002), DT is often valued by, generally for its most critical performance significance or value. Over time, the perceived performance mix of the

technology begins to shift and change, when the primary basic features or functionality threshold is reached. As a start, DT emerge out as an inferior product serving a specific market. However, upon maturity and along with the changes in its perceived performance mix, these technologies start to over-perform the leading technology by appealing to the mainstream market. Following this development, these new technologies quickly sets a new standard thus phasing of older technologies and its producer out of the market. Established firms are often ignorant against the potentials of disruptive technology due to its initial inferiority and low perceived performance mix. Established firms often assume that these technologies can only serve a specific need and market, and that most of their customers may not value its use.

SMEs that are technology oriented hence adopting newer technologies and or complementing existing technologies to further enhance business operations will realized that, these technologies positively affect the overall business operation, in turn positively contributes to firm's performance. Evolution of technology enhances effectiveness and efficient performance, enhances quality of products and or services offerings, resulting better firm performance.

As published and identified by TheStar, Malaysian newspaper (2016), SMEs, which make up the overwhelming proportion of businesses in Malaysia, still have a knowledge gap on the importance and convenience of implementing ICT solutions in their companies. Most of these SMEs still rely on physical bookkeeping as well as being encumbered by the lack of internet access. It is said that, 'Information and

Communication Technology' (ICT) use is still very low in the SME environment and that, the reason is because they tend to be more conservative when it comes to incorporating ICT solutions in their business, which hampers their competitive advantage. SME segment makes up 97% of the businesses in Malaysia and is a major contributor to the economy, yet, from these figures, less than 25% incorporate ICT in their day-to-day business.

Therefore, in conclusion, disruptive technology alters the way businesses operate, disruptive technology has an impact on the success of SMEs' performance and that a radical technology may be a source of competitive advantage to a firm that successfully adopts it.

The literature presented above leads to the development of the following hypothesis:-

> *H3: There is a between Disruptive Technology and SMEs Performance -*
> *(Disruptive Technology – SMEs Performance).*

3.3.4 Relationship between Innovative Capacity and SME performance being mediated by Disruptive Technology

In a research on, the resource-based-view theory (RBV) by Timothy & James (2007) pointed out that, (RBV) is firmly rooted in the strategic choice tradition and argues, very generally, that firm performance is the result of appropriate strategies enacted with the proper resources and capabilities present in the firm. Entrepreneurial oriented firms seem to perform best in hostile environments (Covin & Slevin, 1989). Environmental uncertainty pushes management to examine resources and capabilities hence expand the geographic space of markets served or capture greater existing market. Environment

uncertainty lead SMEs to process improvements to lower costs, or product improvement to better meet customer's needs. SMEs internationalization is a response to inquiries, relationship building activities at gaining cooperation or access to targeted new market. Innovation capability is internally-oriented strategies (process improvement) and positively contributed towards firm's performance. Externally-oriented strategy (management experience with, possession of unique product and competitive advantage) is positively related to performance.

Features and benefits of newer emerging technologies according to Adner (2002), are often valued by the customers, generally for its most critical performance significance or value. In the same vein, Gao *at. el.,* (2007) stated that, technology oriented firms appear to possess the ability and will to acquire better technologies to achieve superior performance. Similarly, Dominic and Wilhelmina (2012) relates that, the internet is one of the technologies being utilized over traditional methods and that, utilizing these technologies is cheap, fast, efficient and reduces the overall costs of business. More risk-taking companies may realize the potential of a disruptive technology and try to find ways to incorporate and adopt these technologies into their business processes. Companies that fail to account for the effects of a new disruptive technology may find themselves losing market share to companies that have found ways to integrate the technology into the way that they manage labor, capital and overall business operation. Therefore, in conclusion, disruptive technology changes the way businesses operate and has an influence on the success of SMEs performance.

Lack of DT technology adoption affecting firm performance was equally highlighted by research by Anthony (2014) in his study of SMEs in Africa. Accordingly, the following were challenges faced SMEs which resulted in SMEs poor performance;- (a) Utilization of conventional technology (lack of necessary knowledge on modern technology and it's benefits), (b) Inadequate application of essential business management practices, (c) Lack of Marketing skills, (d) Access to financial support due to high criteria and credit rating and the collateral, and high interest rate imposed, and (e) Poor corporate governance.

Similarly, Mayanyn & Maria (2016) in their literature review conclude that, innovation does not necessarily involve high technology or a great amount of economic resources. Innovation is about doing things differently and producing a positive impact on products or processes. Innovation is the implementation of something new. It is a product, a process, a marketing method or even an organizational change to make a difference and improve the activities of the enterprise. It adds value for the customer. This improvement ultimately will have a positive economic impact within the organization. Implementation of innovation strategies is not an easy task for MSE (Micro & Small Enterprises), as they face limited access to technology, and to economic resources.

Similar findings were echoed by Saul & Berman (2006) stating that, by the 2010 onwards, more than 90% of the innovation in the automation industry will be electronic related and that, when factoring in technology, know-how is often sufficient. Many innovation-based strategies are based on the unique market application of an existing integrated set of technologies rather than requiring technological breakthrough.

Therefore, firms with technology-driven business strategies can spur innovation and growth.

The literature presented above leads to the development of the following hypothesis:-

> **H4: There is relationship between Innovative Capacity and SMEs Performance mediated by Disruptive Technology - (Innovative Capacity - Disruptive Technology – SMEs Performance).**

3.4 Research Design

Bryman (2004) states that, research design refers to the outline of data collection and analysis. Whereas, Sekaran & Bougie (2010) explains that research design is a way of gathering and analyzing data to arrive at a solution. The approach adopted in this research is cross-sectional and applies the quantitative approach that is based on deductive reasoning. Equally, this study adopts a survey research design. As pointed out by Fisher (2010), a survey method is adopted when a study is aimed at making assessment of thoughts, feelings, and opinion about a given situation by collecting primary data from respondents. The survey method allows researcher to gather quantitative data for analysis of descriptive, as well as, inferential statistics. Henceforth, according to Saunders *et. al.,* (2009), potential reasons for a particular relationship between variables can be suggested and models of these relationships can be produced.

The main purpose of the study is to examine the effect of the relationship between innovative capacity and firm performance in SME services sector within Malaysian context. The researcher exploits the Internet by adopting five (5) or more of the following approaches;- (a) E-mailing copy of every set of survey questionnaires, (b)

distributing online survey questionnaires to e-mails addresses of various SME firms, (c) Utilizing WhatsApp messenger tool by forwarding survey questions' URL to business owner's mobile phone contact numbers, (d) Personal visits to distribute survey questionnaire in a self-addressed stamped reply envelopes, and (e) Participating in events conducted by SMECorp, by distributing hard-copies of survey questionnaires.

The survey questionnaires are addressed to the selected respondents that are located and based within state of Selangor, in Malaysia. As stated by Zikmund *et. al.,* (2013), some of the benefits for using internet is that it is inexpensive and quick and that a wide geographical area can be covered with ease at a push of a button. The anonymity is high and the respondents can respond to the questionnaire at their convenience in terms of time and place. Online survey research is now the most used methodology, used by 95 percent (%) of market research professionals and found to be an extremely valuable decision-making tool. Beside the above advantages, online survey research is fast, especially when compared with traditional survey methodologies, and perhaps it is the most important advantage. Questionnaires are delivered nearly instantaneously worldwide over the internet without paying for postage or an interviewer. Errors are equally reduced. The only weakness is verifying respondent authenticity is difficult.

Zikmund *et. al.,* (2013) further stressed that, observations may not portray a better understanding of certain behaviors as people may behave differently during observation, and similarly, secondary data is not appropriate due to poor record keeping and or information may be outdated, may refer to wider geographic region, thus affecting the

quality of the data (Saunders *et. al.,* 2009). Therefore, a survey method utilizing questionnaire as the instrument for data collection is regarded suitable for this study, as data collection involves SMEs owners-managers.

3.5 Unit of Analysis

As for the unit of analysis, target respondents are SME business owners-managers/entrepreneurs and that, this study is focused on the selected region and state of Selangor due to the fact that Selangor has the largest population, which is 125,904 firms as of 2011 (SME Annual Report, 2014/2015). The economy of Selangor is a progressive market economy and that, Selangor State contributes the biggest fraction of the GDP with RM 34,460 billion in 2013. In comparison to other states, Selangor is reported to have the most developed infrastructure that signifies better standard of living with the lowest rate in poverty.

Upon collection of the required data from the respondents, the researcher uses statistical software tool which is known as SPSSv22 and SmartPLSv3.2.7 (Statistical Package for the Social Sciences) to perform data analysis and interpretation. The independent variable of this study is; 'Innovative capacity' and the dependent variable is the 'SMEs Firm Performance', mediated by 'Disruptive Technology'.

3.5.1 Independent Variable

Focus of the independent variable in this study is the innovative capacity (IC) of SME firms. The most common developed innovation types are incremental in nature which was diversified into all innovation types: products, services, processes, production

methods and modes of actions, yet, the most common type of radical innovation type were, products, services and the modes of actions. Innovation capability is internally-oriented strategies (process improvement), and said to positively contribute towards firm's performance.

A firm can make many types of changes on its method of work, its use of factors of production and the types of output that improve its productivity and or , commercial performance. This study adopts innovation capacity dimensions as defined and categorized by OECD, (Oslo Manual, 3rd edition, 2005a) which specifies that main types of innovations are distinguished as; product innovation, process innovation, marketing innovation and organizational innovation. Briefly, an innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in-business practices, workplace organization or external relations.

Product innovation involves significant changes in the capabilities of goods or services. Both entirely new goods and services and significant improvement to existing products are included. Process innovations represent significant changes in production and delivery methods. Organizational innovations refer to the implementation of new organizational method. These can be changes in business practices, in workplace organization or in the firm's external relations. Marketing innovations involve the implementation of new marketing methods. These can include changes in product design

and packaging, in product promotion and placement, and in methods of pricing goods and services.

3.5.2 Dependent Variable

The dependent variable of the study is SMEs business or firm's performance (FP). Performance is defined as a measure of the achievement of firm's objectives (Daft, 2009). It is the firm's ability to effectively and efficiently utilize resources in order to survive, satisfy customer's wants and needs and contribute to the creation of employment. It equally relates to meeting or exceeding specifics goals and objectives as defined by business plans. Environment uncertainty lead SMEs to process improvements to lower costs, or product improvement to better meet customer's needs. There are evidence from past researches', showing that there is a relationship between innovative capacity and business performance of a firm.

3.5.3 Mediating Variable

The mediating variable between the independent variable and dependent variable is known as disruptive technology (DT). Disruptive technology alters the way businesses operate and it can therefore be concluded that disruptive technology has an impact on the success of SMEs. For the purpose of this study, adoption of disruptive-technologies with the following dimensions;- Technology Sensing - capability, Technology Response - capability and Technology Investment, are used as the mediator variable.

3.6 Operational Definition

According to Hair *et. al.,* (2009), operationalization of constructs consists of defining the measures of variable used representing construct and how they are measured. Saunders *et. al.,* (2009) describe operational of constructs as the translation of concepts into tangible indicators of their existence. Therefore, the following section presents definition of constructs and the selection of items of the relevant constructs.

3.6.1 SMEs Performance

Daft (2009) defines performance as a measure of the achievement of firm's objectives. Business performance relates to meeting or exceeding specifics goals and objectives as defined by business plans. Hunt & Morgan (1996) stated that, a firm's success is measured and sustainable performance which is, in turn, measured by profits and return on investment. Kaplan & Norton (2004) wrote that, a company's performance is influenced by intangible assets, such as, learning and sources of competitive advantage that affect the value-creating process. Reichhled (1996) asserts that, ultimately, a firm's performance is measured by its ability to generate cash (sales) and reinvest (profits) in activities that continue to provide superior profits. Wiklund (1999) further states that, business performance includes growth and financial performance.

In a study by Yusuf (2002), found that, there is no consensus on an appropriate measure of business performance. Several studies (Brush & Vanderwerf, 1992; Butler *et al.,* 2003; Watson, 2007) stressed that, the researchers finds it difficult to obtain data from the owner-manager, whether in personal interviews or in answering questionnaires,

because most of the owner-managers are unwilling to disclose their financial performance indicators, as this information is confidential to be known by others. Besides that, Butler *et al* (2003) discovered that most enterprises do not have financial statement.

Previous studies (Ostgaard & Birley, 1996; Robinson, 1998; Tsai & Li, 2007; Venkatranam & Ramanujam, 1987) suggested that, applying financial approach in measuring the performance is very common. Study by Tse *et al.,* (2004) stated that, business performance can be measure by two perspectives; (a) an objective concept based on absolute measures of performance, and (b) by subjective concept involving self-reported measures. Several previous studies (Dawes, 1999; Dess *et al.,* 1997; Dess & Robinson, 1984; Jaworski & Kohli, 1993; Pearce *et al.,* 1987; Robinson & Pearce, 1988; Venkatraman & Ramanujam, 1986), have found a strong correlation between objective and subjective responses. Pearce *et al.,* (1987) suggested that, subjective evaluations were a reliable means for measuring performance.

Further to the above, several other studies (Dess & Robinson, 1984; Butler *et al.,* 2003; Venkatranam & Ramanujuam, 1986), further suggested subjective method to avoid bias on performance evaluation by SMEs entrepreneurs. Based on past research literature (Dess & Robinson, 1984; Butler *et al.,* 2003; Venkatranam & Ramanujuam, 1986), SMEs owners or entrepreneurs always show a high tendency of reluctance to reveal business profitability to the public or even researchers.

Therefore, this study will embark on the application of objective approach in measuring the performance of firms. Self-reported measures of business performance are used in this study. A total of ten (10) items as reflected in Table 4.1 below, (See Appendix A – Firm/SME Performance (FP)) are adopted to represent the measurement of firm performance. They are;- (i) Sales Growth, (ii) Business Turnover, (iii) Employment Growth, (iv) Gross Profit Growth, (v) Return On Asset (ROA), (vi) Return on Investment (ROI), (vii) Innovation and Learning, (viii) Market Share Growth, (ix) Net Income and (x) Overall Business Performance. The firm performance measurement is self-reported, since accurate, reliable and transparent financial data is not available.

Further to the above, in order to avoid poor and low response rate from SMEs entrepreneurs and owners, this study will employ the self-rated method with 5-point Likert scale to measure the foregoing indicator's result. Several studies (Croteau & Bergeon, 2001; Durand & Coeurderoy, 2001; Han, 2000; Hoque, 2004; Hoque *et al.,* 2001; Santiago & Moesel, 2007; Tsamenyi *et al.,* 2008) found that, there is precedence for use of self-rated as a reliable method to measure financial performance of businesses. Similarly, several other studies (Bontis, William Chua, & Richardson, 2000; Croteau & Bergeon, 2001; Venkatraman, 1989) stated that, past researchers equally adopted the used of 5-point Likert scale format. As mentioned above (See Appendix A – Firm Performance (FP)), a total of ten (10) items are being used for measurement of the overall firm performance assessment and that, the study operationalized performance as a one-dimensional construct. All items used to measure Firm performance (FP) construct in this

study were measured using five-point Likert-scale (1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher).

3.6.2 Innovative Capacity

Innovation in services-oriented sectors can differ substantially from innovation in many manufacturing-oriented sectors. It is often less formally organized, more incremental in nature and less technological. This study takes into consideration of, innovative capacity or innovative behavior of firms (Silva, 2003; Roberts & Amit, 2003; Mogollón & Vaquero, 2004), to include a number of dimensions of a firm's innovation process, namely product innovation, process innovation, marketing innovation and organizational innovation. Oslo manual (OECD 2005a) distinguishes innovation for the service sector into four areas or dimensions, as specified above. Innovation capacity variable as specified in the Oslo manual were adopted and adapted, hence the following dimensions were considered as measuring the intensity of innovative capacity: (i) Product innovation; (ii) Process innovation; (iii) Marketing innovation; and (iv) Organizational innovation. Many researchers (Nas & Leppälahti, 1997; Klomp & Van Leeuwen, 1999; Kleinknecht & Oostendorp, 2002; Kemp, *et al.,* 2003; Roberts & Amit, 2003; Ferreira, 2003; Mogollón & Vaquero, 2004; Marques & Monteiro, 2006) have sought to establish a link between the innovative behavior of firms and their performance.

The aim of this study is also centered on assessing the effect and influence that a firm's innovative capacity can have on its performance. This variable is measured according to OECD's (Oslo Manual, 3rd, edition, 2005a) recommendation for developing countries as,

'measurement exercises should focus on the innovation process rather than its output and emphasis on how capabilities efforts and results are dealt with' (p. 139). Several indicators as reflected in Table 3.1 on following pages/below, (See Appendix A – Innovative Capacity (IC)) are adopted from Oslo manual (OECD, 2005a) consisting of four (4) dimensions (Product Innovation, Process Innovation, Marketing Innovation and Organizational Innovation) with twenty seven (27) items in total. All items used to measure IC construct in this study were measured using five-point Likert-scale (1 = strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree/Neutral; 4 = Agree; 5 = Strongly Agree).

3.6.3 Disruptive Technology

Disruptive technology refers to a selection and or, an adoption of technologies or up-to-date technology that significantly alters the way that businesses operate. A disruptive technology may force companies to alter the way that they approa5ch their business or risk losing market share or risk becoming irrelevant. Recent examples of disruptive technologies includes but not limited to, smart phones and the e-commerce retailing. Clayton Christensen popularized the idea of disruptive technologies in his book titled, '*The Innovator's Dilemma'* in 1997. Technopedia.com defines disruptive technology as an enhanced or completely new technology that replaces and disrupts an existing technology, rendering it obsolete. It is designed to succeed similar technology that is already in use and that disruptive technology applies to hardware, software, networks and combined technologies.

Dominic and Wilhelmina (2012) relates that, the internet is one of the technologies being utilized over traditional methods and that, utilizing these technologies is cheap, fast, efficient and reduces the overall costs of business. More risk-taking companies may realize the potential of a disruptive technology and try to find ways to incorporate and adopt these technologies into their business processes. Companies that fail to account for the effects of a new disruptive technology may find themselves losing market share to companies that have found ways to integrate the technology into the way that they manage labor, capital and overall business operation.

A disruptive technology does not have to be better than those currently offered by the market, and may damage the overall market to some extent by existing technology. It could, for example, be significantly cheaper and still provide the desired features. The advent of e-commerce retailing has led consumers to buy products online rather than from their stores, with online options often carrying lower prices. This has benefited consumers but made it much more difficult for producers and brick-and-mortar stores to maintain profitability.

Selection of potential disruptive technologies to be adopted by firms acting as the mediating or intervening variable in this study are based on three (3) dimensions consisting of; Technology-Sensing capability, Technology-Response capability and Technology-Investment. A total of ten (10) items as reflected in Table 4.1 below, for measurement (See Appendix A − Disruptive Technology (DT)) are adopted seeking understanding on firm's adoption and embracement of technologies for the day-to-day of

business operation and subsequent enhancement overall firm's business performance. All items used to measure DT construct in this study were measured using five-point Likert-scale (1 = strongly Disagree; 2 = Disagree; 3 = Neither Agree or Disagree/Neutral; 4 = Agree; 5 = Strongly Agree).

3.7 Instruments for Measurement of Variable

The variables used in this study were measured through established instruments drawn and adopted with adaptation made, from the literature and previous studies as reflected in the following Table 4.1 (Instruments of study variables) on next page.

Table 3.1
Instruments of Study Variables.

