THE MODERATING EFFECT OF GREEN PRODUCTIVITY PRACTICES ON THE RELATIONSHIP BETWEEN INNOVATIVE CAPABILITIES AND FIRMS' COMPETITIVE PERFORMANCE

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ABSTRACT

Malaysia Productivity Corporation (MPC) has introduced green productivity (GP) to address global warming by providing value-added information on productivity, quality, competitiveness and best practices through research innovative activities and creative culture. Although GP is limited in Malaysia, firms are encouraged to invest in it through the support of Green Technology Financing Scheme (GTFS). However, researchers found that the environmental technology awareness is low in the Asian region, as the percentage of invention patents is small and firms do not have the capability to innovate. Therefore, this study investigated the link among the seven dimensions of innovation capabilities (ICs) comprising learning, R&D, resources allocation, manufacturing, marketing, organization and strategic planning, by relating them with GP and a firm's competitive performance. By adopting Resource Based View (RBV) and Contingent Resource Based View (CRBV) and Theory of Planned Behaviour (TPB), the study investigated the link between ICs and a firm's competitive performance moderated by GP. Empirical quantitative data were collected from 88 samples selected from Small Medium Enterprises (SMEs) manufacturing firms in Malaysia. Structural Equation Modeling by using SMARTPLS software was employed to examine the relationship in the framework between ICs, GP practices and three performance indicators: sales performance, innovation performance and product performance. The results revealed that R&D capability has the most influential impact on a firm's competitive performance measures. The findings further verified that different ICs through GP practices have different impacts on different performance measures. Therefore, ICs and new perceptions of GP do not focus only on moral responsibility but include key strategic decisions aimed at achieving a firm's success and sustainable performance in the future. The theoretical and practical implications of the study are the GP implementation, and how it has empirically validated the importance of R&D capability in promoting innovation and performance of SMEs in Malaysia.

ABSTRAK

Perbadanan Produktiviti Malaysia (MPC) telah memperkenalkan produktiviti hijau (GP) bagi menangani pemanasan global dengan menyediakan maklumat nilai tambah kepada produktiviti, kualiti, daya saing dan amalan terbaik dalam aktiviti inovatif penyelidikan dan budaya kreatif. Walaupun GP adalah terhad di Malaysia, syarikat digalakkan untuk melabur dalam GP melalui sokongan Skim Pembiayaan Teknologi Hijau (GTFS). Namun begitu, para penyelidik mendapati bahawa kesedaran terhadap teknologi alam sekitar adalah rendah di rantau Asia kerana peratusan paten ciptaan adalah kecil dan syarikat tidak mempunyai keupayaan untuk membuat inovasi. Oleh itu, kajian ini mengkaji rangkaian yang tergolong dalam tujuh dimensi keupayaan inovasi (ICs) terdiri daripada pembelajaran, R&D, peruntukan sumber, pembuatan, pemasaran, organisasi dan perancangan strategik dan menghubungkannya dengan GP serta prestasi daya saing syarikat. Dengan mengguna pakai Pandangan Berasaskan Sumber (RBV) dan Pandangan Berasaskan Sumber Kontinjen (CRBV) serta Teori Tingkah Laku Terancang (TPB), kajian ini mengkaji hubungan antara ICs dengan prestasi daya saing syarikat melalui penyederhanaan GP. Data kuantitatif empirik telah diperolehi daripada 88 sampel yang dipilih daripada syarikat pembuatan Perusahaan Kecil dan Sederhana (SMEs) di Malaysia. Model Persamaan Berstruktur (SEM) dengan menggunakan software SMARTPLS digunakan untuk mengkaji hubungan yang terdapat dalam rangka kerja antara ICs, amalan GP dengan tiga penunjuk prestasi: prestasi jualan, prestasi inovasi dan prestasi produk. Dapatan kajian menunjukkan keupayaan R&D adalah yang paling mempunyai kesan pengaruh ke atas ukuran prestasi daya saing syarikat. Dapatan kajian selanjutnya mengesahkan bahawa ICs yang berbeza melalui amalan GP mempunyai kesan berbeza ke atas ukuran prestasi yang berbeza. Oleh itu, ICs dan persepsi baharu GP tidak memberi tumpuan hanya kepada tanggungjawab moral tetapi termasuk juga keputusan strategik utama yang mengarah kepada pencapaian kejayaan dan kemampanan prestasi syarikat pada masa hadapan. Implikasi teori dan praktikal kajian ini adalah pelaksanaan GP, dan bagaimana ia secara empirik mengesahkan kepentingan keupayaan R&D dalam menggalakkan inovasi dan prestasi SMEs di Malaysia.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AMOS	_	Analysis of Moment Structures
APO	_	Asian Productivity Organization
ARE	_	Asian Rare Earth
AVE	_	Average Variance Explained
BCAC	_	Raub Cyanide Action Committee
BSC	_	Balanced Score Card
CP	_	Competitive Performance
CR	_	Composite Reliability
CRBV	_	Contingent Resource Based View
DE	_	Development Expenditure
DOE	_	Department of Environment
DOSM	_	Department of Statistics Malaysia
EPU	_	Economic Planning Unit
FDI	_	Foreign Direct Investment
FM	_	Faculty of Management
GDP	_	Gross Domestic Product

GP	_	Green Productivity
GTFS	_	Green Technology Finance Scheme
HCM	_	Hierarchical Component Model
IBM	_	International Business Machines
IC	_	Innovation Capability
IDs	_	Identifications
IEA	_	International Energy Agency
IP	_	Innovation Performance
IPCC	_	Intergovernmental Panels on Climate Change
LC	_	Learning Capability
LCA	_	Life Cycle Assessment
MFC	_	Manufacturing Capability
MIDA	_	Malaysian Investment Development Authority
MIGHT	_	Malaysia Industry Government Group for High Technology
MKC	_	Marketing Capability
MOSTI	_	Ministry of Science, Technology and Innovation
MPC	_	Malaysia Productivity Corporation
MTDC	_	Malaysian Technology Development Corporation Technology
OC	_	Organization Capability
OECD	_	Organization for Economic Co-operation and Development

PhD	_	Doctor of Philosophy
PLS	_	Partial Least Square
PLSc	_	PLS Consistent
PLS-SEM	_	Partial Least Square-Structural Equation Modeling
PP	_	Product Performance
RAC	_	Resources Allocation Capability
RBV	_	Resource-Based View
R&D	_	Research and Development
RDC	_	Research and Development Capability
RM	_	Ringgit Malaysia
ROA	_	Return on Assets
SMEs	_	Small Middle Enterprises
SP	_	Sales Performance
SPC	_	Strategic Planning Capability
SPSS	_	Statistical Package for Social Science
TCA	_	Total Cost Assessment
TIC	_	Technological Innovation Capability
TPB	_	Theory of Planned Behaviour
UNEP	_	United Nations Environment Programme
UNIDO	_	United Nations Industrial Development Organization
UTM	_	Universiti Teknologi Malaysia
VIF	_	Variance Inflation Factor

VRIN	_	Valuable, Rare, Inimitable, Non-Substitutable

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Global warming affects all of us and a clear evidence of its effects is climate change. The fourth and fifth Intergovernmental Panels on Climate Change (IPCC) have confirmed there is a 90% and 95% increase consecutively, that human activities and deforestation are probably the cause of the problem for the past 60 years (IPPC, 2007 & 2013). This indicates that human and illegal activities include rapid falling of forest trees, unlawful logging activities and excessive uses of natural fuels such as fuel, oil and gas. These have led to the extraordinary release of greenhouse gases especially carbon dioxide that has caused about 0.9ºC warming and partially offset by about 0.3ºC cooling from human aerosol emissions (Nuccitelli, 2013). Nevertheless, this has caused a dilemma on how to attain economic achievement or lead climate change to address the serious global warming effect (Mohanty & Deshmukh, 1998; Srinivasan, 2002; Parasnis, 2003; Tersine, 2004; Moharamnejad & Azarkamand, 2007). According to IPCC 2013, climate change on individual regions or countries will be differentiated by time and whether different societal and environmental systems enable them to mitigate the

change or not. The predicted effects of global warming by geographical regions have been released in the IPCC 2007 report that has confirmed the cause and effects of global warming, which have been identified for the future.

