IMPLEMENTING INNOVATION: PROJECT TEAM CHARACTERISTICS WITH MODERATING IMPACT OF DYNAMIC MANAGERIAL CAPABILITIES AND TYPES OF INNOVATION

by

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DEDICATION

For my beloved late father – Ranjit Singh Mann
(departed 07.06.07)

Dearest daddy,

My little hands in yours

As you walked me through

This journey called life

However,

For this journey of research

Our hands parted

Before its completion

Even then,

I dearly held on to

Your handwritten indexes

On all my research files

This thesis is especially for you, Dad

My love for you will never fade

A place is vacant in my heart

May your soul, rest in peace!

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LIST OF ABBREVIATIONS

AMT	Advanced Manufacturing Technology
ANOVA	One-way Analysis of Variance
BPR	Business Process Reengineering
BPS	Business Process Systems
CEO	Chief Executive Officer
CFC - Comm	Cross-Functional Cooperation - Communication
CFC - IR	Cross-Functional Cooperation - Interpersonal Relations
CFC - TW	Cross-Functional Cooperation - Teamwork
CRM	Customer Relationship Management
DMC	Dynamic Managerial Capabilities
DMSS	Decision Making Support Systems
DSS	Decision Support System
ERP	Enterprise Resource Planning
FD	Functional Diversity
HR	Human Resource
ICT	Information Communication Technology
IIS	Internet-based Information System
IS	Information System
ISDN	Integrated Services Digital Network
IT	Information Technology
JIT	Just-in-Time
KMO	Kaiser-Meyer-Olkin
LB - PO	Leadership Behaviour – People Orientation
LB - TO	Leadership Behaviour – Task Orientation
MASTIC	Malaysian Science and Technology Information Centre
MIS	Management Information Systems
MOSTI	Ministry of Science, Technology and Innovation
MRP	Material Requirements Planning
MSA	Measure of Sampling Adequacy
PMBOK	Project Management Body of Knowledge
RBV	Resource-Based View
RM	Ringgit Malaysia
RMM	R&D, Manufacturing, Marketing
R&D	Research and Development
SD	Standard Deviation
SMEs	Small and Medium Enterprises
SMI	Supplier Managed Inventory
SPSS	Statistical Package for Social Sciences
Std	Standard
TQM	Total Quality Management
TS - BF	Team Skills – Business Functional
TS - IM	Team Skills – Interpersonal and Management
TS - TTM	Team Skills – Technical/Technology Management
UK	United Kingdom
US	United States
VIF	Variance Inflation Factors

PELAKSANAAN INOVASI: CIRI-CIRI PASUKAN PROJEK DENGAN KESAN KEUPAYAAN PENGURUSAN DINAMIK DAN JENIS INOVASI SEBAGAI MODERATOR

ABSTRAK

Inovasi adalah asas daya saing utama untuk setiap organisasi. Ia merupakan pelantar untuk peningkatan prestasi dan kecekapan sesebuah organisasi. Penyelidikan ini tertumpu pada satu fasa inovasi yang khusus iaitu fasa pelaksanaan. Boleh dikatakan, kebanyakan kegagalan inovasi berpunca dari fasa ini. Penyelidikan ini merangkumi sektor perkilangan di Malaysia dan unit yang dianalisis adalah projek. Projek bergantung kepada pelbagai sumber daripada sesebuah organisasi untuk berjaya. Oleh itu, pendekatan "*resource-based view*" menjadi teori utama dalam penyelidikan ini. Asas kejayaan pelaksanaan sesuatu projek inovasi adalah sumber manusianya. Dalam penyelidikan ini ada tiga jenis sumber manusia iaitu: ketua projek, ahli pasukan dan pihak atasan. Penyelidikan ini dijalankan untuk memperihalkan aras kejayaan pelaksanaan inovasi dalam sektor perkilangan di Malaysia dan pengaruh ciri-ciri pasukan projek ke atas kejayaan pelaksanaan projek inovasi. Ciri-ciri pasukan projek yang dikaji termasuk gelagat ketua, keahlian (*ownership*), kepelbagaian fungsi/jabatan (*functional diversity*), kerjasama berfungsi silang (*cross-functional cooperation*) serta skil pasukan. Dalam penyelidikan ini juga terdapat dua faktor konteks iaitu keupayaan pengurusan dinamik dan jenis inovasi. Jenis inovasi terdiri daripada konstruk berbilang iaitu inovasi radikal dengan tokokan (*incremental*), inovasi produk dengan proses serta inovasi pentadbiran dengan teknikal. Kajian semasa ini menggunakan kaedah soal-selidik yang ditadbir sendiri untuk pengumpulan maklumat. Data untuk penyelidikan ini merangkumi 118 projek daripada sektor perkilangan di Malaysia. Projek-projek inovasi yang diperolehi