Variables	No of Items	Source and Scale
(Independent Variable) **Innovative Capacity (IC):-** (4 Dimensions) i) Product Innovation, ii) Process Innovation, iii) Market Innovation, and iv) Organization Innovation.	27 (Twenty Seven)	a) OECD, (oslo Manual, 3rd Edition, 2005a) i) 5-Point Likert Scale.
(Intervening / Mediator Variable) **Disruptive Technology (DT):-** (3 Dimensions) i) Technology Sensing ii) Technology Response iii) Technology Investment	10 (Ten)	a) Srinivasan, Lilien, and Rangeswary (2002) b) Sircar *et al.* (2000); Bharadwaj (2000). i) 5-Point Likert Scale
(Dependent Variable) **Firm / SME Performance (P):-** i) Sales Growth, ii) Business Turnover, iii) Employment Growth, iv) Gross Profits Growth, v) Return on Asset (ROA), vi) Return on Investment (ROI), vii) Innovation and Learning, viii) Market Share, ix) Net Income, x) Overall Business Performance	10 (Ten)	a) Aidis & Van Praag, (2007), b) Bontis *et al.,* (2000), c) Dess & Robinson, (1984); Lumpkin & Dess (1996), d) Durand & Coeurderoy, (2001), e) Han, (2000), f) Hoque *et al.,* (2001), g) Smith & Reece, (1999). i) 5-Point Likert Scale

Likert-scale is used in order to avoid poor and low response rate from SMEs entrepreneurs and owners. According to Alreck & Settle, (1995), Likert-scale is said to be more suitable for this type of study based on the nature of the respondents and the information that are required. Additional, a scale between five (5) and seven (7) points is reliable than a higher or lower scales and that a scale with no midpoint may increase the error on measurement (Krosnick & Fabrigar, 1997). Some of the adopted items were slightly modified or adapted to make them more relevant to the purpose of this study. A scale validation procedure were performed, using coefficient alpha. This is to ensure that the scale used, are both valid and reliable for the specific purpose of the study. Again, the instrument that measured innovative capacity is adopted and adapted, and the items were measured on a five-point Likert scale (Figure 3.2), and were coded on a scale of 5 (Strongly Agree) to 1 (Strongly Disagree), where else, the instrument that measured SMEs firm performance was equally adopted and adapted and the items were measured on a five-point Likert scale (Figure 3.3), and were coded on a scale of 5 (Much Higher) to 1 (Much Lower). Instrument that measured disruptive technology adoption is also adopted and adapted and the items were measured on a five-point Likert scale (Figure 3.4), and were coded on a scale of 5 (Strongly Agree) to 1 (Strongly Disagree).

Strongly Disagree	Disagree	Neither Agree nor Disagree/Neutral	Agree	Strongly Agree
1	2	3	4	5

Figure 3.2
Likert Scale for 'Innovative Capacity'.

Much Lower	Lower	No Change	Higher	Much Higher
1	2	3	4	5

Figure 3.3

Likert Scale for 'SME Business Performance'.

Strongly Disagree	Disagree	Neither Agree nor Disagree/Neutral	Agree	Strongly Agree
1	2	3	4	5

Figure 3.4

Likert Scale for 'Disruptive Technology'.

Table 3.2 presents the adopted and adapted survey items that are used to capture the study variables. For further references, Appendix "A" as attached presents the research survey questionnaires in two (2) main languages (English and Bahasa Malaysia).

Table 3.2			
Measurement Intruments.			
Variable	**Original Items Adopted**	**Adapted version Items**	**Source and Scale**
	Sales Growth.	Sales Growth.	Aidis & Van Praag, (2007); Bontis*et al*., (2000); Dess & Robinson, (1984); Lumpkin & Dess (1996); Durand & Coeurderoy, (2001); Han, (2000); Hoque*et al.*, (2001); Smith & Reece, (1999).
	Business Turnover.	Business Turnover.	
	Employment Growth.	Employment Growth.	
	Gross Profit Growth.	Gross Profit Growth.	
FP	Return on Assets (ROA).	Return on Assets (ROA).	
	Return on Investment (ROI).	Return on Investment (ROI).	
	Innovation and Learning.	Innovation and Learning.	
	Market Share Growth.	Market Share Growth.	
	Net Income.	Net Income.	
	Business Performance	Business Performance.	

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Table 3.2 - *(Continue)*			
ICPdt	Increase range of goods and services	For the last 3 years (or since establishment), our company has;- Increase range of goods and services.	
	Replace products being phased out.	For the last 3 years (or since establishment), our company has;- Replace products being phased-out.	
	Improve quality of goods and services.	For the last 3 years (or since establishment), our company has;- Improve quality of goods and services.	OECD (Oslo Manual, 3rd Edition, 2005a)
	Achieve industry technical standards.	For the last 3 years (or since establishment), our company has;- Achieved industrial technical standards.	
	Develop environment-friendly products.	For the last 3 years (or since establishment), our company has;- Develop environment-friendly products.	
ICPro	Increase capacity of production or service provision.	For the last 3 years (or since establishment), our company has;- Increase capacity of production or service provision.	
	Reduce consumption of materials and energy	For the last 3 years (or since establishment), our company has;- Reduce consumption of materials and energy.	
	Reduce unit labour costs.	For the last 3 years (or since establishment), our company has;- Reduce unit labour cost.	
	Reduce negative environmental impacts.	For the last 3 years (or since establishment), our company has;- Reduce negative environmental impacts.	OECD (Oslo Manual, 3rd Edition, 2005a)
	Improve health and safety.	For the last 3 years (or since establishment), our company has;- Improve health and safety.	
	Reduce process design costs.	For the last 3 years (or since establishment), our company has;- Reduce process cost.	
	Reduce mobilization lead times.	For the last 3 years (or since establishment), our company has;- Reduce mobilization lead time.	
ICMkt	Enter new markets.	For the last 3 years (or since establishment), our company has;- Enter new market.	
	Increase or maintain market share.	For the last 3 years (or since establishment), our company has;- Increase or maintain market share.	
	Increase the ability to adapt to different client demands.	For the last 3 years (or since establishment), our company has;- Increase the ability to adapt to different client demand.	
	Develop stronger relationships with customers.	For the last 3 years (or since establishment), our company has;- Develop stronger relationship with customers.	
	Increase visibility or exposure for products.	For the last 3 years (or since establishment), our company has;- Increase awareness on product and services.	

Table 3.2 -*(Continue)*			
ICOrg	Increase sharing or transferring of knowledge with other organizations.	For the last 3 years (or since establishment), our company has;- Increase sharing or transferring the knowledge with other organization.	
	Improve communication and interaction among different business activities.	For the last 3 years (or since establishment), our company has;- Improve communications and interaction among different business activities/units.	
	Improve IT capabilities.	For the last 3 years (or since establishment), our company has;- Improve IT capabilities.	
	Improve flexibility of production or service provision.	For the last 3 years (or since establishment), our company has;- Improve flexibility of production or service provision.	
	Increase efficiency or speed of supplying and/or delivering goods and services.	For the last 3 years (or since establishment), our company has;- Increase efficiency in delivering goods and services.	
	Reduced time to respond to customer needs.	For the last 3 years (or since establishment), our company has;- Reduced time to respond to customer needs.	
	Improve working conditions.	For the last 3 years (or since establishment), our company has;- Improve working environment.	
	Meet regulatory requirements.	For the last 3 years (or since establishment), our company has;- Meet regulatory requirements.	
	Reduce operating costs for service provision.	For the last 3 years (or since establishment), our company has;- Reduced operating costs for service provision.	
DTsc	Actively seek intelligence on technological changes in the environment that are likely to affect our business.	For the last 3 years (or since establishment), our company;- Actively seek intelligence on disruptive technologies that are likely to affect our business.	Srinivasan, Lilien, and Rangeswary (2002).
	We are often quick to detect changes in technologies that might affect our business.	For the last 3 years (or since establishment), our company;- Are often quick to detect changes in technologies that might affect our business.	
	We periodically review the likely effect of changes in technology on our business.	For the last 3 years (or since establishment), our company;- Periodically review the likely effect of changes in technology on our business.	
	We are often one of the first in our industry to detect technological developments that may potentially affect our business.	For the last 3 years (or since establishment), our company;- Are often one of the first in our industry to detect technological development that may potentially affect our business.	

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	Table 3.2 -*(Continue)*		
DTrc	We generally respond very quickly to technological changes in the environment.	For the last 3 years (or since establishment), our company;- Generally respond quickly to the emergence of disruptive technologies.	Srinivasan, Lilien, and Rangeswary (2002).
	This business unit is ahead the industry in responding to new technologies.	For the last 3 years (or since establishment), our company;- Tends to be first to adopt disruptive technologies, compared to others in our industry.	
	We tend to accept new technologies that effect our current investments to add value.	For the last 3 years (or since establishment), our company;- Tend to adopt new technolo-gies that add-value to our current investment.	
DTti	For the pas few years, our company:- Has allocated a generous budget for purchase of information technology hardware.	For the last 3 years (or since establishment), our company;- Allocated a sufficient budget for purchasing IT/information technology hardware.	Sircar *et al.* (2000); Bharadwaj (2000).
	Has allocated a generous budget for purchase of information technology software.	For the last 3 years (or since establishment), our company;- Allocated a sufficient budget for purchase of IT software.	
	Has emphasized information technology training.	For the last 3 years (or since establishment), our company;- Emphasized IT/information technology knowledge enhancement among staff.	

Note: FP=Firm Performance, ICpdt=Innovative Capacity-Product Innovation, ICPro=Innovatice Capacity-Process, Innovation, ICMkt=Innovative Capacity-Marketing Innovation, ICOrg=Innvative Capacity-Organizational Innovation, DTsc=Disruptive Technology-sensing capability, DTrc=Disruptive Technology-response capability, DTti=Disruptive Technology-technology investment.

As stated by Dawson (2007), survey questionnaires method is appropriate for the study as it has advantage over other methods of data collection, as it is better and straight-forward to generate statistics via coding, tabulation and analysis. Furthermore, many people and potential respondents are familiar and are comfortable responding than participating in an interview. With an accompanying cover letter from the University specifying reason for research purposes further ensures confidentiality, hence respondents are encourage to share sensitive information compared to an interview.

SPSSv22 and SmartPLSv3.0 statistical tool is adopted, and upon data screening analysis, the principle technique used in this study is to look into the coefficient determination

(R^2), effect size (f^2) and predictive relevance (Q^2) in order to test the strength of the relationship between variables and for prediction on the effect of exogenous variable on endogenous variable.

3.7.1 Face Validity

Prior to actual data-collection, all the related and relevant items representing the mentioned variable were reviewed by two (2) experienced academicians to obtain suggestions and inputs for modifications (an Associate Professor and a Senior lecturer from Universiti Utara Malaysia). As defined by Lacity and Jansen (1994), face validity is a process of making sense, persuasive and seeming right on the survey items to the participants. It is important to conduct face validity exercise prior to data collection and that the process can identify weak areas of the instruments thus ensure it measures what it is supposed to measure (Miller, 2011). As this research was conducted using survey questionnaire, based suggestions from the experts, the questionnaire was fine-tuned to further ensure that it measure the research objectives, hypotheses and research framework.

Upon necessary adaptation made, the questionnaires were used for pre-test by forwarding to thirteen (13) respondents from the selected sector. The pre-test conducted is to ensure that the questionnaires is valid and can be easily understood by the participants (Cavana, Delahaye & Sekaran, 2001).

The purpose of this review is to ensure content items are valid to represent the study's variables, make sense and are relevant to the study's context that is able to communicate clearly and avoid misinterpretation among respondents (Slattery *et al.,* 2011; Lietz, 2010). The following test or analysis and findings are derived from the 13 of the following respondents.

3.7.2 Reliability Analysis Results.

With the use of SPSS22, the below reliability results were obtained for the initial assessments.

Table 3.3		
Cronbach Alpha Results – Innovative Capacity (IV).		
a) Innovative Capacity – (Independent Variable - IV)		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.94	0.944	26

Table 3.4		
Cronbach Alpha Results – Disruptive Technology (M).		
b) Disruptive Technology (Mediator)		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.808	0.83	10

Table 3.5		
Cronbach Alpha Results – Firm Performance (DV).		
c) Firm Performance (Dependent Variable - DV)		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.947	0.949	10

The above test results were obtained prior to further enhancement and expansion of items on all three (3) variables mentioned in the research. Average Cronbach's Alpha derived for items of Innovative Capacity is 0.94 (Table 3.3) and for items representing mediator known as Disruptive Technology, the index is 0.808 (Table 3.4). As for items representing Firm Performance (Table 3.5), which shall conclude to represent SME performance, the index is 0.947. As described by George & Mallery (2003), the rule of reliability of > 0.9 is regarded Excellent, > 0.8 as Good, > 0.7 as Acceptable, > 0.6 as Questionable, > 0.5 as Poor, and < 0.5 as Unacceptable. The pilot test results is expected to show strong reading as all the items or survey questionnaires on innovative capacity are adopted and adapted from Oslo manual (OECD, 2005a). Similarly, items for Disruptive Technology and Firm Performance are equally adopted and adapted. With the foregoing results of 0.940 (Innovative capacity), 0.808 (Disruptive Technology) and 0.947 (Firm Performance), the scale is considered reliable, indicating internal consistency. Reliability is the degree to which a measure is free from random error and therefore gives consistent results. It indicates internal consistency of the measurement device, which refers to accuracy and precision of the measurement procedure. The researcher is confident to obtain relevant and valid reliable data from the targeted respondents.

3.8 Sample

Population refers to the entire group of people, things or events of interest that the study tries to examine (Cavana, *et. al.,* 2001). In this thesis, the population of the study is based on SMEs that have business operations only within the Selangor state of Malaysia.

According to the report of the Census of Establishments and Enterprises 2011, three major categories of SMEs in Malaysia are; services, agriculture and manufacturing. SMEs from service sector has been chosen as the targeted group for this research study since the service sector within SMEs formed the largest category, with 90% of total SMEs as compared to manufacturing (5.9%), Construction (3%), Mining and quarrying (0.1%) and agriculture (1%) sectors. The bulk of the SMEs are micro enterprises (79%), followed by small (18%) and medium (0.3%) enterprises. Most of the SMEs are retail, restaurant, wholesale, transportation, communication and professional services. Moreover, this sector also plays a significant role, contributing 65% of employment opportunities and 35.9% of the nation's gross domestic product (GDP).

Table 3.6
Distribution of SMEs in Service Sector by Sub-Sector and Size.

Sub Sector	Micro	Small	Medium	Total SMEs
Wholesale & Retail Trade & Repair of Motor Vehicle & Motorcycles	228,113	55,048	6,637	289,798
Food & Beverage Services	117,020	24,459	1,242	142,721
Transportation & Storage	34,790	3,901	1,334	40,025
Personal Services & other activities	34,427	2,218	76	36,721
Professional, Scientific & Technical Services	10,777	7,384	893	19,054
Administration & Support Service	7,543	2,661	405	10,609
Human Health & Social work	6,257	2,617	166	9,040
Real Estate Activities	6,107	1,833	240	8,180
Education	5,672	1,923	343	7,938
Arts, Entertainment & Recreation	5,174	874	169	6,217
Financial Services	3,973	1,129	254	5,356
Accommodation	1,448	985	384	2,817

Table 3.6 – *(Continue)*

Information & Communication	722	873	285	1,880
Water supply; sewerage, waste Management & Remediation activities	381	112	29	522
Electricity, Gas, Steam & Air Conditioning supply	16	44	47	107
Total	**462,420**	**106,061**	**12,504**	**580,985**

Source: SMECorp, 2016 (Census, 2011)

As reflected in Table 3.6, the total number of SMEs in service sector that are registered with SMECorp of Malaysia in SME Info Portal website is 580,985 SMEs enterprises, out of which, 110,714 firms are located within the state of Selangor (SME census, 2011). The list of these firms are obtained from SmeCorp's, as reflected on the below URLs (Universal Resource Locator);-

a) http://www.secure.smeinfo.com.my/directory/index.php

b) http://www.smecorp.gov.my/index.php/en/guides/2015-12-21-10-49-38/list-of-companies

3.8.1 Sample Size Determination

In this thesis, the researcher determined the sample size using the G*power 3.0 software (Faul *et al.*, 2007) as advised by (Hair Jr *et al.*, 2016) to get the minimum required sample size for performing the Partial Least Squares Structural Equation Modeling (PLS-SEM). Using the G*power software 3.0, the researcher set the following criteria. First, the researcher made a selection of F-tests from Test family, then selected the "Linear multiple regression: Fixed model, R^2 deviation from zero". While choosing the type of power analysis, we made a selection of "a priori: Compute required sample size – given α, power and effect size". Afterwards, the researcher gave the following input parameters. For instance, as effect size ($f^2 = 0.15$), α error prob = 0.05, power (1-β err

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prob) = 0.95, and number of predictors = 2. Based on the input parameters, the result indicated that the minimum required sample size for the study model is 107 as shown in below, Figure 3.5.
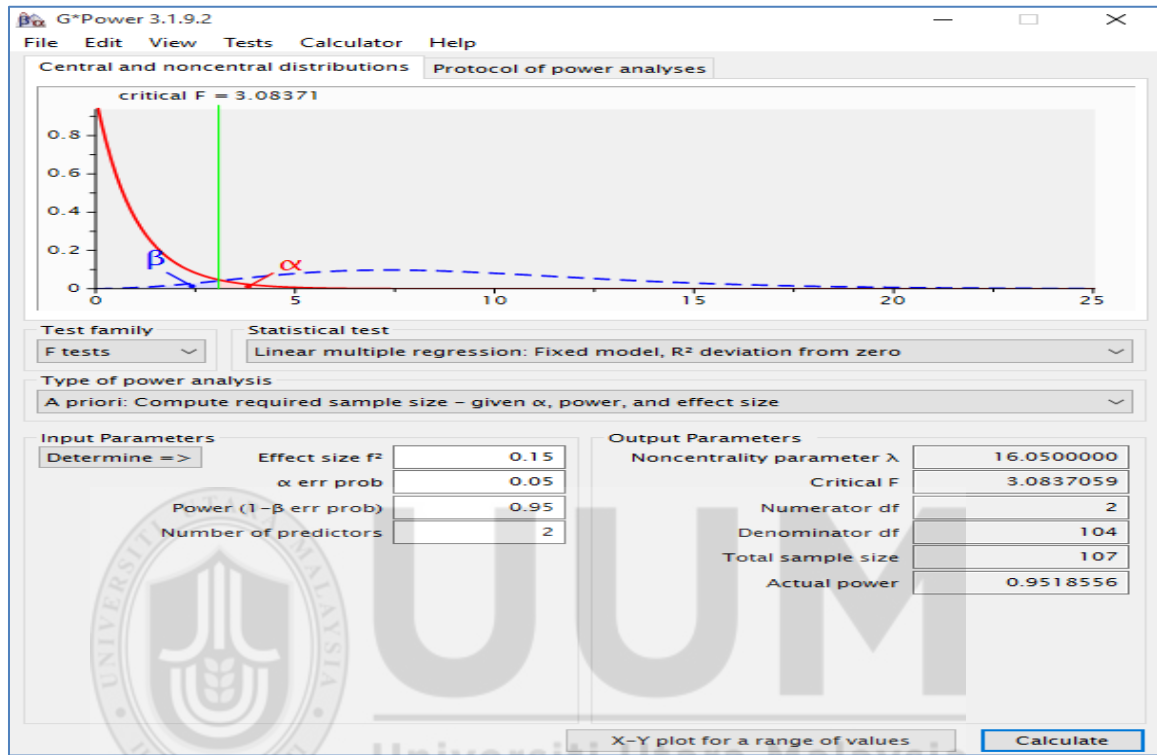
Figure 3.5
Sample Size Calculation.