The United Nations Environment Programme (UNEP) 2012 reported the trend in global and sectoral greenhouse gas emissions from 1970 to 2010. For global emissions over the period, it showed an increase of 44%. Within the period, the highest increase of global emission was in 1990 with an increase of approximately 30%. This is followed by the period 2000-2010 when the rise of global emissions was about 20%. For sectoral emissions, the energy production and conversion had a 67% increase in the share of total emissions. The total greenhouse gas emissions inventories revealed a composition of 1.6% related carbon dioxide emission during the period of 2009 to 2010.

The situation was worsened further by the rise of worldwide energy consumption of manufacturing industries from 56.5% in 1971, to 80.7% in 2011 (IEA Statistic, 2013). Manufacturing industries still account for nearly one-third of today's global energy usage, and are responsible for 20% of global carbon dioxide emissions in 2010 (IEA Statistic, 2012) largely blamed for the problem of global warming. The development and increase of manufacturing industries have indeed added to the significant consumption and utilization of the resources. The increase of consumption and utilization has also added to the increase and generated large volumes of waste. However, some lessons on industrial waste management in developing countries can be made based on Japan's experience with The Keidanren Voluntary Action Plan on the Environment that can serve as a reference to generate lesser volumes of waste (UNEP, 2013). This plan is to seek and encourage industrial circles to deal with volumes of waste more concretely by creating a recycle-based society to counteract global warming in today's environment and the future.

Manufacturing operations through product innovation and improved methodology and technical developments have also been recognised as the foremost drivers of environmental consequence (Cairncross, 1992; Hart, 1995; Schmidheiny, 1992). Ecological impact assessments have mismatched raw material utilisation, specifications, production efficiencies, energy consumption, pollutant emissions, product delivery systems and recycling (Sarkis, 1995). Hence, none of the legal compulsory and financial encouragement was enforced to change or insert innovation elements in manufacturing products (Naughton, 1990). On the top of that, what manufacturing firms require to be successful in the long-term in terms of economic performance and growth is to innovate green environment. In fact, the emerging green technologies of manufacturing on innovation have made an impact and are the key drivers to economic performance (UNIDO, 2014). Organization for Economic Co-operation and Development (OECD) 2011 highlighted that green growth not only fosters economic growth and development, but ensures continual natural resources and environmental services be supported (OECD 2011). Nevertheless, the report concluded that the main factor of green growth is innovation by allowing decoupled growth from natural capital depletion to contribute to economic growth and job creation. Zhu and Sarkis (2004) commented on the green initiatives to influence environmental and economic performance. Avishek (2008) confirmed Green Productivity (GP) practices as a strategy to increase both productivity and environmental performance so that the overall social and economic improvement leads to sustained improvement in the quality of life for human beings. According to Asian Productivity Organisation (APO) 2009, GP practices can be applied in manufacturing, service, agriculture and communities.

1.1.1 Manufacturing Sector

Manufacturing is undeniably an important sector for many countries especially for industrialized nations. This sector has prominently contributed in terms of its significant contribution to the economic development, and creation of enormous job prospects and employment opportunities. Figure 1.1 portrays Malaysia's growth rate of overall Gross Domestic Product (GDP), share of manufacturing sector to GDP, and share of Small Middle Enterprises (SMEs) to GDP from 2006 to 2011. This latest published statistics from the Economic Census 2011 is based on 2005 prices. Since 2006, the overall GDP has consistently superseded the average growth of the overall economy. Despite the negative performance in 2009, Malaysia has continued to maintain a favourable growth rate in 2010 and 2011. This same trend was followed by manufacturing GDP and SMEs GDP. This can be interpreted that GDP of manufacturing and SMEs directly affect the fluctuation of GDP's curve. Manufacturing sector indeed is very important and should not be ignored.

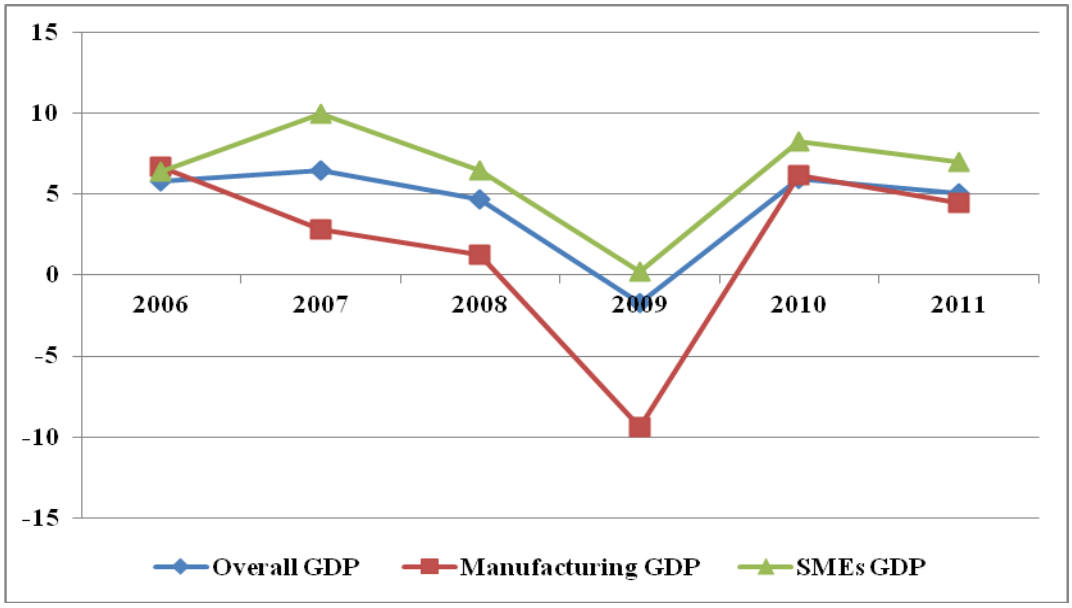

Figure 1.1 Annual Overall GDP Growth, Manufacturing GDP and SMEs GDP Growth (2006–2011)

Source: Department of Statistics, Malaysia and SMEs Corporation Malaysia

Figure 1.1 confirms a decline of GDP in 2009. This was compensated with the Foreign Direct Investment (FDI) to Malaysia with an increase of investments from RM4.3 billion in 2009 as compared to RM28.2 billion in 2010 which is a drastic increase of 550% (MIDA, 2011). A major portion of 37.8% of the total investment of RM148.6 billion contributed to the investment in the manufacturing sector. The manufacturing sector is expected to remain as a major contributor to growth in the Malaysian economy. Comparatively, in 2011, Malaysia attracted significantly higher levels of investments in the manufacturing sector in comparison to 2010. The number of approvals in the manufacturing sector, included a total of 846 manufacturing projects with investments of RM56.1 billion were approved in 2011; whereas, in 2010, there were 910 manufacturing projects with a cumulative total investments of RM47.2 billion. Malaysia has been progressively attracting and continues to attract high levels of quality investments in the manufacturing sector in 2011. This is a clear indication and reflection of the on-going increase in investments reflecting the country's competitiveness (MIDA, 2011).

FDI directly and indirectly drives Malaysia's economy and firms' competitive performance to a certain extent in terms of long-term growth, jobs, skills, and especially innovation which pushes R&D activities in creating value of new product development. By outsourcing in manufacturing, FDI allows Malaysia manufacturers to drive technology in design and develop new products. With these advantages, the 2015 report on Malaysia's investment performance from Malaysian Investment Development Authority (MIDA) claimed that the knowledge across value chain has stimulated other new products and services (MIDA, 2015). Zamborsky (2008) claims that FDI acts as functions of the value created by the competitive advantages where local firms achieve higher profitability than multinational corporations. FDI intensity does maintain positively the relationship of performance and competitive advantage between foreign and local firms (Zamborsky, 2008). Indeed, this attractive investment stimulates the SMEs in manufacturing at a growth of 6.0%, higher than the national level which registered a growth of 4.8% in 2012 statistically. The major favorable growth was supported particularly, by plastic related products under the sub-sectors of petroleum,

chemical, rubber and plastics. The second contribution of SMEs' manufacturing growth is food, beverages and tobacco, with the increase of the population, improvement of live style, longevity and well-being of human lives (MIDA, 2011).