termasuk yang berbentuk usaha kualiti, sistem maklumat, pembangunan produk baru (*new product development*), proses, mesin serta pembangunan perniagaan (*business developments*). Untuk menganalisis data, pelbagai kaedah analisis data telah digunakan seperti ujian perbezaan, analisis kebolehpercayaan, analisis faktor dan analisis regresi berganda berhirarki. Kajian ini mendapati bahawa kepelbagaian fungsi, gelagat ketua yang berorientasikan kerja (*task orientation*) dan skil pengurusan interpersonal memberi kesan secara langsung kepada kejayaan pelaksanaan projek inovasi. Dari sudut moderator, keupayaan pengurusan dinamik mempengaruhi perhubungan antara gelagat ketua; serta kerjasama dengan kejayaan pelaksanaan projek inovasi. Jenis inovasi membawa kesan ke atas perhubungan antara skil pengurusan teknikal/teknologi; skil fungsi perniagaan (*business functional*); komunikasi; serta kerjasama dengan kejayaan pelaksanaan projek inovasi. Dari aspek praktik, kajian ini menyediakan satu kerangka-kerja operasional yang boleh digunapakai oleh pihak industri untuk menjayakan pelaksanaan projek inovasi. Kajian ini juga memberi garis panduan untuk pemilihan ciri-ciri pasukan projek berdasarkan jenis inovasi. Dari sudut teori, kajian ini menyumbang kepada bidang pengurusan inovasi khususnya untuk fasa pelaksanaan dan juga pemahaman tentang pasukan.

IMPLEMENTING INNOVATION: PROJECT TEAM CHARACTERISTICS WITH MODERATING IMPACT OF DYNAMIC MANAGERIAL CAPABILITIES AND TYPES OF INNOVATION

ABSTRACT

Innovation is the nexus of competition for all organizations. It serves as a platform to enhance organizational performance and effectiveness. This study focuses on a very specific phase of innovation, which is the implementation phase as it is most germane to innovation. Innovation failures are known to originate from this phase. This study elucidates on the success of innovation project implementation in the manufacturing sector in Malaysia. The study depicts projects as the unit of analysis. Projects are dependent upon resources in order to flourish, meaning human resource is a basic criterion of success for an innovation project implementation. As such, the resource-based view forms the underlying theory for this research. There are three major human resources in this study: project leader, team members and managerial core. This study was conducted to describe the success of innovation project implementation in the manufacturing sector in Malaysia and to explore the influence of project team characteristics on success of innovation project implementation. Project team characteristics comprised of leadership behaviour, ownership, functional diversity, cross-functional cooperation and team skills. There were also two contextual factors introduced: dynamic managerial capabilities and types of innovation. Types of innovation was a multi-dimensional construct, with radical versus incremental innovation; product versus process innovation; and administrative versus technical innovation. This was a cross-sectional study with self-administered questionnaires. Data was compiled from 118 innovation projects in the manufacturing organizations in Malaysia. These innovation projects comprised of

quality initiatives, information systems, new product development, process, machinery and business developments. The data analyses used was test of differences, factor analysis, reliability analysis and hierarchical regressions. The findings show that functional diversity, task oriented leadership behaviour, and interpersonal and management skills impact directly on success of innovation project implementation. For the moderators, dynamic managerial capabilities impact on the leadership behaviour; also teamwork and success relationships. Types of innovation have moderating effects for the technical/technology management skills; business functional skills; communication; teamwork and success of innovation project implementation relationships. This study provides an operational framework for implementing innovation successfully in organizations and guides practitioners to identify the appropriate team member characteristics required for various innovation projects. Theoretically, this study contributes to the field of innovation management, specifically the implementation phase and to the study of groups.

CHAPTER 1

INTRODUCTION

Innovation to most organizations is crucial for long-term survival and growth. Innovation provides an organization with the platform to enhance organizational performance and effectiveness. During troubled times, continuous innovation of products, services, technology and the organization itself is one way to keep a business afloat. Most organizations have stressed on innovation, even incorporating innovation into the organizations' mission statements. Afuah (2003, p. *vii*) emphasized: "innovation will be to the 2000s what total quality management was to the 1970s, what time-based management was to the 1980s, and what efficiency was to the 1990s – that is, a precondition for gaining or maintaining a competitive advantage".