3.8.2 Sample Selection

In the previous section, the researcher concluded that this thesis needed a minimum sample of 107 participants (SMEs) in order to perform the PLS-SEM analysis. However, the researcher still targeted to get the maximum sample of SMEs to collect the study data. For this reason, the researcher used a multi-stage sampling technique to select the participants for data collection. Multistage sampling refers to a method that selects a sample in different stages, and each stage is being sub-sampled from the whole population (Uthayakumaran & Venkatasubramanian, 2015). It is done sequentially across

two or more hierarchical structure of the population. Multistage sampling is applicable when the sampling frame of the given population is inappropriate or does not exist (Acharya *et al.*, 2013). Multistage sampling is also known as cluster sampling as it includes the process of selecting the clusters within the clusters (Gay *et al.*, 2011).

According to Acharya *et al.* (2013), the multistage sampling technique involves the replication of two fundamental steps; step one is listing and another step is sampling. This study used the fundamental steps of multistage sample to derive the required sample size. First of all, the researcher categorized Malaysia into two main parts such as Peninsular Malaysia and East Malaysia. Using this categorization, the researcher picked the Peninsular Malaysia as it considers the most economically established in terms of SMEs and it is the home for the majority of Malaysia's population (Chin, 2015).

Afterwards, the researcher made a list of the main regions of Peninsular Malaysia and the researcher found that there are four main regions of Peninsular Malaysia such as central, southern, northern and eastern region (Chee et al., 1997; Chin, 2015). Within the list of four regions, the researcher selected the central region due of having more SMEs corporations (Musa & Chinniah, 2016). Within the central region, the Selangor state had the most SMEs corporations followed by Kuala Lumpur (Musa & Chinniah, 2016). Hence, this thesis aimed to collect data from SMEs that have only operations within the Selangor state.

Next, the samples were selected from the name list which is available on the SmeCorp's Web-Portal, and followed the following criteria;- Unit of analysis are owners managers of SME firms in Malaysia, and within the Selangor State region. The SME definition approved by National SME Development Council, Central Bank of Malaysia in 2013 which is based on two criteria: the number of full-time employees or the annual sales turnover (National SME Development Council, 2013). The targeted respondents or unit of analysis are owner-managers, CEO's or Managing Directors of SME firms.

3.9 Data Collection Procedure

Survey research is defined as, the systematic gathering of specific information about particular persons or entities (Brannick, 2000). In addition, surveys are a quick, relatively inexpensive, and accurate method to investigate a research phenomena (Zikmund, 2000), and are used when it is necessary to collect a large number of responses (Creswell, 2003). Furthermore, there are many modes in which to administer surveys such as, by telephone, face-to-face, mail, and electronically (Domegan & Fleming, 2007). Period for data collection were four (4) months, between the month of May 2017 till end of August 2017. The target respondents or unit of analysis are, owner-managers cum entrepreneurs that operates' small and medium enterprises (SMEs) within services sector located within the State of Selangor, Malaysia.

The researcher uses multiple approaches; e-mails (electronic mails), an On-line-survey method, WhatsApp with URL link of the survey questionnaire (via hand-phone contacts) messenger tool, and traditional postal mode to distribute questionnaires to the selected

respondents. Benefits of an online research and survey respectively are many, such as, lower cost, faster fieldwork, accuracy and quality responses, eliminate interviewer bias, respondents are not pressured to answer instantly or immediately. Survey questionnaires via WhatsApp messenger tool are equally fast and instant communication through the utilization and dissemination of the online survey's URL to smart-phones business owners. Similarly, this particular communication tool provides and allows respondents to conveniently respond to the survey questionnaires.

The researcher used the randomizer tool from the website https://www.randomizer.org/ to initially randomly select 800 SMEs and invite them for participation. Hence, the sum of 800 administered questionnaires through e-mails and online web-survey, the researcher initially expected to collect back between about 20% - 50% responses but the researcher could not meet the expectations. Due to possibilities of potential poor responses from the respondents at the early stage of data collection, the researcher used various methods to increase the response rate such as, initial phone call to solicit assistance and acknowledgment, subsequent follow-up and follow-through by e-mails, yet again, subsequent follow-up again by phone call to those that assisted in dissemination of WhatsApp message, thanking respondents for their assistance and contribution. Self-addressed envelopes containing hard-copy of survey questionnaires were equally distributed within reachable radius. To further ensure sufficient responses, the researcher also participated in events conducted by SMECorp by distributing hard-copies of survey questionnaires to the participants. The above stated methods of data collection resulted the researcher to get the responses from only 160 SMEs. However,

after the data screening and treating missing values, the study left with 150 valid cases that can be further used for data analysis.

3.10 Technique of Data Analysis

A combination of descriptive and an inferential statistics method of data analysis were applied in this research. Descriptive statistics are employed to describe, summarize or explain a given set of data, whereas inferential statistics computed from a sample is to infer about the population concerned by making inferences from which the data were drawn (Singh, 2007). Upon collection of raw data, the respondent's questionnaire were coded and subsequently computed into the Statistical Package software for Social Science (SPSSv22 and SmartPLS) for data analysis. The sequence of analysis were, screening of data to find data entry errors, outliers, violation of assumption, possible missing values, followed by descriptive analysis to generate and compare demographics details (Saunders *et al.,* 2009).

Data screening is important and it involves a number of steps as reflected in the following steps of analysis. For inferential analysis, SmartPLSv3.2.7 (Partial Least Square Structural Equation Modeling – PLS-SEM) were employed. According to Hair *et. al.,* (2011), PLS-SEM has developed into an important method and approach when it comes to investigating relationship between latent constructs to determine the cause and effects.

Numerous research stated that, PLS-SEM approach is superior, flexible and strong analysis tool for statistical model building, testing and predicting theory (Lowry &

Gaskin, 2014; Ringle, Wande, & Becker, 2014; Robins, 2012). As stressed by Wan (2013), PLS-SEM path modeling produces better, reliable and valid confirmatory factor analysis. Several researches further confirms' the utilization of PLS-SEM statistical methodology in various research areas in social science, including business research (Hair Jr., Sarstedt, Hopkins, & Kuppelwieser, 2014). For example, in strategic management (Gudergan, Devinney, Richter, & Ellis, 2012; Hulland, 1999; Lew & Sinkovics, 2013); marketing (Hair, Sarstedt, Ringle, & Mena, 2012; Henseler, Ringle, & Sinkovics, 2009; Reinartz, Krafft, & Hoyer, 2004); operations management (Peng & Lai, 2012); human resource (Becker, Klein, & Wetzels, 2012); family business (Sarstedt, Ringle, Smith, Reams, & Hair, 2014); management information system (Chin, Marcolin, & Newsted, 2003; Marcoulides, Chin, & Saunders, 2009). Hair *et. al.,* (2012) and Henseler *et. al.,* (2009) further states that, PLS-SEM is superior method as it has the ability to assess latent variables and their relationship with the items (outer model) and test the relationship between the latent variables (inner model).

In conclusion, PLS-SEM allows for complex models that has chains of effects, such as, mediation and other more complex relationship (Lawry & Gaskin, 2014). Therefore, this study adopts SmartPLSv3.2.7 for the analysis of outer model (reliability, convergent validity and discriminant validity) and the inner model (significance of the path coefficients, coefficient determination, effect size and predictive relevance).

3.10.1 Missing Data

Missing data is incomplete information obtained when a respondent fails to answer one or more questions in a survey (Hair *et al.,* 2014). Missing data are treated in several ways. Complete case analysis known as 'list-wise-deletion', available case methods known as pair-wise-deletion' and filling in the missing value with estimation is an option recommended (Singh, 2007). According to Hair Jr. *et al.,* (2013), these missing values must be replaced with the mean value if the missing value per item is less than 5%.

3.10.2 Assessment of Outliers

Subsequent analysis after treating missing responses is the verification of outliers. Outliers are defined as an extreme response to a particular or most of the questions (Hair *et.al.,* 2014). Couple of reasons explains outliers, such as, incorrect data entry or the observations within the intended populations are extreme in their combination of values across the variable (Hair *et.al.,* 2006). Mahalanobis D^2 measurement is applied through the evaluation using Chi-Square distribution with an alpha level of 0.001 and the degree of freedom of the number of items. The score was compared to Chi-square X^2 value. If Mahalanobis D^2 > Chi-square X^2 then that case was considered as an outlier and can be considered for deletion from the dataset (Hair *et al.,* 2006).

3.10.3 Assessment of Normality

Normality assessment is to gauge whether the data is normally distributed, hence variation of sufficiently large data affects the statistical test results (Hair *et al.,* 2010). The PLS-SEM is a lenient model that makes no assumptions about the normality of the

data distributions and that it is a non-parametric statistical method and does not require data to be distributed normally, yet it is important to check that the data is not too far from being normal (Hair, *et al.,* 2013). In order to detect extreme normality data, statistical results such as skewness and kurtosis test is carried-out. The result of skewness and kurtosis should be closed to zero to be considered as a normal distribution. For general guidelines, as suggested by Hair *et al.,* (2014a), recommends the range of skewness is greater than + 1 or lower than -1 to indicates a substantially skewed distribution. For kurtosis, if range is greater than +1, the distribution is too peaked and if less than -1 shows a distribution that is too flat.

3.10.4 Multicollinearity

Multicollinearity explains high correlation among independent variable when the results indicates .90 and above (Pallant, 2011). Utilization of SPSS software is deployed to detect variance inflation factor (VIF) in colinearity and possibility of multicollineatity exist if the tolerance value is more than 0.1 and less than 10 (Pallant, 2011).

3.10.5 Descriptive Analysis

The objective of the descriptive analysis is to change the raw data into the form that is easy for researcher to interpret and understand (Zikmund, 2003). The descriptive statistics provides demographic details of the profile of respondents.

3.10.6 Path Model Estimation

As stated in the technique of data analysis section above, Partial Least Squares-Structural Equation Modeling (PLS-SEM) was adopted for data analysis. PLS-SEM has become an important approach when it comes to investigating the cause and effect relations between latent constructs (Hair, Ringle, & Sarstedt, 2011). Generally, PLS-SEM is a path modeling statistical method for modeling complex multivariate analysis of relationships between observed and latent variables (Esposito Vinzi, Chin, Henseler, & Wang, 2010). The PLS-SEM approach is a strong, superior and flexible tool for statistical model building as well as testing and predicting theory (Lowry & Gaskin, 2014; Ringle, Wande, & Becker, 2014; Robins, 2012). PLS-SEM is a statistical methodology that has been used by several researchers in various research areas in social sciences, including business research (Hair Jr., Sarstedt, Hopkins, & Kuppelwieser, 2014).

Prior to application of the PLS-SEM algorithm, several parameters are specified in terms of the structural model weighting scheme, initial values to run the algorithm, data metric and maximum number of iterations. The report enables the researcher to verify and evaluate the initial results of the outer weight, outer loadings, structural model's path coefficients and R^2 values (Hair *et al.,* 2014a).

3.10.7 Justification for using PLS-SEM Technique

The application of PLS-SEM technique in this study was based on the following justifications. Firstly, structural equations models via Partial Least Square have been demonstrated to be superior models that perform estimations better than regressions for

assessing mediation (Preacher & Hayes, 2004). Empirical study results had showed that statistical report for total effect of the sum of direct and indirect effects between two constructs and measurement error provides more deeper and accurate estimates of mediating effects through bootstrapping procedure (Hair *et al.,* 2012b). Again, PLS is a soft modeling approach to SEM with no assumptions about data distribution (Vinzi *et. al.,* (2010). This, PLS-SEM becomes a good alternative when the following situations are encountered (Bacon, 1999; Hwang *et. al.,* 2010; Wong, 2010);

   i) Sample size is small, (ii) Applications have little available theory, (iii) Predictive accuracy is paramount, and (iv) Correct model specification cannot be ensured.

PLS-SEM has been deployed in many fields, such as behavioral sciences (Bass *et. al.,* 2003), marketing (Henseler *et. al.,* 2009), organization (Sosik *et. al.,* 2009), management information system (Chin *et. al.,* 2003) and business strategy (Hulland, 1999). Therefore, the use of PLS-SEM in this study was adopted.

3.11 PLS-SEM Analysis

The PLS-SEM approach requires two theories to construct and validate the model such as measurement theory and structural theory (Hair Jr *et al*., 2016). The measurement theory explains how the study variables are operationalized and measurement in the model and whereas, the structural model specifies the path modeling among the study variables. Hair *et al*. (2011) stated that the PLS-SEM approach is a comprehensive multivariate statistical analysis technique that benefits the researcher to simultaneously evaluate the measurement model and the structural model.

In order to assess the study model through PLS-SEM, the researcher used a two-step process as recommended by (Hair *et al*., 2011). In the first step, the researcher assessed the measurement model for its reliability and validity of the constructs which are either specified as reflective or formative. Once the reliability and validity of the measurement models were confirmed, the researcher then examined the estimates of the structural model.

3.12   Step one: Evaluating the Measurement Models

While assessing the measurement models, we first need to differentiate and specify the constructs that are either reflectively or formatively measured (Hair *et al.*, 2011). In order to specify the constructs whether they are reflective or formative, we employed the important decisions rules given by (Coltman *et al.*, 2008; Petter *et al.*, 2007) for specifying the construct as reflective or formative. The first rule is to look at the nature of the construct whether the latent construct is existing or formed. The second rule is to look at the direction of causality between the items and latent construct; if it is reflective, the causality is from construct to items, if it is formative then the causality is from items to the construct. The third rule is to look at the characteristics of items used to measure the construct such that if it is reflective, then the items should have a shared common theme, items are exchangeable, and deleting or adding an item does not change the meaning of the construct, whereas, if the construct is formative, items do not share a common theme, items are not replaceable, and deleting or adding an item changes the conceptual meaning of the construct. Once the constructs or measurement models were finalized as reflective

or formative, we next used different settings for the assessment of reflective and formative measurement models.

3.12.1 Evaluating Reflective Measurement Models

i) Internal consistency

The first criterion to be evaluated is typically internal consistency reliability. The traditional criterion for internal consistency is Cronbach's Alpha. Kock (2013) defines reliability as "a measure of the quality of instrument". The response of each item questions of latent variable should be responded in a same way by different respondents. Latent variables reliability is assured when the scale generates consistent results. According to Hair Jr *et al..* (2016) Cronbach's alpha has limitation and it is more appropriate to apply a different internal consistency reliability, which is referred as composite reliability. Composite reliability is usually interpreted in a same way as Cronbach's apha (Aibinu & Al-Lawati, 2010; Hair Jr *et al.*, 2016). Composite reliability threshold values (0.60 to 0.70) are considered to be acceptable in exploratory research, while in more advance stages of research, values between 0.70 and 0.90 are considered as satisfactory.

ii) Convergent Validity

Urbach and Ahlemann (2010) defined convergent validity as "the degree to which individual items reflecting a construct converge in comparison to items measuring different constructs". To evaluate the convergent validity of a reflective constructs, researchers need to consider the outer loadings of the indicators and the average variance

extracted (AVE) (Hair Jr *et al*., 2016). High outer loading on a construct indicate the associated indicators have much in common. According to Hair Jr *et al.* (2016) a common rule of thumb is that the standardized outer loadings should be 0.70 or above. However, in some cases, the constructs have weaker loadings of (<0.70) (Hulland & Business, 1999). Recently, Hair Jr *et al*. (2016) advised that outer loadings of indicators between (0.40 and 0.70) should only be removed when deleting the indicator leads to an increase in the composite reliability or the average variance extracted (AVE).

Average extracted variance (AVE) is defined as "the grand mean value of the squared loadings of the indicators associated with the construct (i.e., the sum of the squared loadings divided by the number of indicators" (Hair Jr *et al.*, 2016). The value of AVE should be 0.50 or greater than that (Hair, 2010; Urbach & Ahlemann, 2010).

iii) Discriminant Validity

Discriminant validity refers means that a construct truly be distinct from other constructs (Hair Jr *et al.*, 2016; Straub *et al.,* 2004). Traditionally, researchers measures discriminant validity on two perspectives. The cross-loadings are the first approach to assess the discriminant validity of the indicators, while Fornell-Larcker criterion is the second approach to assess the discriminant validity (Hair Jr *et al*., 2016). It compares the square root of the AVE values with the latent variable correlations. The square root of each constructs' AVE should be greater than its highest correlations with any other constructs (Fornell & Larcker, 1981).

As an alternative, Henseler *et al*. (2015) propose to assess the heterotrait-monotrait ratio (HTMT) of the correlations for the discriminant validity. HTMT is "the mean of all correlations of indicators across constructs measuring different constructs (i.e., the heterotrait-heteromethod correlations) relative to the (geometric) mean of the average correlations of indictors measuring the same construct (i.e., the montrait-heteromethod correlations for formal definition of the HTMT)", (Henseler *et al.*, 2015). Henseler *et al.* (2015) suggested a threshold value of 0.90, if the path model includes constructs that are conceptually very similar and a more conservative threshold value is 0.85. HTMT values above than 0.90 is considered to indicate a lack of discriminant validity.

3.12.2 Evaluating Formative Measurement Models

The criteria to assess the formative construct is different from the reflective construct. For the formative construct, prior studies have guided to evaluate the Variance Inflated Factor (VIF) that examines the Collinearity among the associated indicators as well as the outer weights and their significance of the indicators designated on the formative construct, to consider a valid formative construct (Chin, 2010; Hair *et al.*, 2011).

i) Evaluating Collinearity

A high correlation between two formative indicators is known as collinearity. More than two indicators highly correlated then it is known as multicollinearity. Hair Jr *et al.* (2016) added that the high level of collinearity are crucial issue because they have an impact on the estimation of weights and their statistical significance. The critical value of the VIF is 5 by (Hair Jr *et al*., 2016) and 3.3 a more restricted value by (Kock & Lynn, 2012)

ii) Evaluating indicator weights and significance

Outer weights are usually examined to check whether the indicator weights are significant or not. If significant, the construct is a valid formative construct and continue with the interpretation. If not, then we need to assess the outer loading as (Hair Jr *et al.*, 2016) suggested that If outer loading is ≥ 0.5 then keep the indicator even it is insignificant, if outer loading is < 0.5 and not significant then delete the formative indicator.

3.13   Step Two: Evaluating the Structural Model

After meeting the reliability and validity of the measurement models, the researcher next assessed the structural model as recommended by (Hair *et al.*, 2012). In order to evaluate the structural model, scholars recommended to test the significance of path coefficient, effect sizes, coefficient of determination (R^2), and predictive relevance (Q^2) (Hair *et al.*, 2012; Kock, 2015).

i) Path-coefficient

Path-coefficients represent the magnitude and directions of relationships in a model. While evaluating the path-coefficients, we checked the P-values and T-values to demonstrate the significance of the hypothesis testing (Kock, 2016).

ii) Effect Size (f^2)

Hair Jr *et al.* (2016) recommended that researchers should evaluate their structural model with relevant effect size. The effect size is defined as "the percent of exogenous latent

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variable that contributes to the endogenous latent variable's R^2 value (Hair Jr *et al.*, 2016). Authors explained that the effect size estimates the strength of relationships between variables (Chin & Newsted, 1999). The magnitude of the effect size can be analyzed as large (0.35), medium (0.15), and small (0.02) (Cohen, 1988).

iii) Co-efficient of determination (R^2)

According to (Hair Jr *et al.*, 2016), the co-efficient of determination *(R^2 value)* is the most common measure to examine the structural model. In addition, the value of R^2 indicates the amount of variance in the dependent or endogenous variables explained by all of the exogenous or independent variables. The present study is related to the field of consumer behavior and for such studies, the value of $R^2 = 0.20$ are taken high by (Hair Jr *et al.*, 2016), while the value of $R^2 = 0.10$ is also deemed satisfactory for endogenous variable (Falk & Miller, 1992).

iv) Predictive relevance (Q^2)

Besides the estimate of R^2, authors by Hair Jr *et al*. (2016) have recommended to employ the use of Stone-Geisser's Q^2 measure as a predictive precision. The value of Q^2, estimates how well-observed values are remodeled by a given model and its parameters (Chin, 1998b). While assessing the value of Q^2, we should check whether the threshold value of Q^2 exceed the value of zero (>0) (Hair Jr *et al.*, 2016).