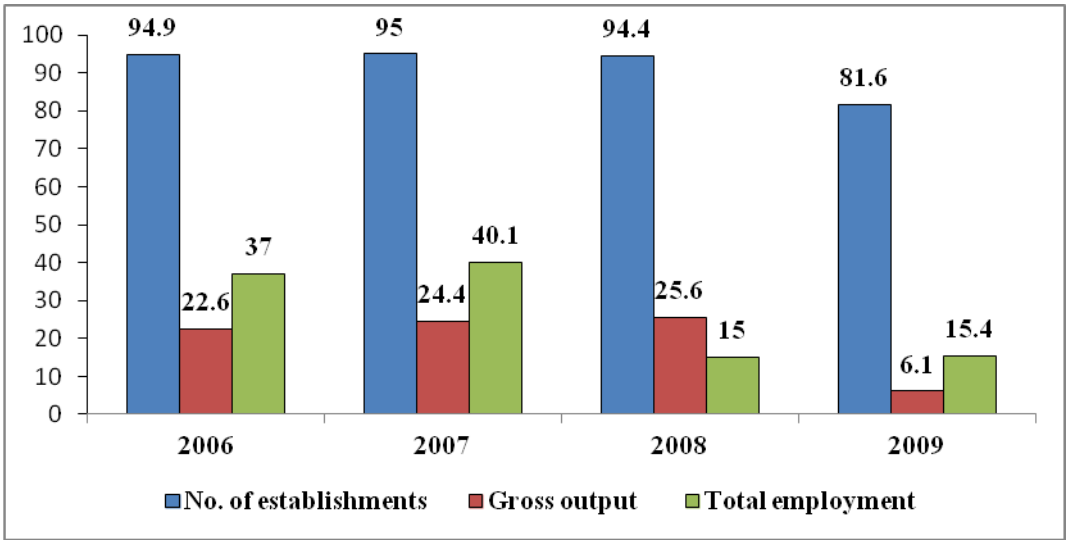

Figure 1.2 Contributions of SMEs Manufacturing, 2006-2009

Source: Manufacturing Findings, Department of Statistic, 2006-2009.

Figure 1.2 shows the data analysis from 2006 to 2009 which is crucial to find the weaknesses of SMEs manufacturing in Malaysia. SMEs manufacturing contribution to gross output dramatically decreased from 22.6% in 2005 to 6.1% in 2009. Economists believed that the wealth of nations and growth of their economies strongly depend upon their SMEs' performance (Schroder, 2006). With various factors and shortcomings in the external environment, the total employment rate had declined. Because of the negative impact, Malaysia launched the SMEs Masterplan (2012 - 2020) with the vision and mission of the Malaysian government's initiatives to accelerate growth of SMEs. To accomplish the vision and mission as well as achieve high income, the nation should be driven by productivity and innovation as the most critical factor influencing the performance of SMEs in Malaysia. Cost reductions, product quality improvements, delivery speed and flexibility in volume—all these are positive operational or manufacturing high value added activities indicating why SMEs should adopt green implementation (Ramayah et al., 2013). With these green initiatives, in 2011,

the value-added growth of SMEs in the manufacturing sector expanded by 7.6% during the year, higher than the overall GDP growth for the manufacturing sector of 4.7%. Value-added growth of SMEs in the manufacturing sector expanded by 6% during the year, higher than the overall GDP growth for the manufacturing sector of 4.8% in 2012. With the increase of productivity and innovation, many manufacturing-based SMEs in Malaysia would welcome this study to explore and suggest better propositions for the SMEs in manufacturing. In many developed and developing countries, SMEs are the unsung heroes that bring the stability to the national economy (Ebrahim et al., 2011) and enhance the social benefits and potential economics such as job creation with low cost assets, positive contribution to the GDP, supportive plan for enterprises on a large scale, adaptation to market changes and flexibility, and contributing to market places which are less profitable for large companies (Sultan, 2007). In fact, the notion that the companies have truly benefited from these factors remain uncertain. The outcome and findings of an investigation would allow this study to explore and suggest the best ways for SMEs manufacturing to avoid some of the pitfalls.

1.1.2 The Case of Malaysia

There are many major weaknesses in the innovation system and policy in the Malaysian business environment. The launching of government-sponsored Research & Development (R&D) grants should be reviewed for their inefficiency of implementing innovation projects, although Malaysia has performed well with strong commercialisation in business R&D. By encouraging incubator programmes to commercialise R&D and spin off firms in other major technology-related industries, these may be one of the solutions to manage Inno-fund in Malaysia. The review will provide a roadmap to assist the government. Coordination and complementation among key meso-organizations—Ministry of Science, Technology and Innovation (MOSTI), Malaysian Technology Development Corporation Technology (MTDC) and Malaysia Industry

Government Group for High Technology (MIGHT)—could ensure success for the brain gain policy and brain circulation strategies. In policy and strategies that have been tested by other competitor countries, Malaysians from overseas with tacit and experiential knowledge can leap across the stages in the technology trajectory of a product. Another failure of Malaysia for its low performance on innovation is due to weak institutions, trade balance in royalties and licensing fees and knowledge output. The weak institutions between university-industry linkages have become an issue when Malaysia has not followed up on the strong innovation output (scientific publications and patents) against the weak commercialisation of those results. Trade balance in royalties and licensing fees caused longer payments to be made against receipt received, and to produce net trade deficit indicated that Malaysia is a net technology and services importer. In short, the shortcomings of innovation in Malaysia are influenced by three factors: technology output, knowledge based workers, and innovation linkages and knowledge.

According to the Economic Planning Unit (EPU) data in Figure 1.3, economic and social sector contains an average 80% of total Development Expenditure (DE) for the Federal Government from the First to the Tenth Malaysia Plan. On the contrary, other parts of DE included are the security and general administration. Transportation, communications, energy and utilities—all these infrastructure developments were also given extensive budget allocations in the last four decades. There had been a drastic change of approach and attainment in the development efforts since the late 1980s, which shifted the industrial development strategy from import substitution to export promotion. Although the spending on economic and social has been increased in every economic planning term, the percentage of development expenditure against the percentage of GDP dropped from 13.5% in 1981–1985 to 7.9% in 2006–2010. This indicates that the pattern of government's development spending has been consistently maintaining its economics and social with emphasis on knowledge of innovation and creativity especially, in the Tenth Malaysia Plan (2011-2015).