In a highly competitive business world, an organization that stresses on innovation is able to create a competitive advantage. In fact, innovation has become a prerequisite for gaining and maintaining competitive advantage in the business world. Customers' needs and expectations continuously change over time, as such an organization that is innovative and believes strongly in innovation will be able to sustain and even increase its market share. Due to its importance, this study intends to explore innovation in greater depth.

1.1 Background of the Study

According to Sundbo (2001), the innovation process can be broadly categorized into three phases. These phases are: the initialization phase, development phase and the implementation phase. The initialization phase is where the idea is developed. It also includes getting the idea accepted by all stakeholders. During the development phase,

the idea is transformed and designed. When the innovation has been fully developed it must be implemented. For example, in the case of new product development (NPD), the product will actually be produced at this phase. Thus, innovation is actually operationalized at the implementation stage.

Cozijnsen, Vrakking and Ijzerloo (2000) emphasized on the different perspectives instead of phases. Basing on a meta-analysis of previous major studies, successful innovation was classified into five different perspectives:

1. Adoption and diffusion theories
2. Planned change
3. Organizational-structural
4. Implementation
5. Strategic

The adoption and diffusion, planned change and organizational-structural perspectives relate to the initialization phase. At these phases, important success factors revolve around the individual and structural characteristics together with the speed of innovation acceptance. Level of analysis involves the individual, groups, departments and organization. The implementation perspective, stressed on the organizational conditions, commitment of the people involved, adjustments and behavioural changes. Finally, the strategic perspective relates to factors such as research and development (R&D) expenditure and the availability of technological knowledge. The strategic perspective is at the end of Sundbo's phases model whereby it is equivalent to the incorporation phase. This phase was not addressed by Sundbo.

The above discussions bring about the following delineation:

1. Innovation has many phases.
2. Each innovation phase has different success factors.

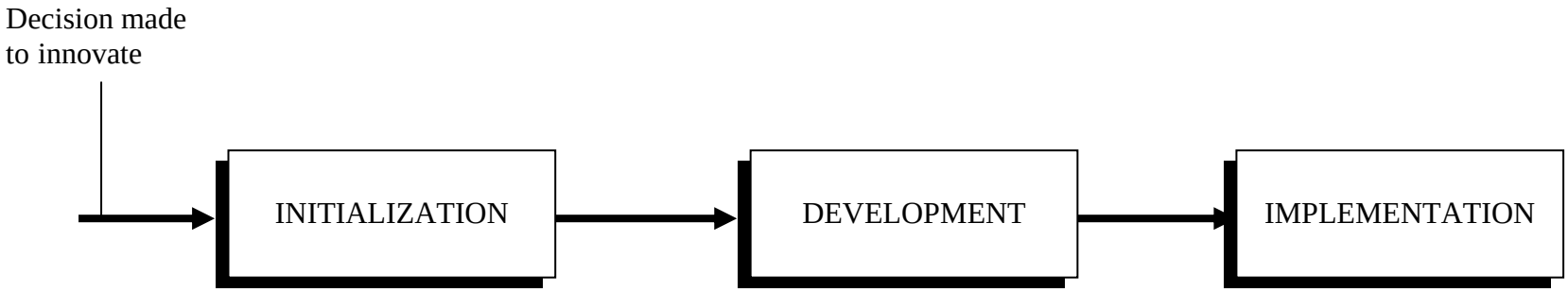
From the three phases or five perspectives of innovation, the implementation phase plays a vital role. It is during the implementation phase that innovation actually materializes. This is where innovation is given shape and form in an organization. The success or failure of an innovation can be determined at this phase. In fact, most failures can be expected to occur during this phase (Cozijnsen et al., 2000; Linton, 2000; Sundbo, 2001; Yahya & Ho, 2000). Klein and Sorra (1996) debated that many innovations are implemented ineffectively resulting in innovation failures. Project execution (implementation) was ranked to be the most important area contributing to project failure in terms of serious budget and schedule overruns (Whittaker, 1999). Along a similar vein, Yusuf, Gunasekaran and Abthorpe (2004) contended that the principal reason for failure is poor management of implementation. Klein and Knight (2005) also echoed that failures should not be termed as innovation failure but implementation failure instead. It can be summarized that without the implementation phase, the initialization and development phase is to no avail. Simply put, the implementation phase plays a critical role for the success of an innovation.