SmartPLS calculates Q^2 values through the blindfolding procedure. The blindfolding option in SmartPLS was the omission distance set to 7 (default). An omission distance in

the range of 5 to 10 is recommended for most research (Hair *et al.*, 2012). After running the procedure, results of the target endogenous construct are reported as cross-validated redundancy values (measures of Q²).

Summary

The main objective of this study is to understand both the innovative capacity and SMEs performance by empirically evaluating the relationship between the constructs within the context of SME firms in Malaysia. This study adopts definition as categorized by OECD (Oslo Manual, 3rd edition, 2005a) which specifies that main types of innovations are distinguished as; product innovation, process innovation, marketing innovation and organizational innovation. A pilot study was carried-out to further ensure validity of the questionnaire and the appropriateness of the research variables. To achieve the objective, a quantitative analysis method and technique is proposed. Upon data screening process, the following analysis are carried out utilizing SmartPLSv3.2.7;- validity and reliability, convergent and discriminant validity, confirmatory factor Analysis, R-Square (R²), Effect Size (f²), Predictive relevance (Q²), and the relevant analysis for Path Model, Measurement Model and Structural Model. The interpretation of the findings are discussed and listed along with recommendation for future research in the following chapters, four (4) and five (5) respectively.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1   Introduction

This chapter presents the results of data analysis and further discusses its findings. The chapter begins with the analysis of the response rate obtained from the field, analyses the results of response rate and further explains data screening processes employed. Subsequently, PLS-SEM approach was used to assess measurement and structural model and the findings are presented. Lastly, the results of the hypotheses analysis are examined and reported.

4.2   Analysis of survey responses

Results of collected data and demographic information are analyzed and reported. This section further explores the goodness of data, response rate, and the analysis of non-bias responses along with profile of respondents.

4.2.1   Goodness of Data

Primary data of the study was collected through survey questionnaires targeting SME firm owner-managers within the state of Selangor, Malaysia. The data collection was conducted over a period of four (4) months, effective May 2017 to the end of August 2017. Only 150 questionnaires were the final number used for analysis and further examination for this research.

4.2.2 Response Rate

The data used for this research were collected from owner-managers of SMEs within the state of Selangor. Survey questionnaires of the this study were distributed through the following approaches; online survey via emails, postal mail with self addressed stamped envelope, utilization of smartphone's application known as WhatsApp and participation in events conducted by SMECorp Malaysia. Efforts were made requesting attention to fill survey questionnaire in order to enhance response rate by reminding respondents by follow-up emails, and WhatsApp messages (Sekaran & Bougie, 2010). Through the above process, 160 responses were received in total from the various approached adopted. Out of these responses, 10 responses from the personally distributed survey questionnaires during the SMECorp's events were rejected as the respondent marked same response, which is also known as 'straight line' or unengaged respondent and due to incompleted survey forms. Descriptions of the responses are depicted in Table 4.1 below.

Table 4.1

Description of approach Method and Response rate of collected questionnaires.

Approach Method	Distributed	Returned	Response Rate in Percentage (%)
Online via Emails (Google Form)	200	49	24.5%
Postal Mail (Self Addressed Envelope)	200	9	4.50%
WhatsApp (Business contact)	200	51	25.50%
SMECorp event (2 events)	200	51	25.50%
Total:	**800**	**160**	**20.00%**
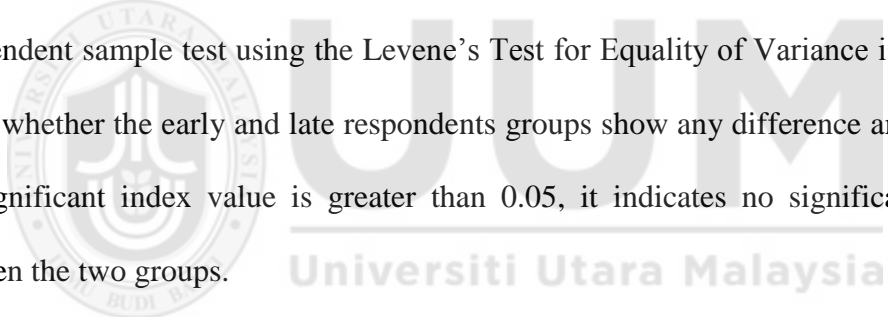
The application of PLS-SEM in this study for analysis methodology requires a minimal range of 30 to 100 responses only, thus a total of 160 respondents are sufficiently adequate for the analysis (Chin & Newsted, 1999). This total is equally as per G*power

sample size calculation of 107 samples, but researcher decided to settled at 150 respondents.

4.2.3   Non-response Bias Test

Based on Mooi & Darstedt (2011), responses that revert later are theoretically are more similar to non-respondent's characteristics, therefore Amstrong & Overton procedure should be followed. This argument stated that late respondents may not have responded if there was no follow-up and follow-through. Therefore, if non-response bias occurs, the results do not concludes on how the total sample responded and that non-response bias could affect the generalization of the sample towards the population of study. An independent sample test using the Levene's Test for Equality of Variance is employed to gauge whether the early and late respondents groups show any difference among them. If the significant index value is greater than 0.05, it indicates no significant difference between the two groups.

The early respondents are those replied within the month of May – June 2017, which totals 78, and 72 for those replied in July – August 2017. Results from the independent sample T-Test are shown in Table 4.2 and Table 4.3 which reveals that, no statistical significant difference at 0.05 level for both groups, hence the present study assumes that non-response bias was not a critical concern for this study and that there is no significant difference between the early and late respondents respectively. Therefore, the null-hypothesis is accepted.

Table 4.2					
Non-response Bias Test results					

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
ICprod	early	78	3.762	0.709	0.080
	late	72	3.725	0.715	0.084
ICproc	early	78	3.598	0.664	0.075
	late	72	3.575	0.734	0.086
ICmkt	early	78	4.012	0.718	0.081
	late	72	3.878	0.737	0.087
ICorg	early	78	3.809	0.707	0.080
	late	72	3.728	0.698	0.082
DTsc	early	78	3.596	0.852	0.096
	late	72	3.379	0.882	0.104
DTrc	early	78	3.556	0.832	0.094
	late	72	3.361	0.980	0.115
DTti	early	78	3.372	0.832	0.094
	late	72	3.440	0.898	0.106
FP	early	78	3.454	0.733	0.083
	late	72	3.382	0.812	0.096

Note: FP=Firm Performance, ICpdt=Innovative Capacity-Product Innovation, ICpro=Innovative Capacity-Process Innovation, ICmkt=Innovative Capacity-Marketing Innovation, ICorg=Innovative Capacity- Organizational Innovation, DTsc=Disruptive Technology-sensing capability, DTrc=Disruptive Technology-response capability, DTti=Disruptive Technology-technology investment

Table 4.3
Independent Samples Test

Variable		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ICprod	Equal variances assumed	0.278	0.599	0.314	148	0.754	0.03654	0.11634	-0.19336	0.26644
ICproc	Equal variances assumed	0.780	0.379	0.2	148	0.842	0.02283	0.11416	-0.20276	0.24842
ICmkt	Equal variances assumed	0.353	0.553	1.126	148	0.262	0.13383	0.1188	-0.10094	0.3686
ICorg	Equal variances assumed	0.422	0.517	0.703	148	0.483	0.08072	0.1149	-0.14634	0.30778
DTsc	Equal variances assumed	0.093	0.761	1.537	148	0.126	0.21768	0.14163	-0.0622	0.49756
DTrc	Equal variances assumed	2.507	0.115	1.314	148	0.191	0.19444	0.14803	-0.09809	0.48697
DTti	Equal variances assumed	0.099	0.754	-0.481	148	0.631	-0.06802	0.14129	-0.34724	0.2112
FP	Equal variances assumed	1.594	0.209	0.573	148	0.568	0.07229	0.12618	-0.17706	0.32163

Note: FP=Firm Performance, ICpdt=Innovative Capacity-Product Innovation, ICpro=Innovative Capacity-Process Innovation, ICmkt=Innovative Capacity-Marketing Innovation, ICorg=Innovative Capacity- Organizational Innovation, DTsc=Disruptive Technology-sensing capability, DTrc=Disruptive Technology-response capability, DTti=Disruptive Technology-technology investment

4.2.4   Profile of Respondents

Descriptive analysis with SPSS tool was employed to present the profile of the respondents. Respondents were asked to indicate a number questions in relations to their firms, such as, age, gender, education level, years of business existence, nature of business, total employment and annual sales turn-over. The details are summarized in Table 4.4.

Table 4.4

Demographic Profile of Respondents.

Demographic	Characteristic	Frequency	Percentage (%)
	Below 30	31	20.7
	31 – 40	45	30.7
Age	41 -50	48	32.00
	51 – 60	25	16.7
	above 61	1	0.7
	Total	150	100
	Female	61	40.7
Gender	Male	89	59.3
	Total	150	100
	High School	5	3.3
	Diploma	15	10
Education	Degree	78	52
	Master Degree	44	29.3
	Doctorate Degree	8	5.3
	Total	150	100
	Less than 5 yrs	27	18
	Between 5-10 yrs	46	30.7
Year Established	Between 11-15 yrs	24	14.7
	Between 16-20 yrs	20	13.3
	More than 21 yrs	35	23.3
	Total	150	100
	Professional Services	53	35.3
	Finance or Insurance	5	3.3
	Tourism	5	3.3
	Agriculture / Livestock	5	3.3
Business Nature	HealthCare / Pharmacy	14	9.3
	Distribution / Logistic	12	8
	Food & Beverage	11	7.3
	Textile	3	2
	Electrical / Electronics	18	12
	Others	24	16
	Total	150	100
	Less than 5	16	10.7
	Between 5-30	51	34
Total Staff	Between 31-75	23	15.3
	Between 76-200	15	10
	More than 200	45	30
	Total	150	100
	Below RM300K	14	9.3
	Between RM300-RM3 Million	62	41.3
Annual Sales	Between RM3million-RM20Million	74	49.3
	Total	150	100

The descriptive analysis indicates that there were 150 respondents in total and that 32% among the respondents are within the age group of 41-50 years, followed by 30% within 31-40 years, 20.7% below 30 years and remaining 16.7% between 51-60 years respectively. Male respondents form the largest number, with 59.3% and female equally formed sizeable number, with 40.7%. 74% of these respondents are married, and that 52% of the total respondents are equipped with tertiary education with a minimum degree, followed by 29.3% with Master Degree, indicating that most of the respondents are among well educated. With respect to years of business operations, 18% are operating below 5 years, 30.7% fall between 5-10 years, 14.7 between 11-15 years, 13.3% between 16-20 years and 23.3 beyond 21 years.

As for business nature, the largest group with 35.3% represents professional services, 16% for others, which are either traders, or multi sector or industry. Remaining respondents are from various service sectors, such as IT, Tourism, Healthcare, Logistics, Distribution, Food & Beverage as well as, Agriculture. With respect to total employees, 34% formed the biggest group of between 6-10 staff. Lastly, for total sales turnover on an annual basis, 49.3% reported between RM 3 million – RM 20 million, followed by 41.3% between RM 300 thousand – RM 3 million and 9.3% below RM 300 thousand respectively. The forgoing indicators were such, as the study focuses solely on SME firms from within the SMEs service sector.

4.3   Data Screening Analysis

As specified in chapter four (4), among the fundamental steps in any study is assessment of data prior to performance of analysis to gauge the effect of the conceptual framework on a particular phenomenon. The fundamental aim of screening process is to detect and decision making on extreme data encountered. The steps involves detection and treatment of missing data, outliers, normality assessment and multicollinarity assessment

4.3.1   Treatment of Missing Data

Missing data is incomplete information obtained when a respondent fails to answer one or more questions in a survey (Hair *et al.,* 2014). Missing data are treated in several ways. Complete case analysis known as 'list-wise-deletion', available case methods known as pair-wise-deletion' and filling in the missing value with estimation is an option recommended (Singh, 2007). According to Hair Jr. *et al.,* (2013), these missing values must be replaced with the mean value if the missing value per item is less than 5%. From the analysis, missing data ranges between 0.60% to 1.83%, therefore, these missing values were replaced through SPSSv22 using mean replacement method.

4.3.2   Outliers Assessment

Outliers are defined as an extreme response to a particular or most of the questions (Hair *et.al.,* 2014). Couple of reasons explains outliers, such as, incorrect data entry or the observations within the intended populations are extreme in their combination of values across the variable (Hair *et.al.,* 2006). In accordance with the suggestions by Tabachnick & Fidell (2013), Mahalanobis D² measurement is applied to identity to deal with

multivariate outliers. Therefore Mahalanobis D² was calculated through linear regression method with SPSSv22, followed by computation of Chi-Square value.

Given that 46 items were used, 43 representing the degree of freedom in the X² table with p <0.001, hence the criterion value was 22.33 (Tabachnick & Fidell, 2013). Therefore, any case with Mahalanobis D² of 22.33 and above is a multivariate outlier and must be removed. Therefore, as mentioned above, cases with a value of 22.33 and above are considered as multivariate outlier and that, the particular respondent/s must be excluded in further analysis. In conclusion, after Mahalanobis test was conducted, a total of 150 respondents were used for further analysis. The results of the D² are sorted descending from largest value at the top of the list to lowest value, which is presented in Appendix D.

4.3.3 Normality Assessment

Upon examination of outliers, one of the basic conditions for inferential statistics test is that the data collected from the sample should be normally distributed. There are a number of available test, such as, skewness, kurtosis, kolmogorov-Smirnov and Shapiro-Wilk statistics. Normality assessment describes a symmetrical bell-shaped curve, which has the utmost frequency of scores in the center with smaller frequencies towards the both extremes (Pallant, 2011). Apart from the statements, PLS-SEM is a lenient model that makes no assumptions about the normality of the data distributions. Yet, PLS-SEM is a non-parametric statistical method and do not requires data to be normally distributed, it is important to check if the collected data is not too far from being normal (Hair Jr. *et. al.*, 2013).

This study applied statistic method of Skewness and Kurtosis as suggested by many researchers (Hair Jr. *et. al*., 2010; Tabachnick & Fidell, 2013, Kline, 2011). As suggested by Kline (2011), Skewness index is acceptable if values are less than 3.0 and that, Kurtosis index is equally acceptable if values are less than 8.0. Additionally, following similar arguments, Kline (2011) stated that the absolute value of Skewness greater than 3 and Kurtosis value greater than 10 many indicate a problem. Based on the suggestion and recommendations, fortunately, the values of the Skewness and Kurtosis of all items in this study are within the acceptable range of < 3 and < 10 respectively, as shown in Table 4.5 below. Figure 4.1 present the histogram and normal probability plots. As shown, all bars were closed to normal curve, meaning that normality assumptions were not violated (Pallant, 2011).

Table 4.5
Skewness and Kurtosis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ICprod	150	1	5	3.744	0.70971	-0.429	0.198	0.967	0.394
ICproc	150	1	5	3.5873	0.69625	-0.293	0.198	0.754	0.394
ICmkt	150	1	5	3.9474	0.7276	-0.866	0.198	1.331	0.394
ICorg	150	1	5	3.7704	0.70186	-0.400	0.198	0.734	0.394
DTsc	150	1	5	3.4917	0.87057	-0.374	0.198	0.607	0.394
DTrc	150	1	5	3.4622	0.90799	-0.526	0.198	0.566	0.394
DTti	150	1	5	3.4044	0.86232	-0.383	0.198	0.142	0.394
FP	150	1	5	3.4195	0.77033	-0.293	0.198	0.23	0.394
Valid N (listwise)	150								
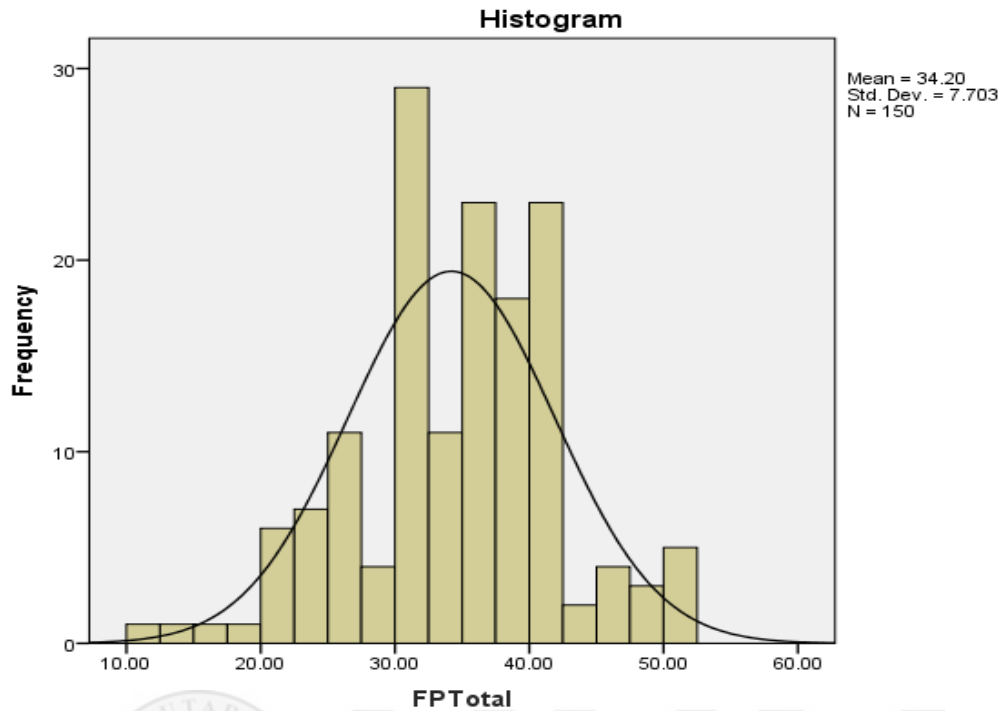
Figure 4.1
Histogram and normal probability plot of Dependent Variable (Firm Performance).

4.3.4 Multicollinearity assessment

According to Hair Jr. *et. al*.,(2010), multicollinearity refers to the relationship between two (2) or more exogeneous variables and that, independent variables indicates little correlation with other independent variables. Multicollinearity problem occurs when the independent variables are highly correlated with each other (Hair Jr. *et.al.,* 2010; Pallant, 2010; Tabachnick & Fidell, 2013). Therefore, when two (2) or more variables are highly correlated, it means that they contain unnecessary information, hence not all are needed in the same analysis as they increases the error terms.

When multicollinearity between variables is high, the standard error of the regression coefficient increases hence the statistical significance of these coefficients becomes less reliable. In order to test multicollinearity, the most reliable statistical test is the examination of Tolerance and Variance Inflation Factor (VIF) with the index of more than 0.1 and less than 10.0 respectively (Hair Jr. *et al.,* 2010; Pallant, 2010). In this study, multicollinearity are first analyzed by examination of correlation matrix then, followed by analysis of Tolerance and VIF level. As stated by Hair jr *et.al.,* (2010) and Pallant (2010), multicollinearity exists when correlation index value between independent variables is 0.9 and higher.

From the Table 4.6, the results indicates' none of the exogenous variables are highly correlated with other exogenous variable. As suggested by Hair Jr. et. el., (2010) and Pallant (2010), correlation index above 0.9 as threshold for multicollinearity among independent variables. The values indicates' that the correlation index are below the threshold level of 0.9, therefore, it is concluded that there is no problem or issues of high correlation among these variables.