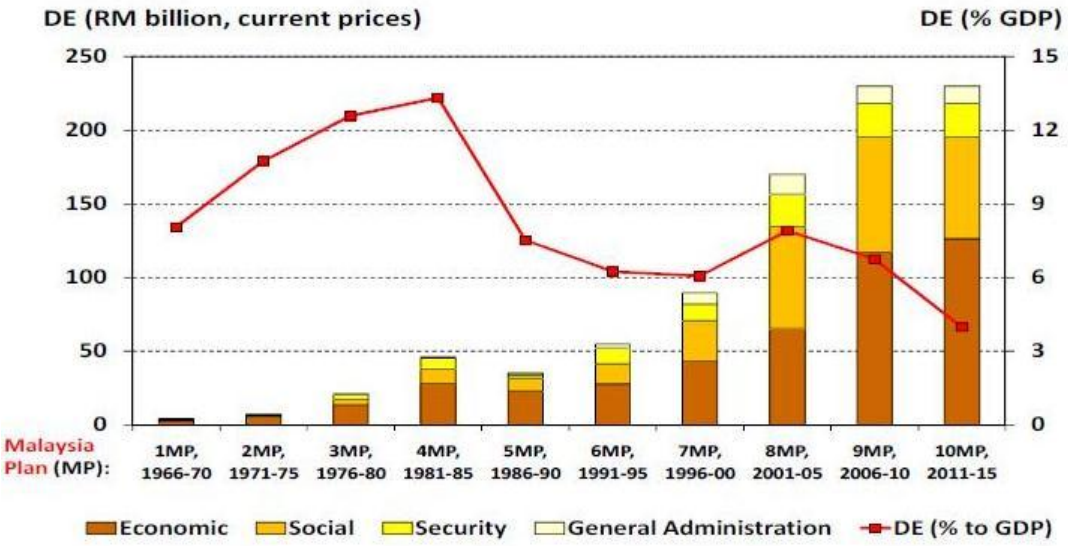

Figure 1.3 Focus of Development Expenditure

Source: Economic Planning Unit, 2012

Although there is a consistent positive increase of R&D from the public and private sectors, Malaysia demands more innovation required for development. Under the Tenth Malaysia Plan (2010—2015), significant allocations have been made to increase productivity and innovation-led growth and build an environment that enhances quality of life. The expectation of average annual growth rate for 2011 - 2015 is estimated to be 5.7% for the manufacturing sector. Furthermore, manufacturing sector is expected to grow at 26.3% annually till 2015.

Table 1.1 : Malaysia Ranks 20th in the World Competiveness Scoreboard 2015: Malaysia and Top Ten Performers

	2015	
	Rank	**Score**
Switzerland	1	5.70
Singapore	2	5.65
United States	3	5.54
Finland	4	5.50
Germany	5	5.49
Japan	6	5.47
Hong Kong SAR	7	5.46
Netherlands	8	5.45
United Kingdom	9	5.41
Sweden	10	5.41
Malaysia	**20**	**5.16**

Source: World Competitiveness Yearbook 2015, IMD

In 2015, Malaysia maintained its index score of 5.16 and was ranked 20st among 144 countries. However, this country appears to be the highest rated among the developing Asian economies. There are three major sub-indexes: basic requirements, efficiency enhancers, and innovation and sophistication factors. The competitiveness indexes are divided into twelve pillars categorized as keys for factor-driven, efficiency-driven and innovation driven economies. For Malaysia's major competitive challenges, technological readiness (pillar 9) was relatively low which was ranked 60th. One of the reasons why Malaysia was removed as one of the top performers in the 2015 World Competitive Index is the low level of female participation in the workforce (119th). Malaysia's GDP in 2015 (102nd) was 4.6% in the government budget deficit. To improve the ranking of World Competitiveness Yearbook 2015 or later year, Malaysia should progress by improving the outstanding position from the weak pillars.

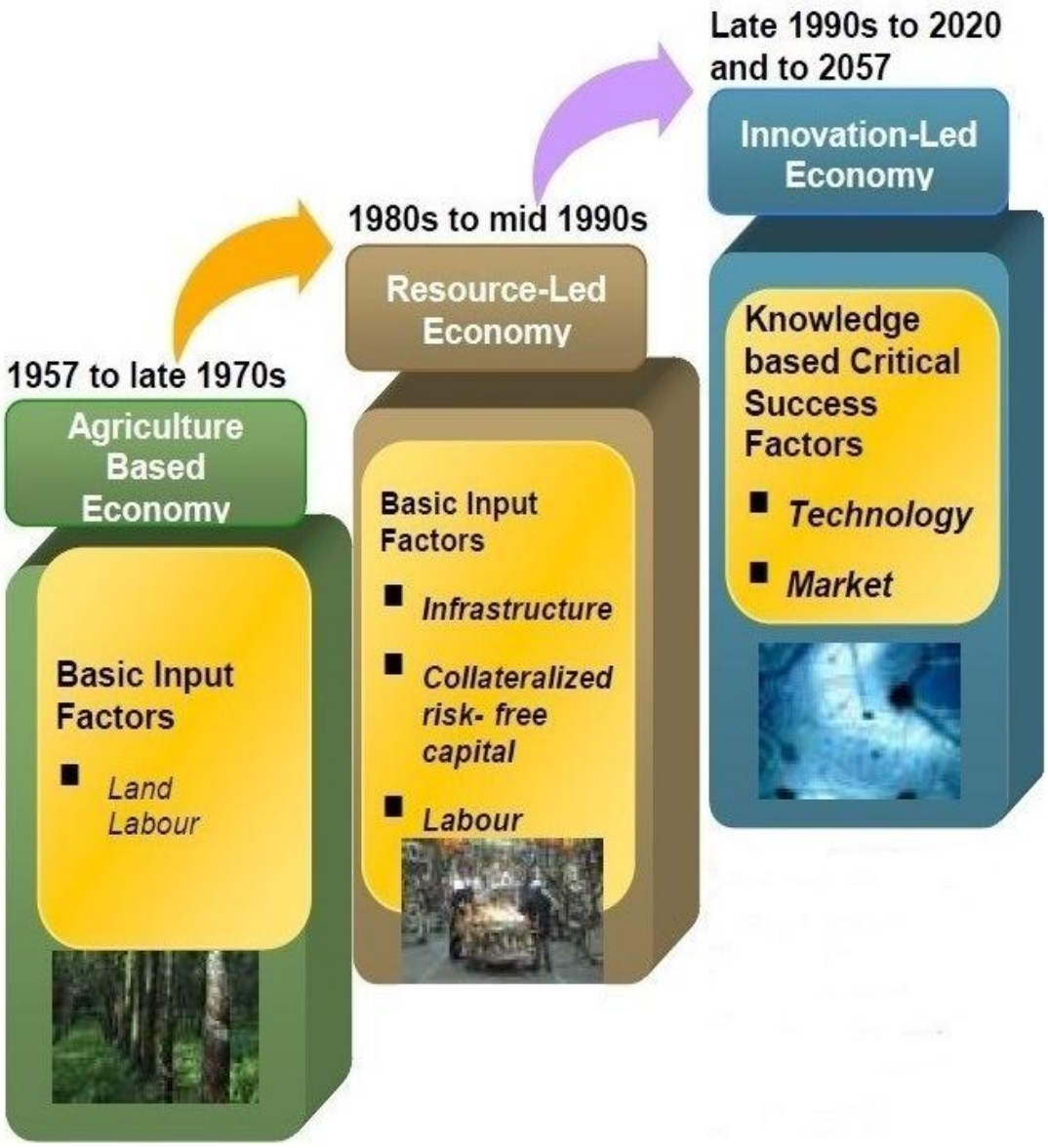

Figure 1.4 Transformation of Malaysia Economy (Adapted from Malaysia Innovation Model, 2009)

Source: MOSTI, 2012

From agricultural-based economy to resource-led economy, Malaysia has experienced a substantial economic transformation for 55 years. The transition in the 1980s and 1990s highlights more on production of three major raw materials: palm oil, tin and rubber. The primary driver of export growth which was one of the world leading electronic exporters is previously Malaysia's leading industrial sector in terms of investment, value added, exports and employment (MOSTI,

2007). Vigorous growth with an average 6% of annual GDP was estimated for Malaysia. The growth is based on the availability of national resources of petroleum and commodities such as rubber, palm oil and manufacturing. In fact, the conventional growth for the vast land bank, cost competitive labour and capital and foreign investment lead to a positive leading growth. Years ago, this country experienced the dilemma whether it will continue to be an industrial nation in 2020 because of the emergence of two major competitor countries: India and China. These countries have competitive advantage over Malaysia by offering cheaper labour that affects foreign investors to set up their FDI here. It is no longer enough for Malaysia to be assemblers or expert practitioners with old methods. This would be the main overall disadvantage for the manufacturing economy and will definitely increase competitiveness due to non-availability of cheaper labour. As reported by MOSTI (2007), Malaysia intends to shift to innovation-based economy which must be accompanied with knowledge of know-how to innovate.

The ultimate objectives of the national mission are to increase the value chain of economy, constructively and productively focus on socio-economic inequalities, nurture "first class mentality", stress the quality standard and sustainability of citizen's life and improve the country's institutional implementation capacity. With this business model, innovation is included as a driving force used to compete with other countries. Although knowledge of innovation for products and services enhances economic development, Malaysia can relate the economy model by linking innovation-led economy to a broad strategy for green growth which is considered as a less risky development of socioeconomic and environment degradation (APO, 2009). According to OECD (2011), if government policy action increases concerns about the future of economic growth patterns, then the demand for greener model of growth will be required. The critical factor of innovation model with technology and market knowledge base is to include green innovation which encourages current production technology and market behaviour by decoupling growth from natural capital depletion and directed towards new ideas, new entrepreneurs and new business models (OECD, 2011). In view of this, the introduction of Balance Approach by Malaysia is to offset the labor workforce competition from labour

intensive countries such as China and India. This approach goes hand in hand with the National Innovation Model to enable green and economy growth. This is a sound overall framework for government policies to shape the environment for green innovation.

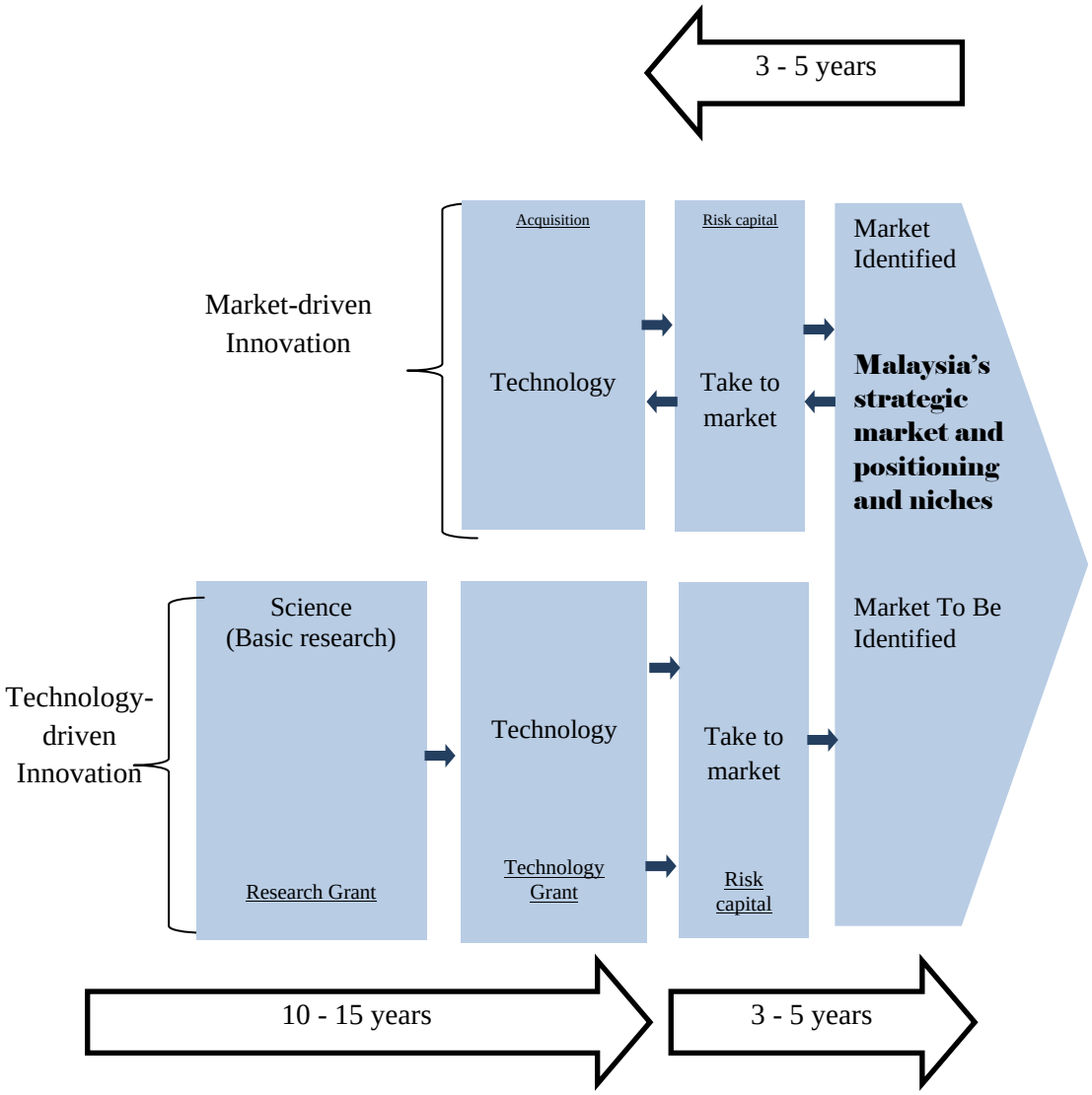

Figure 1.5 The Malaysia Innovation Model (Adapted from Malaysia Innovation Model, 2009)

Source: MOSTI, 2012

1.1.3 The Balance Approach

The balance approach of technology and market-driven innovation based on innovation-led growth was launched in 2007. For technology-driven model, scientists are supported with financial sources in term of research and technology grants. Figure 1.5 shows that the basic research in science and technology will be carried out for 10 to 15 years. Within this period, the approach is to concentrate and encourage merit-based allocation of funding among public research institutions and meet of the national technology needs and security. Eventually, after the basic research phase which takes 3 to 5 years to be exposed to risk capital, private sectors use that technology as a tool to create products and services. Once the market is identified, innovative entrepreneurs are going to enhance their best knowledge of science and technology to fulfil the selected market in the market-driven innovation model. This model has aggressively positioned itself and filled the niche of the identified market to capture short-to-medium term opportunities from 3 to 5 years for value creation. Therefore, public and private sector should actively collaborate with the National Coordination Task Force to implement the framework including the portfolio of incentives needed for risk mitigation. These two-driven models were regarded by Porter (1990) as organization success and competitiveness by investing innovation.

1.2 Problem Statement

Among the 141 countries, Malaysia's position was ranked at 32nd under global innovation index 2012 from MOSTI website. On the other hand, the position of this country had dwindled in the Innovation Efficiency Index and is now ranked 87. Malaysia has not been persistent with the Research & Development (R&D) in the category of Human Capital and Research; hence it had not done well and is ranked lower in the 42nd place. The involvement of the private sector in financing

and performing R&D is noteworthy. Malaysia has been enthusiastic and good at adopting the latest knowledge technologies, clearly demonstrated by its 6th ranking in Knowledge Absorption, and this is driven by high-tech imports where Malaysia is ranked 1st, However, for the Creativity Outputs, Malaysia is ranked 42nd place. The top ten countries in the Global Innovation Index 2012 are dominated by developed economies, namely, Switzerland, Sweden and Singapore. These top countries have scores of 68.2, 64.8 and 63.5 respectively; followed by Finland, United Kingdom, Netherlands, Denmark, Hong Kong, Ireland and the United States. Therefore, Malaysia's efforts to accomplish the score of the innovation levels from 2007 to 2012, was not even within the range by the top twenty performers. This illustrates that some countries, are very inefficient in comparison to other foreign countries which have stronger innovation linkages to global growth.