Table 4.6							
Correlations among Exogeneous variables							

Correlations

	ICprod	ICproc	ICmkt	ICorg	DTsc	DTrc	DTti	FP
ICprod	1							
ICproc	.734**	1						
ICmkt	.615**	.614**	1					
ICorg	.579**	.679**	.733**	1				
DTsc	.578**	.601**	.600**	.654**	1			
DTrc	.558**	.549**	.647**	.656**	.753**	1		
DTti	.526**	.521**	.518**	.602**	.627**	.663**	1	
FP	.508**	.480**	.589**	.531**	.458**	.536**	.610**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Note: ICpdt=Innovative Capacity-product, ICpro=Innovative Capacity-process, ICmkt=Innovative Capacity-marketing, ICorg=Innovative Capacity-organizational, DTsc=Disruptive Technology-sensing capability, DTrc=Disruptive Technology-response capability, DTti=Disruptive Technology-technology investment

Analysis of Tolerance and VIF by testing regression results through SPSSv22, the findings are indicated in the following table. From the Table 4.7, it is clear that the tolerance range 0.32 and 0.48 considerably greater than 0.1 and VIF ranges from 2.06 and 3.08, considerably less than 10. According to suggestion by Pallant (2010) and Hair Jr. *et. al.*, (2010), tolerance value below 0.10 and VIF value above 10 indicates high collinearity. Therefore, the results in Table 4.7 shows that multicollinearity does not exist in this study.

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Table 4.7

Multicollinearity Test based on Tolerance and VIF value.

	Tolerance	VIF
ICpdt	0.39	2.52
ICpro	0.35	2.80
ICmkt	0.38	2.62
ICorg	0.32	3.04
DTsc	0.35	2.79
DTrc	0.33	3.08
DTti	0.48	2.06

Note: ICpdt=Innovative Capacity-product, ICpro=Innovative Capacity-process,
ICmkt=Innovative Capacity-marketing, ICorg=Innovative Capacity-organizational,
DTsc=Disruptive Technology-sensing capability, DTrc=Disruptive Technology-
response capability, DTti=Disruptive Technology-technology investment

4.4   PLS-SEM Analysis

In this thesis, the researcher applied the Partial Least Squares Structural Equation
Modeling (PLS-SEM) method to test the conceptual model as discussed in the
methodology chapter. Previously, the researcher had already discussed the reasons for
using the PLS-SEM approach in this thesis. To perform the PLS-SEM analysis, the
researcher applied the SmartPLS software v3.2.7 to test the hypotheses associated with
the conceptual model. The PLS-SEM analysis was performed in two stages; one stage is
about the evaluation of measurement model and the stage is about the assessment of the
structural model.

Step one: Evaluation of measurement model

At times of assessing the measurement model, it is always important to draw a path
diagram showing the relationships between variables. In PLS-SEM, such type of diagram
is referred as path modeling that comprises a set of hypotheses developed on the basis of

a logic or theory (Hair Jr *et al.*, 2016). Accordingly, the researcher developed a path

modeling in this thesis to explain the mediating role of disruptive technology between

innovation capacity and SMEs' performance, see Figure 4.2.
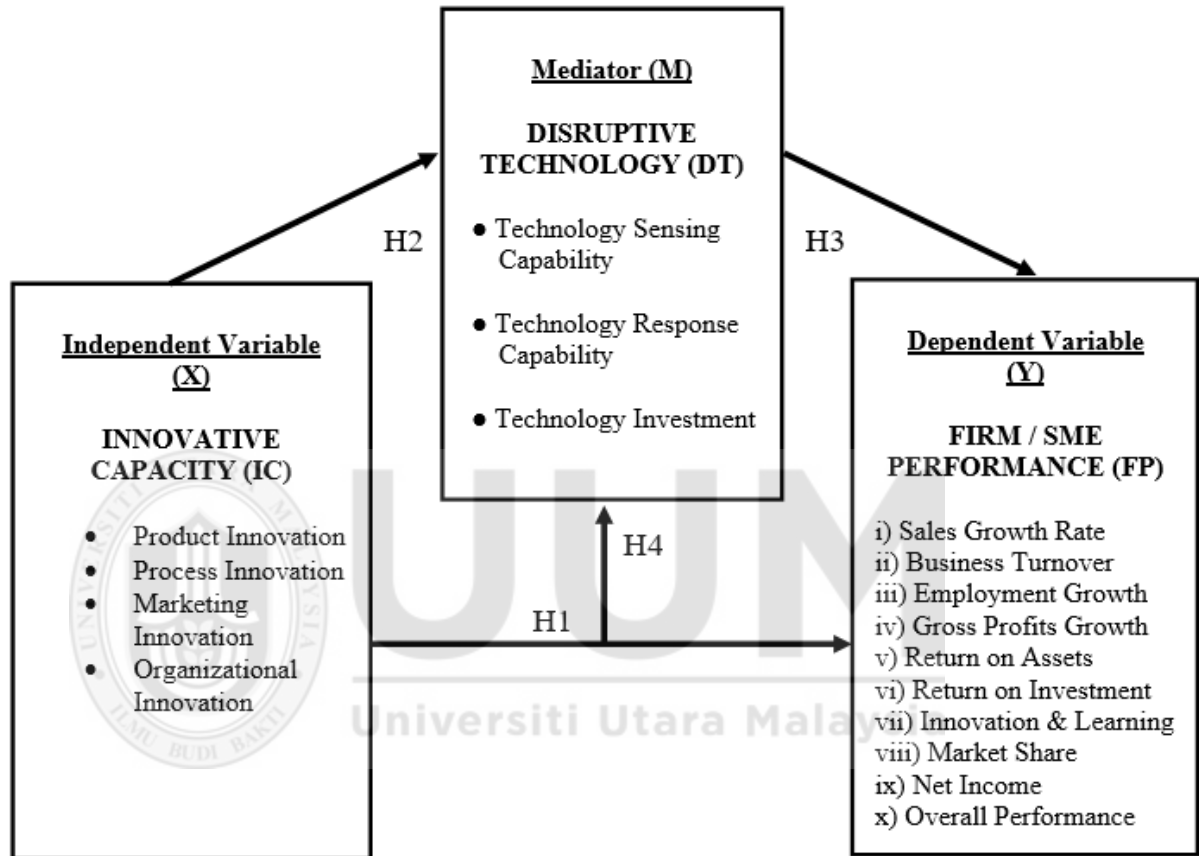
Figure 4.2: Research Model
Specifying the Measurement Model

The measurement model explains the relationship between constructs and their related

items. Such a relationship is helpful in assessing the construct whether it is reflective or

formative and based on the measurement theory; a sound theory is necessary to obtain

useful results from PLS-SEM (Hair Jr *et al.,* 2016). According to Hair *et al.* (2010)

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selecting indicators for measurement model is based on two approaches: 1) established scales or 2) a new or modified existing set of scales.

When a measurement model is developed, then a researcher needs to specify two types of measurement: reflective and formative measurement models. Reflective measure dictates that all indicator items are caused by the same construct and indicators should be highly correlated with each other (Hair Jr *et al.,* 2016). The direction of reflective measure arrows goes from construct to indicators. The formative measurement model is based on the assumption that causal indictors form the construct by means of linear combinations (Hair Jr *et al.*, 2016). The direction of formative measure arrows goes from the measured indicator variables to the constructs.

4.4.1 Innovation Capacity

Innovation Capacity can be categorized as a multidimensional construct as it has main four different nature of constructs comprising product innovation, process innovation, organizational innovation, and marketing innovation (Varis & Littunen, 2010). Innovation capacity is a second-order formative construct as different kinds of innovations forming the overall innovation capacity construct. Each type of innovation is reflectively measured, for instance, this study had 5 itmes of product innovation from ICprod1 to ICprod5, process innovation had 7 items from ICproc1 to ICproc7, Organizational innovation had 9 items from ICorg1 to ICorg9, and marketing innovation had 5 items from ICmkt1 to ICmkt5. The researcher has drawn the figure 4.3 to specify a measurement model for innovation capacity.

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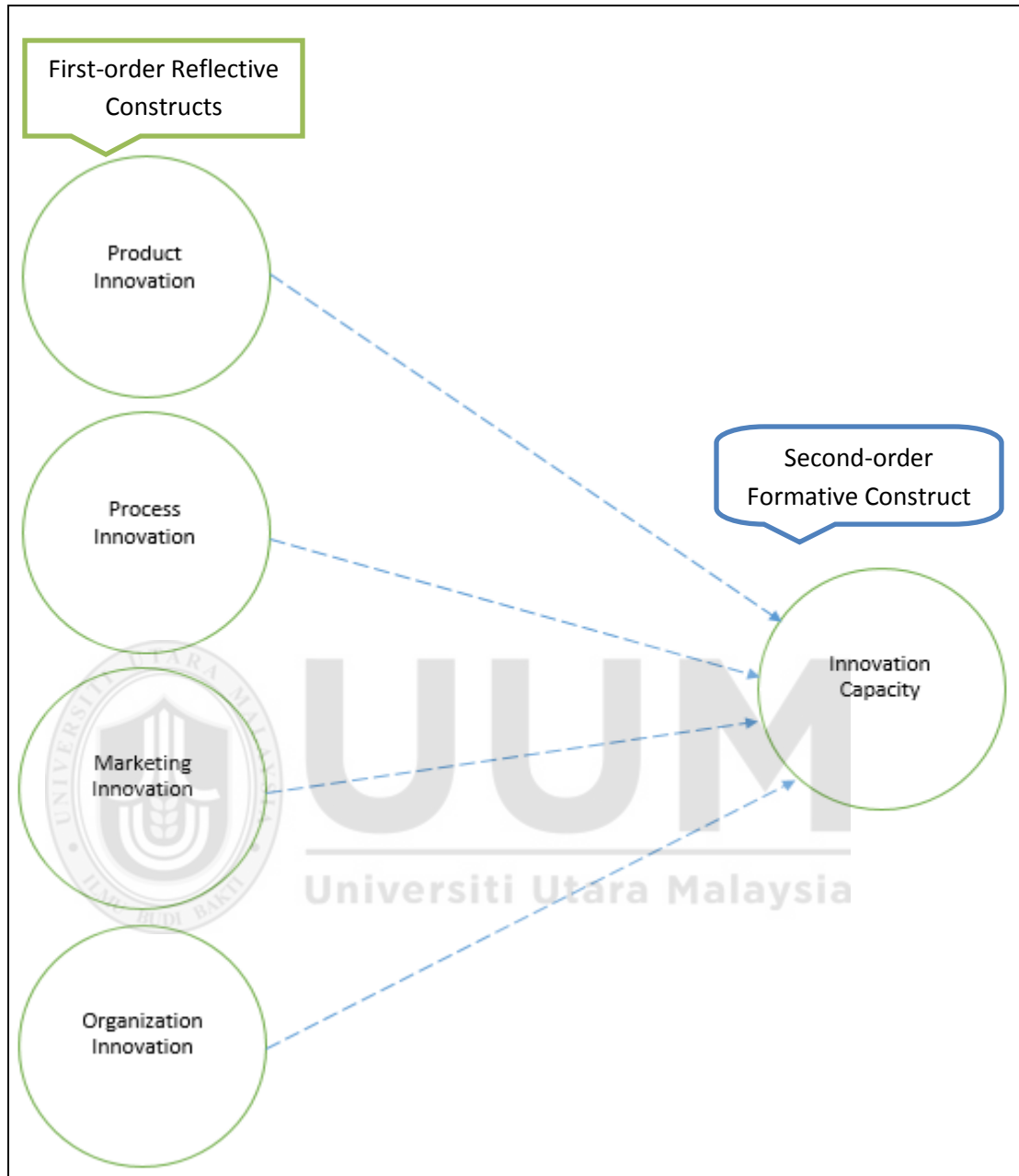
Figure 4.3
Specification of Innovation Capacity Measurement Model

4.4.2 Disruptive Technology as Mediating Variable

As discussed in the methodology chapter, disruptive technology is a second-order reflective construct comprising the three dimensions such as Technology-Sensing capability, Technology-Response capability and Technology-Investment. The researcher had 3 items of Technology-Investment from DTti1 to DTti3, 4items of Technology-Sensing capability from DTsc1 to DTsc4, and 3 items of Technology-Response capability from DTrc1 to DTrc3. The below figure 4.4 has been drawn to specify the measurement model of disruptive technology.
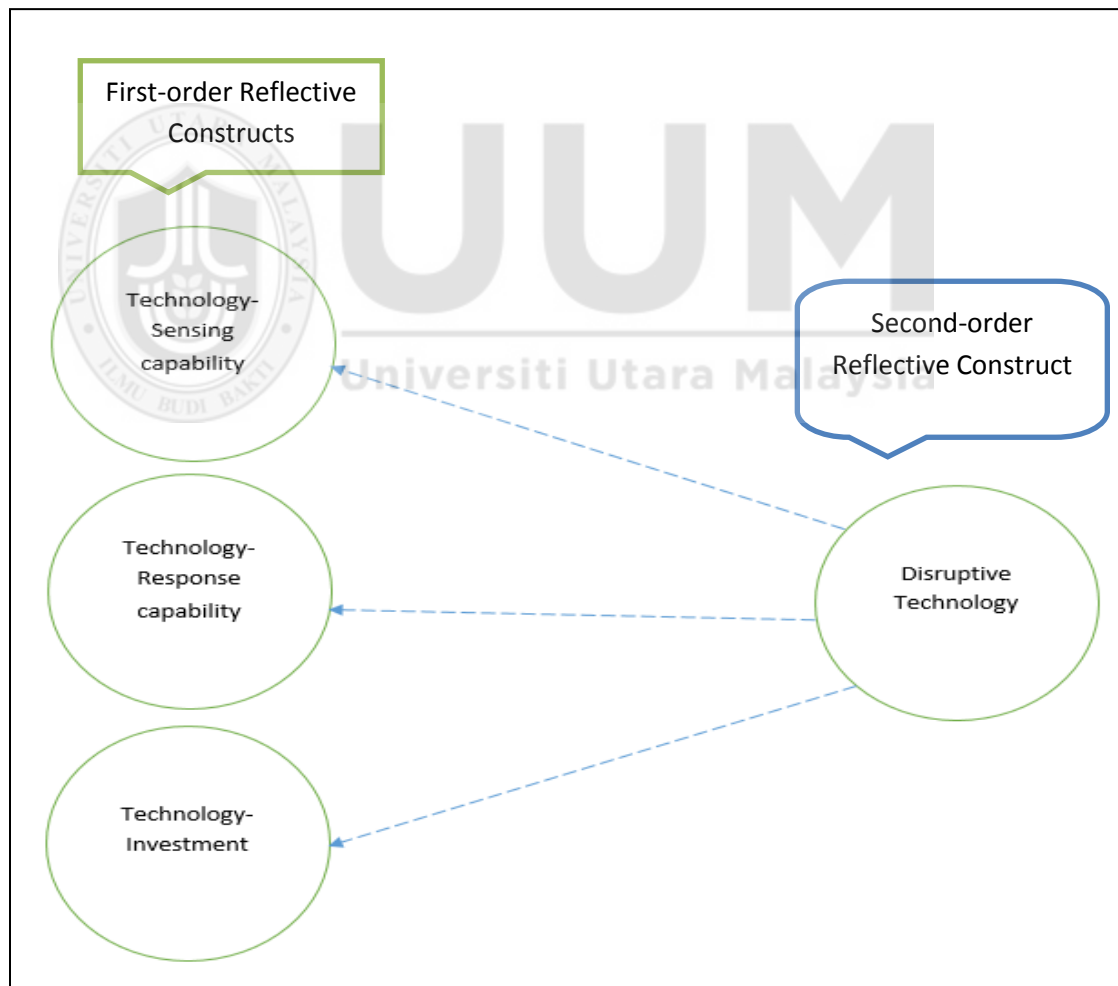
Figure 4.4
Specification of Disruptive Technology Measurement Model

4.4.3 SMEs' Performance as an Endogenous Variable

The existing literature on firm performance has revealed that there are many measures that can be used to assess the firm performance. In this study, the researcher adopted the following measures (i) Sales Growth, (ii) Business Turnover, (iii) Employment Growth, (iv) Gross Profit Growth, (v) Return On Asset (ROA), (vi) Return on Investment (ROI), (vii) Innovation and Learning, (viii) Market Share Growth, (ix) Net Income, and (x) Overall Business Performance to evaluate the SMEs performance. The below figure 4.5 has been drawn to specify the measurement model of SMEs performance.
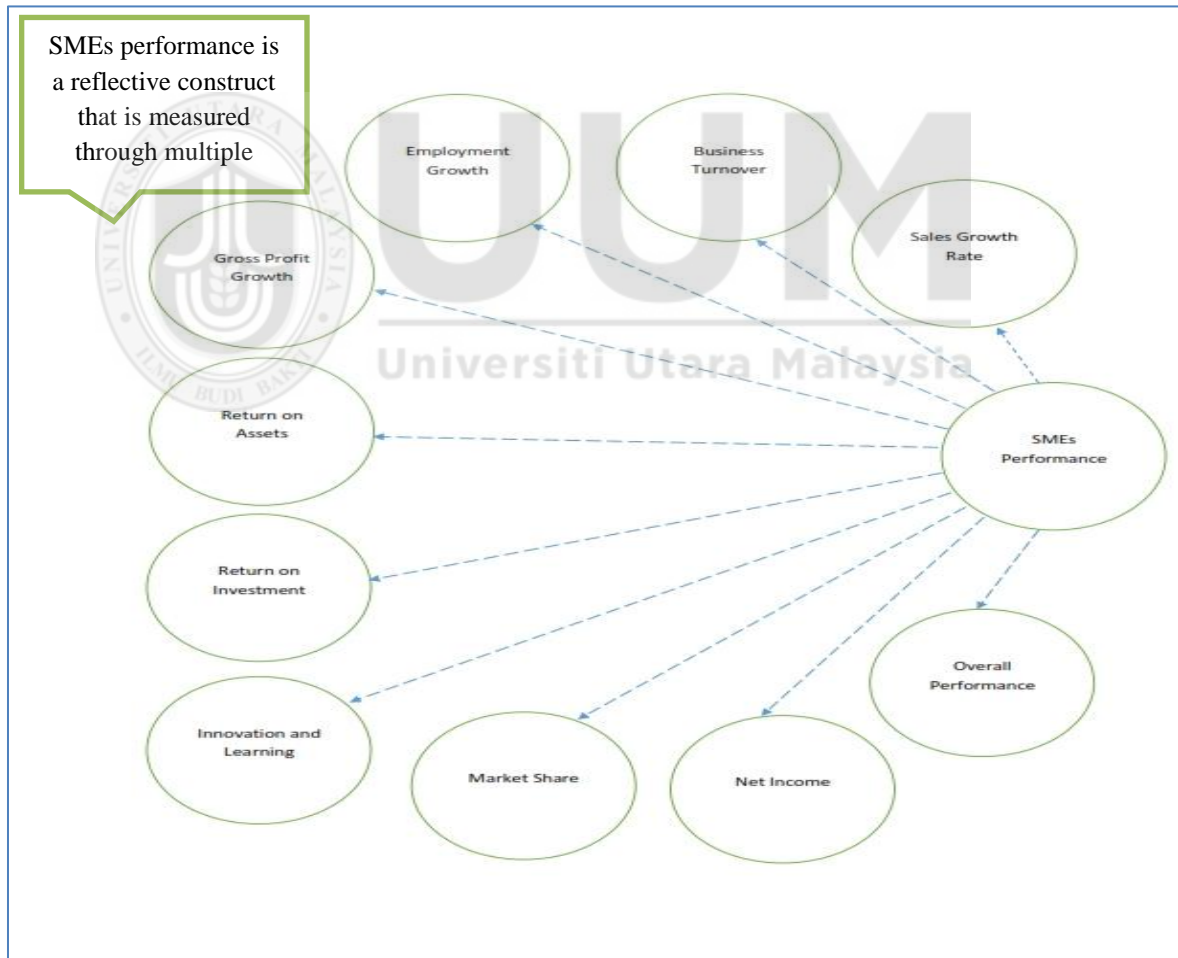
Figure 4.5

Specification of SMEs performance Measurement Model

4.5 Measurement Model Assessment

For measurement model assessment, the researcher followed these figures (4.3, 4.4, and 4.5) to assess the reliability and validity of measurement models. The researcher initially examined the reflective measurement model on first-order reflective constructs as mentioned in the figures (4.3, 4.4, and 4.5). Afterwards, the second-order reflective and formative constructs as mentioned in these figures (4.3 and 4.4) were assessed.