Different views on the categories of Innovation Capability (IC) are significantly imparted based on the review of innovation. IC is defined as the corporate's strength to move forward to transform knowledge and ideas into novel output, systems and processes (Hurley & Hult, 1998; Lawson & Samson, 2001). Chang and Lee (2008) stated that IC is characterised to originate from technology in terms of systems, policies, programs, merchandise, processes, devices and services. Guan and Ma (2003) proposed that an extraordinary resource is transform into a brand-new product that adopts unknown working processes to critically win stiff competition. Many authors have established different approaches to evaluate ICs. Examples of the various approaches are asset approach (Christensen, 1995; Christensen, 2001, Akman & Yilmaz, 2008; Chen & Yang, 2009; Kroll & Schiller, 2010; Li & Kozhikode, 2009; Romijn & Albaladejo, 2002; Sher & Yang, 2003; Subramaniam & Youndt, 2005; Xu et al., 2008; Zhao et al., 2005), process approach (Chiesa et al., 1996; Bertrand, 2009; Cooper, 1996; Forsman, 2011; Hull & Covin, 2010; Nassimbeni, 2001; Wonglimpiyarat, 2010) and functional approach (Yam et al., 2004; Girma & Hanley, 2009; Guan & Ma, 2003). The asset and process approach are slightly more challenging to figure out than the functional approach in which most of Malaysian SMEs manufacturing firms design their organizational structure by functional nature. Moreover, integrated set of capabilities is the main involvement in competitions among firms,

and they classified this functional approach of IC dimensions into seven dimensions: learning capability, research and development capability, resources allocation capability, manufacturing capability, marketing capability, organization capability and strategic planning capability. The purposively chosen seven dimensions of IC concept are based on several articles (Guan & Ma, 2003; Yam et al., 2004 & 2010; Guan et al., 2006; Tseng et al., 2012) that summarize different elements to interact as a diverse structure with multi-dimensions and IC has the leading advantage in the firms' competitions (Wang et al., 2008).

Decision is needed on whether manufacturers understand Green Productivity (GP) practices and are alert to the basic merits of this practice. Consequently, an essential part of the strategic planning for GP practices could be judged in boosting productivity and accessing environmental issues for building economic and social factors. Regarding APO (2009), GP practices can be applied in manufacturing, service, agriculture and communities. Avishek (2008) confirmed GP practices as a strategy to increase both productivity and environmental performance so that the overall social and economic improvement leads to sustained improvement in the quality life for human beings. They admitted that the traditional methods of increasing productivity are not eco-friendly and the pollution control measures were not optimal for sustainable environmental protection.

Malaysia in the early days had abundant resources, minimal development pressures and minimum attention was paid to growing environment protection. There is only a little knowledge about the GP practices despite the fact the government and private institutions conducted campaigns, seminars and conferences on green topics. In fact, there are no GP practice laws or regulations in Malaysia. To emphasise the effect without GP practices, Charles (2012), Humayun (2012) and Anthony (2011) revealed toxic and hazardous substances that were thrown out from the factory during the production process have created dreadful concerns to the environment and health. In Malaysia, two typical cases: Bukit Merah, Perak and Raub Gold Mining, Pahang did not practise GP in the

process of production. Although it has only been a decade since Asian Rare Earth (ARE) factory began production in Bukit Merah, the effects of radiation are found in the community who saw a sharp rise in the cases of infant deaths, congenital disease, leukaemia and lead poisoning (Humayun, 2012). The second case is the Raub Australian Gold Mining Sdn Bhd which started operating its Carbon in Leach gold refinery plant. The Pahang Raub Ban Cyanide in Gold Mining Action Committee (BCAC) recognized and verified that the people of Bukit Koman in Raub have been suffering from disabling skin, eye and respiratory diseases which can be attributed to the polluting fumes including Hydrogen Cyanide and Sulphur Dioxide emitted from the gold mine located at a mere 50 meters from the Bukit Koman Village. However, this situation is illogical for developing countries which created environmental regulations such as Environmental Quality Act 1974, Clear Air Regulations 1978, Scheduled Wastes Regulations 1989 but they are not actually enforcing them. By having more rules and regulations against environment concerns, companies now should include strategic planning to adapt customer with the environmental demand and need (Walton et al., 1998). Nevertheless, companies such Asian Rare Earth Factory and Raub Australian Gold Mining Sdn Bhd did not practise GP, and their operational performance and business survival have not been affected. On the other hands, Porter and Van (1995) described the value that corporations produce for his or her customers that exceeded the cost of producing that value, thus being environmental sensitive is going to formulate competitive analysis to enhance the positioning power of companies in the international markets. Additionally, this study disclosed that GP practices have no conflict on the interest of company especially SMEs to crucially understand the increasing environmental and economic importance that would enhance the competitive power of companies in the international markets.

Research continues to receive attention whether SMEs are engaged in environmentally responsible activities or not as compared to large companies, and the negative consequences of environment impact for SMEs are collectively greater than large firms (Hillary, 2000). Therefore, SMEs managers or owners are in doubt to link the benefits of green environment that will be added advantage to the economic aspects of their business (McKeiver & Gadenne, 2005). The companies

do not view environment as an issue or a responsibility to address (Condon, 2004; Revell & Blackburn 2004; Studer et al., 2005). The worst perspective is not having knowledge about environmental problems in the present and future (Tilbury et al., 2005) or no particular methods to solve this issue (Walker et al., 2007). The question of this environment dilemma is the SMEs owners or managers' expertise to assure that they are doing the right thing since environment is not their main business activity (Redmond et al., 2008). Educational program provided is promised with green benefits, problems and risks (Revell & Rutherfoord, 2003). Eventually, they do not see the relationship between their businesses with green impact or they consider it too expensive to maintain green corner (McKeiver & Gadenne, 2005; Bustamante & Jennings, 2006; Lekas, 2006; Nutek, 2003; Bubna et al., 1999). In similar studies, Ramayah et al. (2013); Yacob and Moorthy (2012); and Logaa and Suhaiza (2013) assessed the close study of the interaction factors among SMEs' characteristics, resources given, and knowledge of SMEs manager or owners to agree with green concepts. Therefore, the extensive concerns are for manager or owners of SMEs to undertake the fundamental merits between IC, GP and SMEs. The study of IC with green practice has been evaluated by Lin et al. (2011) who showed an effective method for identifying position strategic competitiveness of green business innovation. In this study, IC with functional approach works well with GP in which business functional structure has a clear responsibility for the employees with a specialised or similar set of roles or tasks. Handling green practices will make the company understand which group of employees fall behind in such practices and needs to compete for a better performance. With IC, this study is in fact using functional approach instead of process and product approach. The approach is simple and easily understood due to the similarity that most SMEs business has functional structure with IC functional approach. When GP practices are applied on the SMEs, they seemed to be efficient and are feasible for integrating GP into each variable to compete better in the marketplace.

The main concern for using performance measurement in this study is to improve performance. In studies by Robinson (1982) and Montanari et al. (1990), companies have a tendency to emphasise effective issues to measure

organizational performance. Tangen (2003) claims that performance should be based on competitiveness and profitability of business. Van-Schalkwyk (1998) also emphasises financial factors to measure performance such as profit, productivity and return of investment. In this study, three performance indicators were found to be appropriate: sales performance, innovation performance and product performance presented in the theoretical framework. This study measured average sales and non-sales growth collected for the years 2009 to 2012. The financial and operational measurements on green growth on SMEs manufacturing have been confirmed by Ramayah et al. (2013).

This study adopted Yam et al. (2010) model to detect and monitor a firm's competitive performance (dependent variable) of an organization with a set of key variables (independent variables). Numerous studies have established the link between IC with a firm's performance; however Malaysia SMEs manufacturing industry has deeply neglected GP practices to develop a deeper understanding of IC—firm competitive performance.

1.3 Research Questions

Numerous studies have established the link of IC with firm performance. However, Malaysian SMEs manufacturing industry has deeply neglected GP practices. In order to investigate IC—firm competitive performance link through GP practices, it is necessary to conduct a detailed study of this relationship in these SMEs manufacturing firms. The research questions in this study focus on issues relating GP and competitive performance. The interrelated variables of this model are articulated in Figure 2.3. To address the objectives, four research questions have been identified and formulated as follows:

1. Which are the important dimensions of IC on a firm's competitive performance for manufacturing SMEs in Malaysia?
2. Which are the important dimensions of IC on sales, innovation and product performances for manufacturing SMEs in Malaysia?
3. What is the moderating role of GP practices in IC—firm competitive performance relationship for manufacturing SMEs in Malaysia?
4. What is the moderating role of GP practices in IC—sales performance relationship, IC—innovation performance relationship and IC—product performance relationship for manufacturing SMEs in Malaysia?