4.5.1 Assessing the reflective measurement model

In the present thesis, the researcher initially evaluated the first-order reflective constructs of innovation capacity, disruptive technology, and SMEs performance for reliability and validity as mentioned in these figures (4.3, 4.4, and 4.5). The innovation capacity had the following first-order reflective constructs such as product innovation, process innovation, organization innovation, and marketing innovation. In case of disruptive technology, the researcher had Technology-Sensing capability, Technology-Response capability, and Technology-Investment as first-order reflective constructs. Lastly, this thesis had a first-order reflective construct named SMEs performance that was measured through 10 items. To assess the reliability and validity of first-order reflective constructs, this thesis followed guidelines for assessing the reflective measurement model as stated in the methodology chapter. Following the guidelines, the researcher first checked the item loadings, internal consistency and then followed by convergent, and discriminant validity. The results indicated that no item had lower loadings than 0.40, all items had

met the internal consistency of 0.70. All constructs achieved the convergent validity that were greater than the threshold value of 0.50 as shown in the Table 4.8.

Table 4.8

Internal Consistency and Convergent Validity

| Construct Scale | Items | Convergent Validity | | CR | Cronbach's Alpha |
		Loadings	AVE		
Innovation Capacity (Marketing Innovation)	ICmkt1	0.802	0.672	0.911	0.878
	ICmkt2	0.792			
	ICmkt3	0.838			
	ICmkt4	0.822			
	ICmkt5	0.842			
Innovation Capacity (Organizational Innovation)	ICorg1	0.794	0.61	0.933	0.919
	ICorg2	0.847			
	ICorg3	0.798			
	ICorg4	0.854			
	ICorg5	0.838			
	ICorg6	0.674			
	ICorg7	0.782			
	ICorg8	0.710			
	ICorg9	0.710			
Innovation Capacity (Product Innovation)	ICpdt1	0.708	0.575	0.871	0.817
	ICpdt2	0.716			
	ICpdt3	0.774			
	ICpdt4	0.837			
	ICpdt5	0.750			
Innovation Capacity (Process Innovation)	ICpro1	0.762	0.543	0.892	0.864
	ICpro2	0.703			
	ICpro3	0.618			
	ICpro4	0.793			
	ICpro5	0.817			
	ICpro6	0.738			
	ICpro7	0.711			

Table 4.8 (continue)

Internal Consistency and Convergent Validity

| Construct Scale | Items | Convergent Validity | | CR | Cronbach's Alpha |
		Loadings	AVE		
Disruptive Technology	DTrc1	0.890	0.829	0.936	0.897
	DTrc2	0.920			
	DTrc3	0.921			
Disruptive Technology	DTsc1	0.827	0.779	0.934	0.906
	DTsc2	0.905			
	DTsc3	0.909			
	DTsc4	0.886			
Disruptive Technology	DTti1	0.898	0.788	0.918	0.864
	DTti2	0.930			
	DTti3	0.833			
Firm Performance	FP1	0.853	0.705	0.96	0.952
	FP2	0.863			
	FP3	0.773			
	FP4	0.896			
	FP5	0.883			
	FP6	0.861			
	FP7	0.649			
	FP8	0.829			
	FP9	0.876			
	FP10	0.885			

The final assessment of a reflective measurement model is to analyze the constructs for their discriminant validity. In this thesis, the researcher used the latest approach i.e. Heterotrait-Monotrait Ratio of Correlations (HTMT) to assess the discriminant validity for reflective first-order constructs. The results as shown in Table 4.9 indicated that none of the constructs had the greater value from 0.90. This indicated that constructs have no discriminant validity issues.

Table 4.9							
Heterotrait-Monotrait Ratio of Correlations (HTMT)							
	DTInv	DTtr	DTts	FirmPerf	ICMkt	ICOrg	ICProc	ICProd
DTInv							
DTtr	0.748						
DTts	0.703	0.833					
FirmPerf	0.671	0.579	0.489				
ICMkt	0.591	0.729	0.674	0.639			
ICOrg	0.665	0.721	0.718	0.566	0.821		
ICProc	0.603	0.621	0.678	0.530	0.705	0.765	
ICProd	0.628	0.649	0.675	0.585	0.743	0.687	0.875

Once the first-order reflective constructs were validated, the researcher took the latent variables scores and created the second-order reflective and formative constructs. This thesis utilized the two-stage approach as recommended by Becker *et al.* (2012) to perform hierarchical component model analysis as shown in figures 4.3 and 4.4. To examine the validity of second-order reflective and formative constructs, the author again followed guidelines for assessing the reflective and formative measurement model as briefly discussed in the methodology chapter. The researcher first assessed the item loadings, internal consistency and then evaluated convergent, and discriminant validity for disruptive technology which was specified as second-order reflective construct. The results indicated that all items had loadings greater than 0.40, all items achieved the internal consistency greater than 0.70. Besides, all constructs met the convergent validity which means no constructs had AVE values lower than the value of 0.50 as shown in the Table 4.10. The researcher also assessed the discriminant validity on second-order reflective construct (disruptive technology) using the HTMT approach and found that all

constructs had HTMT value lower than the value 0.85, which showed that there was no problem with the discriminant validity, see Table 4.11.

Afterwards, this thesis examined the validity of innovation capacity which was specified as second-order formative construct. For the formative construct, authors have suggested to assess the Variance Inflated Factor (VIF) that examines the Collinearity among the associated indicators (Chin, 2010; Hair *et al*., 2011) and the critical value of the VIF should be lower than 5. The studies of Chin (2010) and Hair *et al.* (2011) have further suggested to check the outer weights and significance of the indicators designated on the formative construct, to consider a valid formative construct.

This thesis evaluated the second-order formative construct of innovation capacity and results proved that the VIF of all the formative indicators were lower than the critical value of 5. This study also analyzed the indicator weights and their significance of the first-order constructs that were designated on the second-order formative construct such as innovation capacity. The results showed that the indicator weights of the first-order constructs significantly contributed to the innovation capacity as the second-order formative construct as shown in the Table 4.10, except ICproc. In this case, the researcher checked its item loading as suggested by Hair *et al*. (2011). If the item loading is more the value of 0.40 then we can retain the formative indicator. The researcher found that the item loading for ICproc is 0.829, which seems fine to retain the formative indicator.

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Table 4.10

Evaluating the Second-Order Reflective and Formative Constructs

Construct Scale	Measurement Model	Items	Convergent Validity			Cronbach's Alpha	VIF	T-Values	P-Values
			Loadings/ Weights	AVE	CR				
Disruptive Technology	Reflective	DTinv	0.860	0.787	0.917	0.865	N/A	N/A	N/A
		DTtr	0.910						
		DTts	0.891						
Innovation Capacity	Formative	ICMkt	0.363	N/A	N/A	N/A	2.476	3.582	0.00
		ICOrg	0.382				2.663	3.454	0.00
		ICProc	0.169				2.852	1.507	0.132
		ICProd	0.230				2.636	2.126	0.034

Table 4.11

HTMT Result

	DT	Performance
DT		
Performance	0.667	

4.6   Structural Model Assessment

Once the assessment of measurement models was done and validated, this thesis continued with the structural model to verify the study hypotheses as stated in the conceptual model in Figure 4.6. The researcher analyzed the structural model as per guidelines that were stated in the methodology chapter. To test the conceptual model, this thesis aimed to verify the following hypotheses using the smartPLS software 3.2.7.

H$_1$: There is a significant relationship between Innovative Capacity and SMEs Performance.

H$_2$: There is a significant relationship between Innovative Capacity and Disruptive Technology.

H$_3$: There is a significant relationship between Disruptive Technology and SMEs Performance.

H$_4$: There is significant relationship between Innovative Capacity and SME Performance mediated by Disruptive Technology.
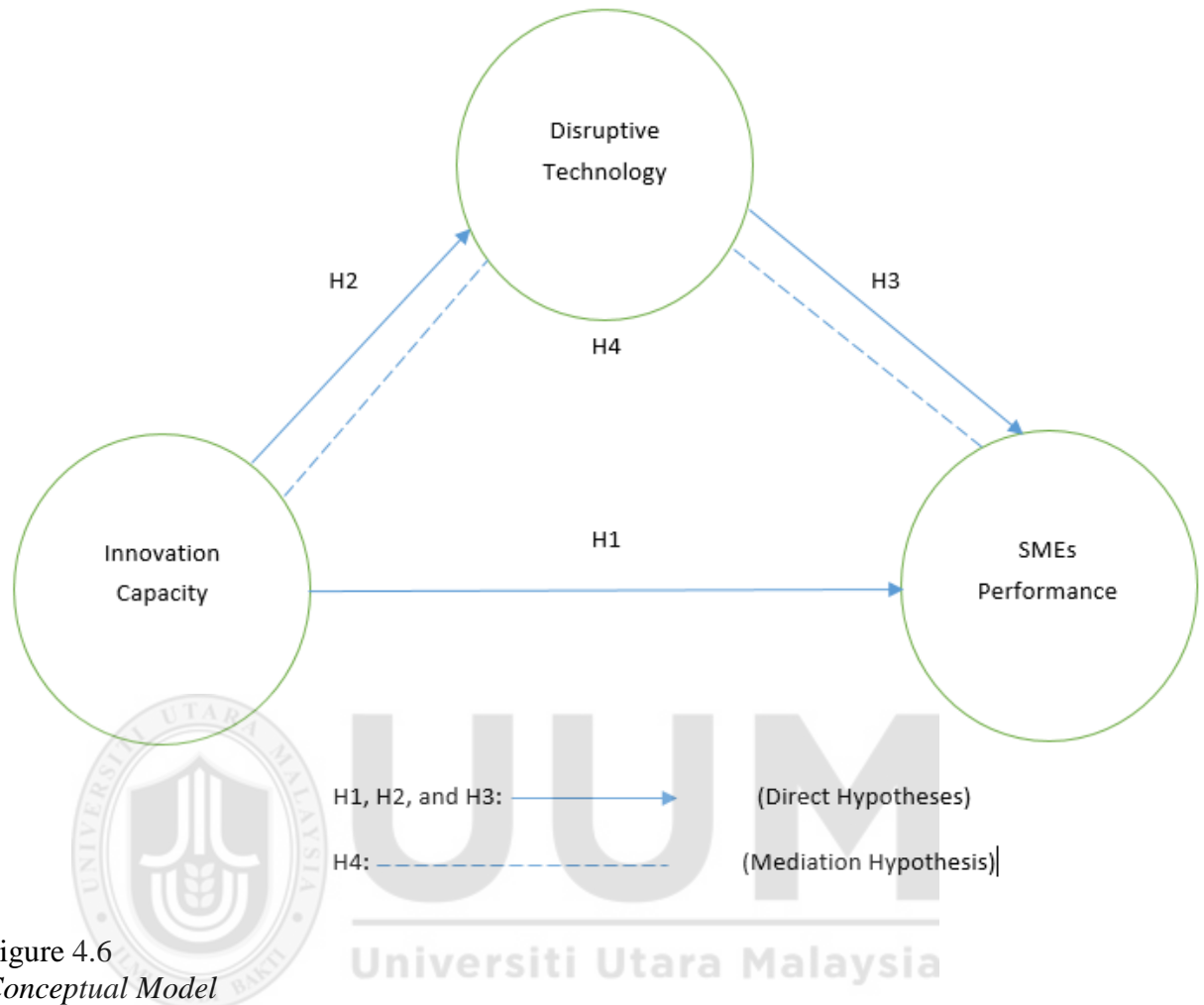
Figure 4.6
Conceptual Model

Using the smartPLSv3.2.7 software, the researcher evaluated a conceptual model based on these criterion such as the significance of path coefficient with effect size and T-value and the value of the R^2 coefficient for the endogenous construct. For endogenous constructs, the researcher also applied the blind folding measure to assess the predictive relevancy for endogenous constructs. The results based on direct relationships were discussed as follow.

Firstly, the researcher examined the impact of innovation capacity on SMEs'
performance, disruptive technology, and disruptive technology on SMEs' performance.
As a result, Table 4.12 reported that all three hypotheses such as H_1, H_2, and H_3 were
supported, see Figure 4.7.
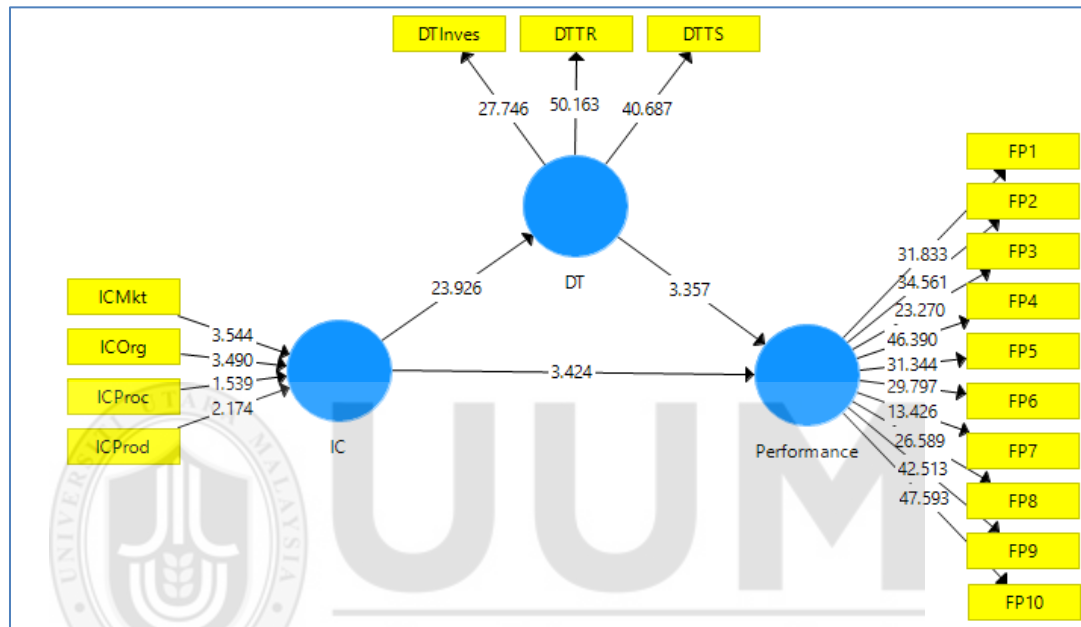
Figure 4.7
Conceptual Model with Results

According to the Table 4.12, The H1 is supported with beta 0.395, T-value 3.439, P-value
0.001 and effect size 0.115. Hence, it has been evidenced that SMEs having the
innovation capacity significantly improves the SMEs performance in Malaysia.

The H2 is supported with beta 0.767, T-value 23.813, P-value 0.000, and effect size
1.427. Thus, it is proven that SMEs corporations with innovation capacity significantly
impacts on disruptive technology of SMEs Malaysia.

The H3 is supported with beta 0.309, T-value 3.328, P-value 0.001, and effect size 0.070. Therefore, it is confirmed that SMEs corporations who routinely practice the disruptive technology significantly improve SMEs corporations in Malaysia.

Whereas, the value of R2 for SMEs' performance is 0.439 and 0.588 for disruptive technology, see Table 4.12. This thesis results have proven that the conceptual model is sound and a reliable source to measure the SMEs' performance through innovation capacity and disruptive technology. Moreover, the SMEs' performance between innovation capacity and disruptive technology is also significantly enhanced when disruptive technology is mediated between innovation capacity and SMEs' performance, see Table 4.13.

In the final step, the blind folding measure is performed to assess the predictive relevancy. The results of predictive relevancy indicated that the value of Q^2 for SMEs' performance is 0.279, and 0.433 for disruptive technology, see Table 4.12.

Table 4.12

Direct relationships results

Path Coefficient Direct Relationship

Hypotheses	Constructs Path	Std Beta	Std Error	T-Test	P-Values	R^2	f^2	Q^s	Decisions
H1	IC --- FP	0.395	0.115	3.439	0.001	0.439	0.115	0.279	Supported
H2	IC --- DT	0.767	0.032	23.813	0	0.588	1.427	0.433	Supported
H3	DT --- FP	0.309	0.093	3.328	0.001		0.07		Supported

4.6.1 Mediation Analysis

The researcher also analyzed the mediating role of disruptive technology between innovation capacity and SMEs performance. The results showed that H_4 is accepted as

Table 4.13

Mediation Analysis results

Hypotheses	Path Direction	Std Beta	Std Error	T-values	P-values	CI-LL	CI-UL	Decision
H4	IC->D->FP	0.237	0.07	3.366	0.001	0.108	0.387	Supported

shown in the Table 4.13. From the mediation test, the researcher has confirmed that disruptive technology mediates the relationship between innovation capacity and SMEs performance with T value 3.366, P-value 0.001, and associated confidence interval such as CI-LL 0.108 and CI-UL 0.387.

4.7 Recapitulation of the study findings

The recapitulation of the study findings are presented in Table 4.14 below.

Table 4.14

Recapitulation of the Study Findings.

Hypotheses	Statement of Hypotheses	Decision
H1	There is a significant relationship between IC and SMEs Performance	Supported
H2	There is a significant relationship between IC and DT.	Supported
H3	There is a significant relationship between DT and SMEs Performance	Supported
H4	There is a significant relationship between IC and SMEs Performance mediated by DT	Supported

4.8   Summary

The foregoing pages in the chapter presented quantitative statistical analysis of the data collected through survey questionnaires distributed to SME firms within Selangor State, Malaysia. The chapter has presented the results of the response rate, followed by analysis of non-response biasness. Subsequently, data examination and data screening process were conducted through the following steps; missing value analysis, outliers analysis, normality analysis and finally, multicollinearity analysis. Next, descriptive analysis of the respondents are presented, followed by Path Model, Measurement model and Structural model assessment with PLS-SEM utilizing SmartPLSv3.2.7 software package developed by Ringle *et .al*., (2014). Lastly, findings from the hypotheses testing based on the evaluation of inner model are equally reported.

CHAPTER FIVE

DISCUSSION, RECOMMENDATION AND CONCLUSION

5.1   Introduction

The chapter summarizes discussion of the research findings based upon the research objectives, research questions, hypotheses and literature review. On top of that, the chapter also presents the theoretical, practical contribution and implications of the study's findings. Then, the chapter equally presents the limitations, as well as, offer recommendation for future research. The chapter ends with the presentation of the conclusion of the study.

5.2   Recapitulation of the study

This section presents the recapitulation of the research findings based on the objectives of the research. The primary objective of the study is to examine the mediating role of disruptive technology between Innovative capacity and performance of SMEs in Malaysia. More specifically, one independent variable, namely Innovative Capacity represented by Product Innovation, Process Innovation, Marketing Innovation and Organizational Innovation are hypothesized to have a positive effect on firm performance and this link is also hypothesized to be mediated by disruptive technology.

Based on the main objective of the study, a total of four objectives are stated and formulated according to the research questions developed from the problem statement in preceding chapters. Studying these relationships will provide avenues to enhance SMEs

performance. The framework is supported by RBV theory, which postulates that firm performance is influenced by a firm's valuable intangible and tangible resources. Four hypotheses are formulated and tested statistically on PLS-SEM using SmartPLSv3.2.7 and the empirical results support all the four hypotheses.