To answer the research questions, researcher chose 88 SMEs manufacturing firms in Malaysia. All of these firms are reputable in SMEs manufacturing sector and may have initiated the GP practices concept. The following research objectives have been articulated to address these research questions.

1.4 Research Objectives

The main objective of this study is to determine unexplored effects of IC in terms of individual and collective constructs on a firm's performance in Malaysian SMEs manufacturing firms and identify the moderating impact of GP practices and contextual variables in the relationship. The study focussed on the four following objectives:

1. To identify important dimensions of IC on a firm's competitive performance
2. To determine the important dimensions of IC on sales, innovation and product performance.

3. To find out the moderating role of GP practices in IC—firm competitive performance relationship.
4. To assess the moderating role of GP practices in IC—sales performance relationship, IC—innovation performance relationship and IC—product performance relationship.

To illustrate these various relationships, the model in Figure 2.3 formulates the relationship among all of the three factors: IC, GP practices and CP. The objective of the dimensions in IC is linked to a sustainable firm's competitive performance in the future.

1.5 Significance of the Study

This study highlights IC and GP practices that implemented in SMEs Malaysia manufacturing firms and restates the extent of their implementation. GP practices as a moderator or mediator is dependent on the firms which view the practice to directly or indirectly affect the survival of a company, or the implementation of green for them to make more or less profit. As the knowledge of GP practices in Malaysia is lacking, this study gathered knowledge in this field and revealed the basic foundation for future studies. Furthermore, this study can insert the knowledge about the emphasis and significant of GP practices on firms and the national communities. This study can also contribute to the knowledge about how IC is accepted among Malaysia firms. Eventually, the study identified the influence of IC with GP practices on sales, innovation and product of the performance and the overall performance. Specifically, this following study is considered significant in three following major areas.

Academically, this study first applied the current theoretical developments in IC towards a firm's competitive performance (Yam et al., 2004). The researchers conducted empirical test from Yam (2004) in a different business environment that is critical for enhancing understanding whether the existing theories are cross culturally valid. This study contributes to the body of knowledge by addressing the role of IC towards a firm's competitive performance in management department in a Malaysian setting. This study adds to the body of knowledge by addressing the gaps in GP practices as stated in the literature by assessing the association between IC and firm's competitive performance, unlike previous studies which emphasised more on the examination of the effect of IC without GP practices. Finally, the significance of this study is also critical in a way to show association of IC from different dimensions in relation to GP practices as recommendation for a theory. This is because the collective and individual measures of these IC dimensions for the selected dimensions provide a basis for improvement in GP practices. For future researchers, the findings of this study may be useful as a reference when they desire to perform a study in same field.

In the actual world of business, economy with a better organization and as a pacesetter within the industry, this study assessed and evaluated the IC and GP practices as a critical strategy to manage competitive advantage (Porter & Millar, 1990). However, for GP practices to be fully adopted, a demonstrable link is needed between such practices to allow IC to improve a firm's competitive performance. The results of the research can assist managers or owner to formulate relevant policies for IC with GP practices and audit with dimensions of IC with GP practices for their firms and other firms based on the specific government and market requirements. Hence, the study can provide a platform for studies on discovering the corporate strategic towards IC with GP practices. The results of this research are not only constructive for green awareness, but are also appropriate for other community driven related projects particularly, in Malaysia and generally, over the world.

In the government policy development, other developed nations were surprised when the Malaysian government proposed to deal with green issues in the 2014 budget that was announced by Malaysia to critically strengthen the promotion of GP practices and green technology or green innovation (MOF, 2013). However, lack of effective cooperation and mutual understanding between government and the industry has resulted in the poor take up rate of this government assistance (Ng & Thiruchelvam, 2012). Through this study, government fosters its efforts to build effective government—private partnership with SMEs manufacturing have resulted in active exchange of information which illustrates IC dimensions for the implementation of GP practices toward gaining firm competitive performance. Based on this process, IC and GP practices are the two recognisable issues that firms should be imposed in the near future. This study relates government agencies and the trade or industry associations, develops awareness programmes needed to be undertaken on a regular basis to update the industry on the latest incentives, financial assistance, and grants that the government provides. As a result, once concepts and results of IC with GP practices are rectified, policy makers could adopt the justified environmental strategies in forming government policy to guide companies in the right direction.

For researchers, managers or owners and policy makers, the outcome of this study provides a foundation to assess IC and the strength of GP practices as a platform to explore further the influence of green initiatives towards other aspects of non-financial and financial performance. Last but not least, the proposed model would be used to assess the impact of IC through the moderating role of GP practices towards a firm's competitive performance. Willard (2002) claims a strong relationship of how GP practices lead to improved business results. In other cases in Malaysia, Asian Rare Earth Factory and Raub Australian Gold Mining Sdn Bhd were not practising GP even with many protest activities, yet their operational performance and business survival are not affected. As a result, GP acts as a moderator in which a variable influences the direction and/or strength of the relation between IC and a firm's competitive performance.

1.6 Research Scope

This study focussed on the existing theories of independent variables of IC on dependent variable of firm competitive performance. More specifically, this study investigated GP practices as a moderator to be tested on the IC—firm's competitive performance link. This study employed a cross sectional approach that examined the proposed variables relationships in a constant manner, as data is designed to look at a variable at a particular point in time (Aric et al., 2007). However, the proposed relationships among the model variables are dynamic and tend to change over time. This study used a single informant approach for each company. The reliability of a single informant is contestably questionable, and may possibly result in perceived differences of the company's extent of using IC across various units within the company (Elizabeth & Gary, 1992). This study also gauged the GP implementation level of which IC dimension shows the importance and how it affects performance within same organizations after analysis of the results from the questionnaire survey and interview sessions. Findings from this research can discover valuable insights from the IC with GP practices which will contribute to the success of this study. This research has limited its scope to only seven dimensions of IC with functional approach (Yam et al., 2004). Follow up analysis will also be conducted for evaluations of separate GP effects of each IC's dimension on a firm's competitive performance.

Overall, this research is confined to SMEs manufacturing firms in Malaysia. There are not categorized specifically as Malaysian or locally owned firms, joint ventures with locally owned firms, overseas or multinational firms located in Malaysia and other Malaysian-based companies. Selection criteria such as sales, employment and the portion of economic contribution are the main thrusts for SMEs manufacturing sector (MIDA, 2013; DOSM, 2011). All the other sectors are not considered due to the fact that the other non-manufacturing sectors did not consume significant amounts of resources and generate large volumes of waste (IEA, 2012). However, manufacturing industries seemed to blame SMEs for environmental practices because of lack of the data, resources, technical expertise

and experience required to handle environment issues (Ghazilla et al., 2015; DOE, 2011). In fact, the environmental performance of SMEs manufacturing sector is mostly driven by the intention of the company owners who are forced to focus on survival rather than sustainability (Yacob et al., 2013). On another note, a slight improvement in the environmental effort in this sector would give a substantially high environment global rating scale because this manufacturing sector creates more waste than service and agricultural sectors (DOSM, 2011). GP practices must be included into IC for SMEs to boost productivity by connecting green concerns to intensify GDP. If these SMEs manufacturing industries have developed the right approach by introducing IC with GP practices, it will advance them towards gaining sustained competitive advantage.

1.7 Research Limitations

As a comparison to previous studies, further studies are needed to investigate the findings of this study in relation to other manufacturing industries and other industries. Secondly, due to the confidentiality of some resources in the selected organizations in the SMEs manufacturing sector, the researcher may not have full access to all the required information. There are several constraints that have created slight deviations in getting ideal results. For example, time, money, geography and workforce were the major limiting factors during the study. Since interviews were conducted by replying qualitative perceptions, there were some biases and probabilities in individual's perception in comparison to others.

The following limitation of this study is acknowledged as the use of a convenience sample drawn from the target population in the SMEs manufacturing Malaysia, which could have impacted the representation of the sample. Mainly, different organization businesses included in the sample might have different perceptions regarding the impact of GP practices on the business functions. Given

that the functions were grouped under IC, it is possible that one of the functions in the group could have implemented more green business practices than another function, thereby possibly influencing the final results. Majority of the respondents are managers or owners who might have different perceptions regarding the impact of GP practices implementation on their firm's competitive performance.

This study is based on a single respondent. To improve the quality and reliability of the data, it is better to have different respondents for dependent and independent variables. The theoretical model excludes some potentially important factors. It seems plausible that the adoption of GP strategy may be a significant factor stimulating IC. It would be informative to examine whether these findings would hold true in a creative context in which knowledge innovation is largely presented.

1.8 Operational Definitions

As Sekaran (2003) explained, an operational definition looks at the behavioural dimensions, facets, or properties indicated by the concept by specifying the operations necessary to measure it. The specific operational definitions are provided for seven major variables used in this study that need to be understood in developing comprehension of the research in the future. The operational variables and operationalized definitions are to be used to avoid any ambiguity within the context of this study. These constructs are defined according to the requirements of this research.

Innovation Capabilities (IC): A functional approach used to understand the seven capability dimensions, namely learning capability, R&D capability, resources allocation capability, manufacturing capability, marketing capability,

organization capability and strategic planning capability (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Learning Capability (LC): Learning capability is labelled for work teams to identify opportunities for improvement and adopt knowledge in their daily activities (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

R&D Capability (RDC): R&D capability refers to high quality mechanism feedback from manufacturing to design, and engineering or product development into technological innovation process (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Resources Allocation Capability (RAC): Resources allocation capability is attached to adequate financial, human resources in phases for a firm's functional department to carry out the innovation activity and process (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Manufacturing Capability (MFC): Manufacturing capability is to transform advanced manufacturing methods, and R&D outcomes for a firm with the ability to produce (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Marketing Capability (MKC): Marketing capability is to formulate close relationship management with customers for efficient sales-force to provide excellent after-sales services in different market segments (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Organization Capability (OC): Organization capability is for a firm with dynamic structure to coordinate among departments with excellent practices for management (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Strategic Planning Capability (SPC): Strategic planning capability enables one to identify internal strengths and weaknesses, and external opportunities and threats to a firm's goal and plans to be adapted to respond to the firm's actions (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Green Productivity (GP) Practices: GP practices are methods to minimize waste by decreasing hazardous and toxic materials, and complying with the environmental friendly packaging to fulfil to any certification with collaboration from customers (APO, 2009).

Competitive Performance (CP): Competitive performance is measured based on the scales of sales and innovation performance applied by a single item while the product performance was used by multi-items (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006).

Sales Performance (SP): Sales performance is measured by calculating the average annual sales growth rate over the last 3 years due to technological new or improved product with/without green productivity practices (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

Innovation Performance (IP): Innovation performance is measured by taking the number of commercialized new products based on the percentage of all

the products of the company over the last 3 years with/without green productivity practices (Yam et al., 2004 & 2010; Zandhessami et al., 2012; Tseng et al., 2012).

Product Performance (PP): Product performance is measured by considering the levels of quality products, basic expenses of such product, the frequent market competition of related product, the nature and type of process technology employed and the mean time from concept to actualise the product (Yam et al., 2004 & 2010; Guan et al., 2003 & 2006; Zandhessami et al., 2012; Tseng et al., 2012).

1.9 Structure of Thesis

This thesis consists of five chapters. Each chapter is devoted to a major aspect of the study. Chapter one gives the background of the study by focusing on linkage of innovation capabilities on a firm's competitive performance. The chapter introduces the problem statement, research questions, research objectives and significance of study. It includes the scope of study along with its limitations. Chapter two discusses the literature on key identified variables including innovation capabilities, green productivity practices and firm competitive performance. Subsequently, the role of the moderator in this relationship is also discussed. A conceptual model derived from the literature is formed at the end of chapter two. Finally, chapter three focuses on explanation of the research methodology which comprises research design and approach, sampling and data collection procedure, data analysis techniques and validity and reliability used in this study. Chapter four presents the outcome of data analysis including the description of the results, discussion of the research findings and results of the research questions and hypotheses. Chapter five gives a detailed assessment of the research findings. It also presents the potential contribution, implications,

limitations, recommendation arising from this research and future directions in Malaysia.

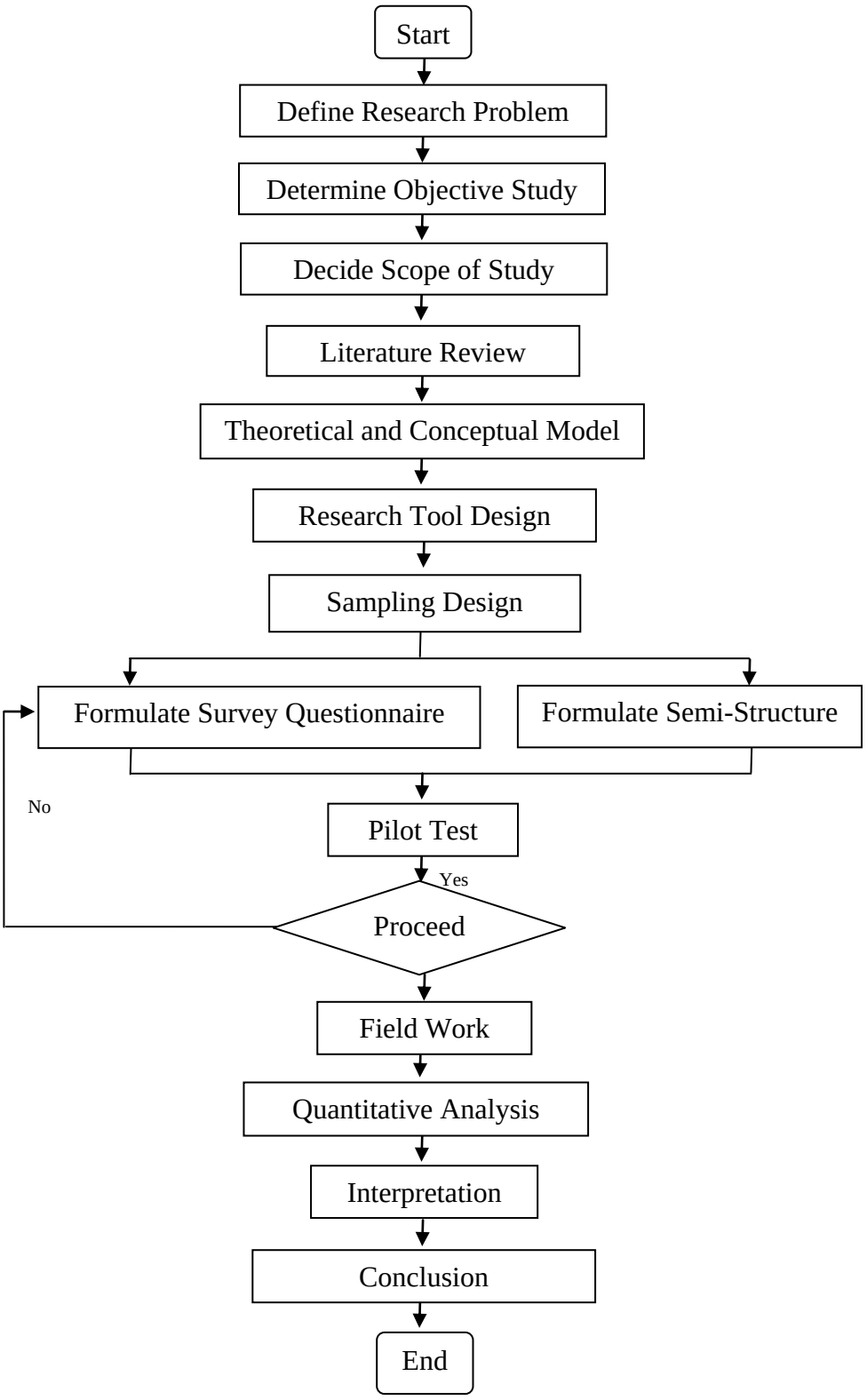

Figure 1.6 Research Flow Chart

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