5.3   Discussion

The following sub-headings of the discussion section present the findings based on the study's objectives.

5.3.1   Positive Relationship between IC (IV) and SMEs Performance (DV)

The first objective of the study is to examine the positive relationship between Innovative Capacity (IC) and Firm Performance of SMEs (FP) in Malaysia. Therefore one hypothesis were put forward, representing the positive relationship between Innovative Capacity and SMEs Firm Performance.

To begin with, innovation in services-oriented sectors can differ substantially from innovation in many manufacturing-oriented sectors. It is often less formally organized, more incremental in nature and less technological. IC in this study is characterized as an adoption of ideas that are new to a firm or industry. Innovation is generally understood as the introduction of a new things or method. This study adopts the definition as identified by OECD Oslo manual, (2005a), which is defined as, the implementation of a new or significant improved products (goods or services), or process, a new marketing method, and or a new organizational method in business practices, workplace organization or

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external relations. The manual further adds that, four main types of innovations are distinguished as; product innovations, process innovations, marketing innovations and organizational innovations.

H1 hypothesized that IC is positively related to firm performance and as postulated, the relationship was found to be positively significant. This empirical results matches' with findings of previous studies that argue IC positively influences firm performance (David *et. el*., 2007; Enkel *et. el*., 2009; Mayanyn & Maria, 2016; Minna, 2014).

As this finding validates the hypothesis, it equally presents an answer to the relevant research questions. In general, the finding provides further support for the assertion of the RBV as a theory on firm's strategic orientation by confirming the positive influence of the VRIN resources on the performance of firm. As mentioned in the literature review, IC consist of interrelated components of product innovations, process innovations, marketing innovations and organizational innovations, these elements allow firms to be bold in taking business decisions in response to competitive environment, environment change, market orientation and or drive markets. Therefore, this study highlights the importance of SMEs to possess IC, as better performance of the firm can be realized. In conclusion, the findings suggest that SMEs, in the context of Malaysia, have to possess IC abilities in order to help firm identify more business opportunities, expand market, create new market and opportunities and take business risk to achieve better performance.

Prior studies equally have noted the importance of adoption of up-to-date technology, thus adding value to business strategies which in-turn spurs innovation and growth (Saul & Berman, 2006). Further, it is acknowledged that, radical technology may be a source of competitive advantage to firms that successfully adopts it. Therefore, this statement similarly supports the assertion of disruptive innovation theory articulated by Clayton M. Christensen and Schumpeter, stating that up-to-date technology positively affects innovations in an organization which in turn produces better overall performance.

5.3.2   Positive Relations between IC (IV) and Disruptive Technology (M)

The second objective of this study is to investigate the relationship between independent variable, Innovative Capacity (represented by;- Product Innovation, Process Innovation, Marketing Innovation and Organizational Innovation) with the mediator variable, Disruptive Technology (represented by;- Technology sensing capability, Technology response capability and Technology investment). Building of RBV and Schumpeter's theory, this objective formulated second hypothesis on the positive relationship between IC and DT. H2 were tested to achieve the objective, which states that there is a significant and positive relationship between IC and DT. The results show that there is a significant positive relationship between IC and DT. Therefore the findings suggest that the more the SMEs are oriented towards demand and market, competition, and business environment, the more they will be engaged in adopting disruptive technologies to generate better positive responses for higher returns (Adner, 2002; Chang *et. el.,* 2010; Dominic & Wilhelmina, 2012).

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The finding links well with the view of past studies that argues that SMEs that adopt strategic activities results in obtaining better firm's performance. Drawing on the notion of RBV, this study suggests that market and technology oriented innovative SMEs are more capable of generating profitability, as a result of the ability of the firm to organize and align resources towards fulfilling customer's needs and satisfaction and leveraging on competitive advantage to capture more business opportunities.

5.3.3   Positive Relationship between DT (M) and SMEs Performance (DV)

The third objective of the study is to investigate the mediating role of Disruptive Technology adoption and its effect on SMEs performance. To achieve this objective, one direct relationship between the mediator and the dependent variable was tested (H3). Since one of the criteria for mediation to hold is the relationship between independent variable to mediator and mediator to dependent variable (Preacher & Hayes, 2008). Disruptive technology refers to newest or up-to-date technologies made available or recently introduced in the market. Hence, H3 states that, there is a significant relationship between DT and SMEs performance. Therefore, as hypothesized, the result indicates that there is a significant positive relationship between Disruptive Technology and SMEs performance. Thus, empirical finding for H3 is supported. In this current study, the relationship between disruptive technology shows that SMEs, which adopt newer or latest technologies or technology oriented SMEs, will have a better performance as compared to SMEs that do not embrace or adopt these technologies for effective and efficient business performance enhancement. This finding is also in accordance to the theory on innovation put forth by Schumpeter, asserting that innovations are imperative for

economic growth, commercial profits and public wealth. Further, findings are also supported by following researchers (Anthony, 2014; Covin & Slevin, 1989; Timothy & James, 2007).

Equally as stated above, firms with technology-driven business strategies or innovation-based strategies through application of an existing integrated set of technologies can spur innovation, growth and that, when factoring in technology, know-how is often sufficient (Saul & Berman, 2006).

Therefore, SMEs need to recognize the importance and benefits of disruptive technologies as higher and better firm performance depends on the SMEs abilities for strategic choice of appropriate strategies enacted with proper resources and capabilities present within the firm. As an example, it could be argued that, many businesses are aware of the Internet but may not broadly recognize it as one of the key technology that must be embraced for successful business operations. Similarly, many businesses should utilize the Internet instead of using conventional and traditional methods and that SME owners need to be aware of the up-to-date technologies available for consumption for better business operation, which provides varied benefits such as, lowers cost, increase efficiency, and ultimately enhance quality of products and or services produced by the firms.

5.3.4 Mediating role of DT (M) on Positive Relationship between IC (IV) and SMEs Performance (DV).

The fourth objective in this study is to examine the mediating role of Disruptive Technology on the positive relationship between IC and performance of SMEs in Malaysia. To achieve the objective, one direct relationship between mediator and the dependent variable was tested (H4). This hypothesis was tested using bootstrapping method (Preacher & Hayes, 2008).

H4 was tested, since one criteria for mediation to hold is the relationship between independent variable to mediator and mediator to dependent variable (Preacher & Hayes, 2008). Disruptive technology refers to newer technologies or an emerging technology that becomes dominant thus disrupts the stable-state of a market and often force-out, existing leading and incumbent firms out of the market. Therefore, DT is selection and an adoption of technologies that significantly alters the way that businesses operate. Hence, H4 states that, there is significant positive relationship between Innovative Capacity and SME performance mediated by Disruptive Technology. As hypothesized, the result shows that there is significant positive relationship between disruptive technology and SMEs performance. Thus, the empirical finding, H4 is supported. In this study, the relationship between disruptive technology and firm performance indicates that SMEs, which adopts disruptive technologies, will have better performance compared to SMEs that do not adopt disruptive technologies. Adoption of disruptive technology through actively seeking intelligence on newer technologies and related tools, quick detection of technology changes for potential effect on business, periodically reviewing changes in

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technology, and responding quickly by investing, technology knowledge enhancement hence adoptions are essential for effectiveness of business operations. This finding is supported by several studies, which reported that disruptive technology influences firm performance (Anthony, 2014; Dominic & Wilhelmina, 2012; Mayanyn & Maria, 2016; Saul & Berman, 2006; Timothy & James, 2007).

In conclusion, SMEs need to recognize the importance of disruptive technologies as better performance is dependent on SMEs ability to embrace and adopt disruptive technologies to enhance business operation, lower cost, and produce better quality products and or services. In other words, the performance of SMEs that are technology oriented that adopts disruptive technologies is different and performance are better. It can be argued that SMEs with and those adopts disruptive technologies are more likely to have larger market share, higher sales revenues and larger profits.

Conclusively, this study indicates that strategic oriented firms with an eye for innovativeness (innovative capacity, either for or on all the following;- product innovation, process innovation, marketing innovation and organizational innovation) directly and indirectly explains positive firm performance through utilization of disruptive technology. Hence, this is an important additional explanation for the existence of the relationship between these strategic orientations and firm performance. Thus, these results further suggest that SMEs need to utilize their strategic activities to further improve their abilities in order to perform better. While strategic orientation appears as a possible predictor of firm performance and the evidence suggest that SMEs, that combine

other orientations and yet by adopting disruptive technology, perform far better. Therefore, consistent with the RBV theory, the findings suggest that strategic orientations are cultured-based, valuable and sophisticated firm resources can lead to competitive advantage.

In general sense, a positive business environment is one that supports SMEs to operate more effectively and efficiently hence generate better productivity. This, in turn it will enhance the abilities of the firms to be more innovative which increases productivity for sustainable development. On the other hand, a negative and poor business environment reduces opportunities for firms to conduct business activities and decreases a country's potential in terms of production, welfare and productivity. Smaller and larger firm reacts differently to such business environment, as large firm may exit from the market and or drop the product of service offerings, and this is not typically possible for SMEs. Response options of SMEs are limited to it's intangible and tangible resources and opportunities offered by the industry and environment.

5.4   Implications of the Study

A vast number of stakeholders such as, the government, practitioners, as well as, academicians in the area of entrepreneurship and strategic management has paid a wide and deep attention to the performance of SMEs and its' varied variables influencing their overall performance. In accordance to this research work and findings, the study offers a couple of implications, specifically in terms of performance of SMEs within the Malaysian context. The results of this study provides' theoretical and practical, as well as,

methodological implications. These implications are further discussed in the following sub-headings.

5.4.1 Managerial and Practical Implications

SMEs have been regarded and recognized as one of the major contributor (35%) towards GDP and (17.9%) of export, generates income and provide large percentage of employment (65%), as well as, alleviation of poverty (SME Annual Report, 2014/2015). Therefore, government and policy makers have to concur that every decisions in relations to SMEs has a direct and indirect effect on activities of the enterprises. Hence, it is imperative that government as well as, policy makers to reveal and publicize their actions and programmes to assist and improve the performance and sustainability of SMEs in Malaysia. From the literature review, this study found that SMEs are often hampered by various challenges such as, low level of innovativeness, inadequate capacity to adhere to standards and certifications, limitation towards access to finances, and minimal technology adoptions (SME Annual Report 2014/15).

Despite the above, the government has put in place numerous support agencies (MITI, SMECorp, Matrade, and others) and funding programmes (SMEcorp, 2015) but due to lack of publicity and awareness of the various government support or assistance made available may be the main reasons why the SME owners are not benefiting from these organizations. Even though those that are made known to some SMEs, these programmes are not well coordinated to guide the SMEs, hence are not patronized. Therefore, there is a definite need and important that an improvement on coordination among various

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institutions and enhancement of publicity for wider reach is necessary to further assist SMEs.

Additionally, SMEs are equally challenged financially, either due to poor cash flow and or weak management, and difficulties obtaining financial support from the banks. Therefore, the various government agencies must encourage SMEs to use their strategic activities to enhance internal finances, as one of the reason banks refuse to extend credit or provide it with high interest rates and demand for collateral requirement, simply for inability of repayment. It is essential that government agencies continue to develop programs to educate SME owners on financial management, and to encourage financial institutions to reduce interest rates and collateral requirement to assist SMEs to secure external financing. Government should equally introduce a policy that would encourage SMEs to pursue innovative business activities and adoption of disruptive technology by luring these firms through the payment of special incentives, granting grants, tax-exemption and or rebates. Perhaps, policies enacted by the government directed at SMEs must stand the test of time and truly ensure that administrative bottlenecks and bureaucratic constraints are minimized or best removed with simplified processes. Policies formulated must encourage SMEs to source funds from capital market.

Unfriendliness of the business environment can deter SME owners and managers to perceive the atmosphere as not supportive, hence instilling fear which in turn makes it less likely for SME owners to embark on high-risk business opportunities. Government and its relevant agencies as well as, policy makers have to create an enabling

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environment as stated above, for SMEs to operate and flourish. In other word, creating an enabling environment that will encourage an entrepreneurial culture among the SME owners in Malaysia. Having said that, policy makers must equally ensure they must also reach out, engage in an informed dialogue, and help create an ecosystem (investment, legal certainties, good infrastructure and predictable regulations) that is right for entrepreneurship as well as society.

Findings obtained from this study and several past studies indicate that, it is empirically established that Innovative Capacity generally contributes positively to firm's performance. Therefore, it is imperative that SME entrepreneurs and or owners-managers acknowledges' the importance of innovation in enhancing firm performance. Based on this study, results indicated that innovative capacity is an effective influencing factor for firm performance. It is recommended that, in order to enhance firm's performance, SME owner-managers should be creative and innovative in managing various dimension of innovation within the firm. The four key dimensions that reflected positive firm performance are; Product innovation, Process innovation, Marketing innovation and Organizational innovation.

In my opinion, in order to enhance the level of innovativeness of the above activities, SMEs need to have a better understanding and information of their competitors, customers, and their respective markets. An audit of a firm's existing resources could reveal its weakness and strength, in order for firm to strategize business plan for positive development. With a proper understanding, SMEs can be equipped with competitive

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advantage by providing value to customers and other stakeholders. Therefore, firms intending to drive market by shaping the needs of existing and potential customers should leverage through radical innovation and firms wishing for market driven innovation should emphasize on incremental innovation.

But then again, what is equally important is that SME firms must have the ability to embrace external and internal ideas and explore inter-firm relationship with external institutions (Universities and others); Be open to licensing their Intellectual Property (IP) if any, to generate and accelerate profits; Be open to partnering and co-operation with complementary partners through alliances and joint-venture either to create opportunities and or expand potential opportunities, as well as, to address resource limitation and challenges.

The other findings obtained from this study is that, significant impact on firm performance can equally be achieved by embracing and managing disruptive technologies. With disruptive technology, SMEs can embark on product, process, marketing and organizational innovativeness to produce better quality products, better quality services, better quality and creative marketing approach for wider reach and an improved organizational quality skills to serve customers better. This in turn can lead to higher customer satisfaction, resulting is superior firm performance. Therefore, SME owners-managers must recognized the importance of innovativeness and that, newer or up-to-date technology's features and benefits may be beneficial hence are vital for firm's sustenance and further growth. Therefore, on the overall, SME firm owner-managers

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should be align towards being product oriented for product innovativeness, market oriented for marketing innovativeness, process oriented for process innovativeness and organizational oriented for organizational innovativeness, yet be able to creatively utilize existing available disruptive technologies to add-value on their offering and have competitive advantage over other firms. Similarly, by the very least, SME firm owners should look at various media and options such as integrated marketing done through exploitation of social media, social networking applications and other tools (Website, Instagram, LinkedIn, Google+, YouTube, FaceBook, E-mails, Twitter, WeChat, WhatsApp, Viber, Snapchat and many others) to generate leads and more businesses.

Government could further enhance and boost SME's adaptation of disruptive technologies by introducing incentive as stated earlier, policies, and simplifying or enhancing processes which will make it easier for SME firms to adopt technologies for the enhancement of business operations hence reduce operating expenses and reflect better profits. Reasonably priced along with preferred or government tax exempted technology, tools and applications especially and specifically for SME's ease of adoption will boost further acceptance for embracement and or adaptation of these technologies. As stated earlier, and again, institutional support such as the establishment of technology training centers targeting to teach and train owner-managers on the use of recent or up-to-date technology and more programmes on technology awareness campaigns highlighting up-to-date technologies that business entities can use to improve productivity and business efficiencies.

Finally, findings of this study equally suggest and urge SMEs to embrace an innovative culture that supports a holistic view of the business. In practical term, developing an innovative culture to produce quality products, and services, combined with a focus on technological superiority, clearly support SMEs firm performance. Focusing on a long-term innovativeness and technological mindset to ensure novelty of their offerings are vital for excellence and competitive advantage. On a final note, entrepreneur or owner-managers has to have the ability to identify opportunities or mismatches in the market, thus a focus on niches, a personal passion for their business or industry with the ability to communicate firm's vision. Additionally, owner-managers must ensure that firm produces an innovative product or service, along with a business that makes a positive impact in the community, beyond pure profits, along with the desire to engage with policy makers to shape agendas related to creation of jobs, financing and matters concerning challenges faced by SMEs.

In conclusion, this study identifies that, innovative capacity and disruptive technology are critical and important resources that inevitably generate competitive advantage. Therefore, these resources must be viewed as matching resources that directly improve firm's financial outcome and in turn, further positively influence firm's performance. Evidence from this study equally commensurate with past studies, such as Liao *et. al.,* (2008) discovered that technology knowledge and finances is major reasons for business discontinuance. Drucker (1985) concluded that, innovation is a specific tool of entrepreneurship and a firm that is not experimenting with new business concepts is probably living on a borrowed time.

5.4.2 Theoretical Implications

This study provides empirical evidence for theoretical relationship hypothesized in the research framework. It highlighted the mediator's role of disruptive technology on the relationship between innovative capacity and performance of SMEs in Malaysia. The study has for (4) hypotheses, and results from the data analysis indicates that all of the hypotheses are supported.

Despite many previous research on SMEs performance investigation number of variable's influence on performance (Arawati & Za'faran, 2008; Chelliah, Muhamad & Yusliza, 2010; Khairuddin, 2001; Mok, 2009; Noraini, 2002; Ramayah, Mohamed, Muhamad & Ng, 2004; Rosli & Syamsuriana, 2013; Za'faran & Oswald, 2006), the results of the combination of innovation capacity through the four dimensions as stated by OECD Oslo manual (2005a); (Product innovation, Process innovation, Marketing innovation, Organizational innovation) in a single model influencing SMEs performance has received minimum attention.

Therefore, based on the above, the structural relationship between innovative capacity (product innovation, process innovation, marketing innovation & organizational innovation) as relevant and related variables affecting positively SMEs performance is investigated in a single model. The finding indicates that all these four innovation dimensions have a positive impact on firm performance. Hence, this study further adds to knowledge on the importance of innovativeness in all aspect of firm's offering along with adoption of disruptive technologies in predicting firm performance.

This study equally presents additional empirical support for the research framework and contributes to the RBV by showing empirical evidence to support the statement of the theory. RBV put forward that the performance of firm is influenced by the firm's bundle of intangible and tangible resources and hierarchies of activities governed by routines and rules and that technological innovation and creative destruction is the basis of competitive advantage. Creative destruction as Schumpeter's theory best applies to firm that wishes to reinvent and remain competitive by being constantly innovative at churning our great products, services, way of marketing and or organizational approaches adopted hence acquire competitive-advantage. Schumpeter (1939) believed and quoted that, innovations are imperative for economic growth, commercial profits, and public wealth and that, economic activities of innovativeness serves to sustain or enhance a firm's performance.

5.4.3 Methodological Implications

Apart from the practical and theoretical contributions, this study has methodological implications as follows; Many previous studies on SMEs performance were mainly analyzed with the used of SPSS software tool, but to the best understanding of the researcher, few have used SmartPLS-SEMv3.2.7 (Ringle *et. al.,* 2014) to produce results and findings. The measurement scales of innovation and disruptive technology variable were adopted and adapted from previous study and OECD Oslo manual (2005a), therefore, replication of innovation study in other context to further confirm the reliability and validity.

PLS-SEM analysis determining composite reliability, convergent validity and discriminant validity reveal satisfactory results, hence this study equally represent an extended contribution to methodology as well as, literature of SMEs performance through the establishment of the adapted measures in the Malaysian context.

5.5   Limitations and Recommendations for future research

Regardless of some significant presentation and contribution highlighted within this research pertaining to SME performance within Malaysian context, there are several limitations that need to be acknowledged. Firstly, the geographical area and industry focused was limited to a particular State and industry, therefore, future research may further expand the coverage to include other States within Malaysia. A comparison study of innovative capacity between specific ethnic groups of owner-managers can also be conducted for further comparison purposes within the country. The study can also be extended by improving the number of respondents, so that the validity and reliability of the result cannot be disputed.

Additionally, this research targeted SMEs within the services sector, thus, there is a need to explore and examine current topic on the performance of SMEs based in various other sub-sectors, such as, manufacturer, mining, medical, law and on other professional firms from these sub-sectors. Henceforth, findings of this study should be carefully and cautiously be generalize to SMEs operating in other parts and States of Malaysia. It is imperative to note that, this study is limited by ignoring the fact that, enterprises characteristics can be different in accordance to business nature and or sectors.

Secondly, this study adopted quantitative methodology and relied on single method of data collection. Survey questionnaire was used as the only instrument in gathering data for the study, hence, respondents may not be willing to participate in answering correctly. Therefore, the responses are not consistent or accurate in measuring the study's variable, hence it would be of interest if future research could adopt mixed-method to investigate an in-depth examination of SMEs performance within Malaysia.

Thirdly, the study embarked on a cross-sectional design, capturing data at one specific point-in-time. Due to cross-sectional method, it restricts in proving relationship between the variable (Sekaran & Baugie, 2010). In view of this limitation, and to gauge long-term behaviors of SME firms, longitudinal study is suggested for future research.

Fourthly, the mediation testing was based on simple mediation model only for accomplishing the respective research objectives. This study did not formulate hypothesis testing for multi-mediation effects, therefore, future research to investigate multi-mediation effects and or moderation effect that can be based on expanded study's research framework would be beneficial to academic.

Lastly, the study examined the mediating role of disruptive technology and its role on the relationship between innovative capacity and SMEs performance in Malaysia. Other factors and variables such as, market orientation, entrepreneur orientation, entrepreneur openness or graduate entrepreneurs, can be adopted to extend the research framework to

further broaden the scope of the future research. Future findings may provide and shed better light on and of SME performance.

5.6   Conclusion

Based on my personal experiences operating an SME entity over the years, coupled with varied and challenging environment, it is my opinion that, any SME firm, regardless of business nature has to have some form of innovativeness in, either or all of the mentioned categories (product innovation, process innovation, marketing innovation and organizational innovation) to ensure competitive advantage, meet clients expectations and better firm performance. With the advancement of technology, it is now imperative that business owners realize the various benefits of these technologies towards an efficient, effective business operation and performance, thus, adopting these technologies further spurs innovativeness that positive and significantly contribute towards greater business performance.

The primary purpose of this research work is to investigate role of innovative capacity and mediating role of disruptive technology on its relationship to SMEs performance in Malaysia. Therefore, this study has obtained and achieve all the four (4) objectives discussed in chapter one (1).

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Appendix – 'A'	
Independent Variable (IV) items:- Innovative Capacity (IC).	

PRODUCT INNOVATION:-	**Strongly <--------------------------> Strongly**
For the last 3 years, (or since establishment) our company has;-	**Disagree** **Agree**
<u>INOVASI PRODUK:-</u>	Sangat <---------------------------> Sangat
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami telah; -	Tidak Setuju Setuju

PRODUCT INNOVATION ITEMS	1	2	3	4	5
1. Increase range of goods and services. Menambahkan pelbagai barangan dan perkhidmatan.	1	2	3	4	5
2. Replace products being phased-out. Menggantikan produk yang telah tamat tempoh.	1	2	3	4	5
3. Improve quality of goods and services. Menambah baik kualiti barangan dan perkhidmatan.	1	2	3	4	5
4. Achieved industrial technical standards. Mencapai standard teknikal industri.	1	2	3	4	5
5. Develop environment-friendly products. Membangunkan produk mesra alam.	1	2	3	4	5

PROCESS INNOVATION:-	**Strongly <--------------------------> Strongly**
For the last 3 years, (or since establishment) our company has;-	**Disagree** **Agree**
<u>INOVASI PROSES:-</u>	Sangat <---------------------------> Sangat
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami telah; -	Tidak Setuju Setuju

PROCESS INNOVATION ITEMS	1	2	3	4	5
1. Increase capacity of production or service provision. Meningkatkan kapasiti pengeluaran atau penyediaan	1	2	3	4	5
2. Reduce consumption of materials and energy. Mengurangkan penggunaan bahan dan tenaga.	1	2	3	4	5
3. Reduce unit labour cost. Mengurangkan kos buruh seunit.	1	2	3	4	5
4. Reduce negative environmental impacts. Mengurangkan kesan negatif alam sekitar.	1	2	3	4	5

	Sangat <---------------------------> Sangat
5. Improve Health and Safety	Tidak Setuju
Menambah-baik kesihatan dan keselamatan.	Setuju

6. Reduce process design cost.	1	2	3	4	5
Mengurangkan kos reka-bentuk proses.					
7. Reduce mobilization lead time.	1	2	3	4	5
Mengurangkan masa mobilisasi.					

MARKETING INNOVATION:-	**Strongly <-------------------------> Strongly**
For the last 3 years, (or since establishment) our company has;-	**Disagree** **Agree**
INOVASI PEMASARAN:-	Sangat <---------------------------> Sangat
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami telah; -	Tidak Setuju Setuju

1. Enter new market.	1	2	3	4	5
Memasuki pasaran baru.					
2. Increase or maintain market share.	1	2	3	4	5
Meningkatkan atau mengekalkan saham pasaran.					
3. Increase the ability to adapt to different client demand.	1	2	3	4	5
Meningkatkan keupayaan untuk menyesuaikan diri dengan					
4. Develop stronger relationship with customers.	1	2	3	4	5
Membangunkan hubungan kukuh dengan pelanggan.					
5. Increase awareness on product and services.	1	2	3	4	5
Meningkatkan kesedaran tentang produk/servis.					

ORGANIZATIONAL INNOVATION:-	**Strongly <---------------------------> Strongly**
For the last 3 years, (or since establishment) our company has;-	**Disagree** **Agree**
INOVASI ORGANISASI :-	Sangat <---------------------------> Sangat
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami telah; -	Tidak Setuju Setuju

1. Increase sharing or transferring the knowledge with other organization.	1	2	3	4	5
Meningkatkan perkongsian atau pemindahkan pengetahuan dengan organisasi lain.					

	Strongly Disagree <---------------------------> Strongly Agree				
2. Improve communications and interaction among different business activities/units. Meningkatkan komunikasi dan interaksi di kalangan unit perniagaan yang berbeza.	1	2	3	4	5
3. Improve IT capabilities. Menambah-baik keupayaan Teknologi Maklumat/IT.	1	2	3	4	5
4. Improve flexibility of production or service provision. Menambak-baik fleksibiliti pengeluaran atau penyediaan perkhidmatan.	1	2	3	4	5
5. Increase efficiency in delivering goods and services. Meningkatkan kecekapan dalam penyampaian barangan dan perkhidmatan.	1	2	3	4	5
6. Reduced time to respond to customer needs. Mengurangkan masa untuk bertindak balas terhadap keperluan pelanggan.	1	2	3	4	5
7. Improve working environment. Menambak-baik persekitaran kerja.	1	2	3	4	5
8. Meet regulatory requirements. Memenuhi keperluan peraturan.	1	2	3	4	5
9. Reduced operating costs for service provision. Mengurangkan kos operasi untuk penyediaan perkhidmatan.	1	2	3	4	5

Mediator Variable – Disruptive Technology (DT)					
TECHNOLOGY SENSING CAPABILITY:	**Strongly <------------------------> Strongly**				
For the last 3 years, (or since establishment) our company;-	**Disagree**				**Agree**
MENGESAN KEUPAYAAN TEKNOLOGI:	Sangat <---------------------------> Sangat				
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami; -	Tidak Setuju				Setuju
1. Actively seek intelligence on disruptive technologies that are likely to affect our business. Secara aktif mencari risikan mengenai teknologi terkini yang mungkin menjejaskan perniagaan kami.	1	2	3	4	5
2. Are often quick to detect changes in technologies that might affect our business. Sentiasa pantas mengesan perubahan dalam teknologi yang mungkin menjejaskan perniagaan kami.	1	2	3	4	5
3. Periodically review the likely effect of changes in technology on our business. Secara berkala mengkaji kesan kemungkinan perubahan dalam teknologi perniagaan kami.	1	2	3	4	5
4. Are often one of the first in our industry to detect technological developments that may potentially affect our business. Sentiasa merupakan salah satu yang pertama dalam industri untuk mengesan perkembangan teknologi yang berpotensi yang boleh menjejaskan perniagaan kami.	1	2	3	4	5

TECHNOLOGY RESPONSE CAPABILITY:	**Strongly <----------------------------> Strongly**				
For the last 3 years, (or since establishment) our company;-	**Disagree**				**Agree**
<u>MEMBALAS KEUPAYAAN TEKNOLOGI:</u>	Sangat <----------------------------> Sangat				
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami; -	Tidak Setuju				Setuju
1. Generally respond very quickly to the emergence of disruptive technologies. Kebiasanya bertindak balas dengan cepat terhadap kemunculan teknologi terkini.	1	2	3	4	5
2. Tends to be first to adopt disruptive technologies, compared to others in our industry. Cenderung untuk menjadi yang pertama untuk menerima pakai teknologi terkini, berbanding dengan syarikat lain dalam industri kami.	1	2	3	4	5
3. Tend to adopt new technologies that add-value to our current investment. Cenderung untuk menerima pakai teknologi baru yang menambah-nilai terhadap pelaburan semasa kami.	1	2	3	4	5
TECHNOLOGY INVESTMENT:	**Strongly <----------------------------> Strongly**				
For the last 3 years, (or since establishment) our company has;-	**Disagree**				**Agree**
<u>PELABURAN TEKNOLOGI:</u>	Sangat <----------------------------> Sangat				
Untuk 3 tahun yang lepas, (atau sejak penubuhan) syarikat kami telah; -	Tidak Setuju				Setuju
1. Allocated a sufficient budget for purchasing IT/information technology hardware. Memperuntukkan bajet yang mencukupi untuk membeli perkakasan teknologi maklumat/IT.	1	2	3	4	5
2. Allocated a sufficient budget for purchasing IT/information technology software. Memperuntukkan bajet yang mencukupi untuk membeli perisian teknologi maklumat/IT.	1	2	3	4	5
3. Emphasized IT/information technology knowledge enhancement among staff. Menitik-beratkan pemantapan pengetahuan teknologi maklumat/IT dikalangan staf.	1	2	3	4	5

(Respondents Questionnaires) Demographic Information

Please mark "X" in the appropriate box

Age / Umur.	1) □ Below 30 yrs / Kurang dari 30 tahun
	2) □ 31 - 4 0 yrs / Antara 31-40 tahun
	3) □ 4 1 – 50 yrs / Antara 41-50 tahun
	4) □ 51 – 60 / Antara 51-60 tahun
	5) □ 61 and above / Melebihi 61 tahun
Gender / Jantina.	1) □ Female / Perempuan
	2) □ Male / Lelaki
Highest Education Level / Pendidikan.	1) □ Senior High School / Sekolah Menengah
	2) □ College Diploma / Kolej
	3) □ Degree / Ijazah
	4) □ Master Degree / Ijazah Sarjana
	5) □ Doctorate Degree / Ijazah Doktor Falsafah
How long has your company been established/operating / Bila syarikat ditubuhkan/Usia.	1) □ Less than 5 years / Kurang dari 5 tahun
	2) □ 5-10 years / Antara 5-10 tahun
	3) □ 11-15 years / Antara 11-15 tahun
	4) □ 16 - 2 0 years / Antara 16-20 tahun
	5) □ More than 21 years / Melebihi dari 21 tahun
What is the nature of your company's business activity / Jenis Perniagaan.	1) □ Professional Business Services / Perkhidmatan Professional
	2) □ Manufacturing / Pembuatan
	3) □ Construction / Pembinaan
	4) □ Finance or Insurance / Kewangan atau Insuran
	5) □ Tourism / Pelancongan
	6) □ Education / Pendidikan
	7) □ Agriculture or livestock / Pertanian atau Penternakkan
	8) □ Healthcare or Pharmaceutical / Kesihatan atau farmasi
	9) □ Distribution or Transportation / Pengedaran atau Pengankutan/Logistic
	10) □ Food and Beverage / Makanan dan Minuman
	11) □ Textile or Apparels / Pakain atau Tektil
	12) □ Electrical or Electronics / Electrik atau Elekronik
	13) □ Others / Lain-lain (pls specify)
	…………………………………….
What is the total number of employees / Jumlah Pekerja.	1) □ Fewer than 5 /Kurang dari 5 orang
	2) □ 5-30 / Antara 5-30 orang
	3) □ 31-75 / Antara 31-75 orang
	4) □ 76-200 / Antara 76-200 orang
	5) □ More than 200 / Melebihi dari 200 orang
What is the annual/yearly sales Turn-over (Yearly Total Sales) / Jumlah dagagan Tahunan.	1) □ Below RM 300,000 Thousand / Kurang dari RM300 Ribu
	2) □ Between RM 300 Thousand – RM 3 Million / Antara RM300 Ribu- RM 3
	3) □ Between RM 3 Million – RM 20 Million / Antara RM 3 Juta – RM 20 Juta
	4) □ Between RM 20 Million – RM 50 Million / Antara RM20 Juta – RM50

Appendix 'B': Letter for Data Collection

"MUAFAKAT KEDAH"

Our Ref : UUM/UUMKL/P-39/133
Date : 31st May 2017

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

COLLECTION OF DATA FOR RESEARCH PURPOSES

We are pleased to inform you that the following individual is UUM Kuala Lumpur student who is presently pursuing his Doctor of Business Administration. He is required to collect data from your organization as a requirement for the BDMZ8024 Dissertation courses that he is pursuing this semester.

No.	Name	Matric No.	I/D No.
1.	Daljeet Singh Malkeet Singh	95474	650907065027

Since he has chosen your organization as herassignment, we would be most grateful if you could render all assistance to him to carry out his project successfully.

Please be informed that the data collected is purely for academic purposes and we assure you that all information or data will be kept strictly confidential.

We really appreciate your kindness and cooperation in the above matter.

Thank you.

"SCHOLARSHIP, VIRTUE AND SERVICE"

Sincerely yours,

DR. AHMAD RIZAL BIN MAZLAN
Director
UniversitiUtara Malaysia
Kuala Lumpur (UUMKL)

The Eminent Management University

Appendix 'C': Preliminary Cronbach's Alpha Test Results (SPSSv22)

INNOVATIVE CAPACITY (IC) – 'Independent Varaible'

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.936	**0.936**	**26**

DISRUPTIVE TECHNOLOGY (DT – Mediator / Intervening Variable)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.842	**0.847**	**10**

SMEs FIRM PERFORMANCE (FP – Dependent Varaible)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.924	**0.924**	**10**
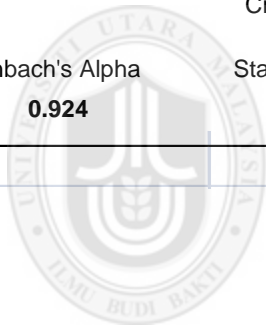
No	Respondent	D2	Outlier in single digits		No	Respondent	D2	Outlier in single digits
Appendix 'D': The results of the D² (Mahalanobis in SPSSv22)								
1	1	29.57939	1		31	31	9.72637	0
2	2	25.21746	1		32	32	9.6661	0
3	3	22.02514	1		33	33	9.44459	0
4	4	21.24541	0		34	34	9.32599	0
5	5	19.2446	0		35	35	9.28263	0
6	6	19.13783	0		36	36	9.22371	0
7	7	18.57441	0		37	37	9.19655	0
8	8	18.49523	0		38	38	9.17642	0
9	9	18.26078	0		39	39	9.09545	0
10	10	18.20374	0		40	40	9.09213	0
11	11	17.96612	0		41	41	8.88623	0
12	12	16.25423	0		42	42	8.78504	0
13	13	15.95559	0		43	43	8.66477	0
14	14	15.19544	0		44	44	8.52305	0
15	15	15.02215	0		45	45	8.44513	0
16	16	13.24453	0		46	46	8.40913	0
17	17	12.70162	0		47	47	8.36273	0
18	18	12.51685	0		48	48	8.18374	0
19	19	12.46763	0		49	49	8.14902	0
20	20	12.37148	0		50	50	8.14228	0
21	21	12.27837	0		51	51	8.01322	0
22	22	11.9979	0		52	52	7.76338	0
23	23	11.59461	0		53	53	7.7543	0
24	24	11.59461	0		54	54	7.56269	0
25	25	11.01623	0		55	55	7.51758	0
26	26	10.67501	0		56	56	7.49418	0
27	27	10.57507	0		57	57	7.34975	0
28	28	10.29952	0		58	58	7.32897	0
29	29	10.24119	0		59	59	6.92109	0
30	30	10.23005	0		60	60	6.87313	0

Source for study: https://www.youtube.com/watch?v=AXLAX6r5JgE (Dr. Todd Grande)

No	Respondent	D2	Outlier in single digits		No	Respondent	D2	Outlier in single digits
				Appendix 'D': The results of the D² (Mahalanobis in SPSSv22)				
61	61	6.81262	1		91	91	4.49535	0
62	62	6.56472	1		92	92	4.47209	0
63	63	6.34746	1		93	93	4.46259	0
64	64	6.24998	0		94	94	4.4347	0
65	65	6.19102	0		95	95	4.41282	0
66	66	6.18767	0		96	96	4.3858	0
67	67	6.03791	0		97	97	4.33075	0
68	68	5.99335	0		98	98	4.31533	0
69	69	5.98142	0		99	99	4.31146	0
70	70	5.9743	0		100	100	4.30053	0
71	71	5.95248	0		101	101	4.21507	0
72	72	5.9181	0		102	102	4.19069	0
73	73	5.89605	0		103	103	4.07984	0
74	74	5.69268	0		104	104	3.91748	0
75	75	5.67487	0		105	105	3.67246	0
76	76	5.58661	0		106	106	3.66562	0
77	77	5.45345	0		107	107	3.48811	0
78	78	5.44984	0		108	108	3.38638	0
79	79	5.4417	0		109	109	3.32738	0
80	80	5.40598	0		110	110	3.23454	0
81	81	5.31362	0		111	111	3.23263	0
82	82	5.11123	0		112	112	2.94634	0
83	83	5.06491	0		113	113	2.73666	0
84	84	5.00788	0		114	114	2.7222	0
85	85	5.00602	0		115	115	2.69729	0
86	86	4.90504	0		116	116	2.66572	0
87	87	4.76041	0		117	117	2.53925	0
88	88	4.64959	0		118	118	2.52139	0
89	89	4.58214	0		119	119	2.51237	0
90	90	4.52079	0		120	120	2.47146	0

No	Respondent	D2	Outlier in single digits						
Appendix 'D': The results of the D² (Mahalanobis in SPSSv22)									
121	121	2.44504	1						
122	122	2.33851	1						
123	123	2.32992	1						
124	124	2.32043	0						
125	125	2.28664	0						
126	126	2.04948	0						
127	127	2.0355	0						
128	128	1.97982	0						
129	129	1.88452	0						
130	130	1.87143	0						
131	131	1.84343	0						
132	132	1.83836	0						
133	133	1.83688	0						
134	134	1.76313	0						
135	135	1.73379	0						
136	136	1.69288	0						
137	137	1.60957	0						
138	138	1.57546	0						
139	139	1.51045	0						
140	140	1.49896	0						
141	141	1.47001	0						
142	142	1.44466	0						
143	143	1.44325	0						
144	144	1.33737	0						
145	145	1.30433	0						
146	146	1.13597	0						
147	147	1.08027	0						
148	148	1.04568	0						
149	149	0.95256	0						
150	150	0.922	0						

Note: The no of outlier insignificant, hence were not deleted.