However, the implementation phase has not been researched upon much. Klein and Knight (2005) stated that research on implementation of innovations is rare. Cozijnsen et al. (2000, p. 152) emphasized: “It is immediately clear that the implementation perspective, and therefore the implementation phase, receives relatively little attention.” Similarly, Dong (2001) stressed that innovation implementation is a subject of little research. This phase is often forgotten but it is important because there can be much resistance here and it is here that many

innovations fail (Sundbo, 2001). Klein and Sorra (1996, p. 1072) repeated a similar cry for the implementation phase: “the neglected member of the innovation family.” In a meta-analysis, Damanpour (1991) indicated that implementation of innovations has received limited attention. In a comparative study, Boer and During (2001) found that organizations tend to concentrate heavily on the development phase neglecting the implementation aspects like the production run and marketing of the new product. Cozijnsen et al. (2000) speculated that one plausible reason why the implementation phase has received so little attention is because it is very difficult to establish a success measure for implementation.

The three phases of innovation are displayed in a diagrammatic form with various examples provided in Figure 1.1 on the following page. It can be observed from Figure 1.1 that the implementation phase is a critical gateway between the decision to innovate and operationalization of the innovation.

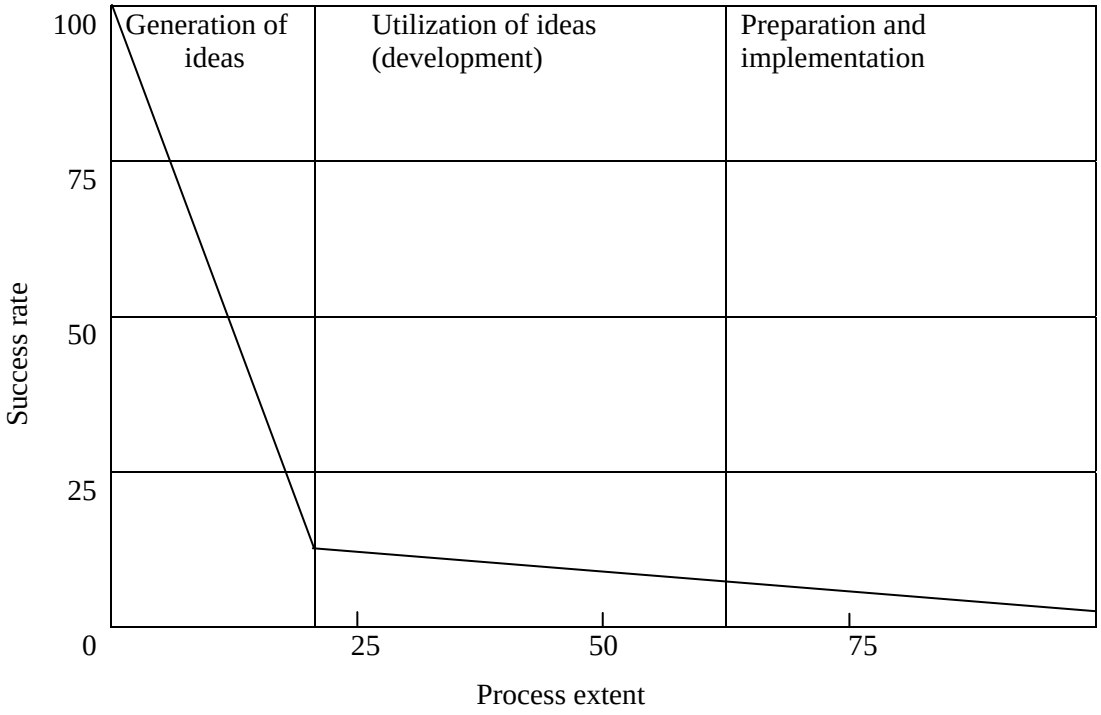
There is a plethora of past research (for example: Arokiasamy, 2004; Cozijnsen et al., 2000; Ibrahim, 2005; Rodriguez, Perez & Gutierrez, 2007; Sivadas & Dwyer, 2000; Tidd, Bessant & Pavitt, 2001;) documenting various innovation failures. From the seventies to the nineties and to the present time, researchers have been converging on this similar theme. Likewise both in academic and in professional circles there is a great deal of evidence concerning these failures. In fact, Nash, Childe and Maull (2001) advocated that failure is more common than success in the implementation of process innovations. It was noted that in the field of computer systems alone, a vast amount of implementation project failures have been documented since the 1960s till the present moment. The subsequent discussions portray examples of innovation failures starting from the 1970s to 2000s.



	Idea is developed	Idea is transformed and designed	Operationalized/ implemented correctly
Example 1 New product development	Ideation Generation of ideas, evaluation and selection of the idea	Prototype	Mass production
Example 2 New payroll system	Requirements established	HR works with IT / vendor, explains requirements New system developed	Complete usage of the new payroll system
Example 3 Machinery modification	Ideation	Modification work carried out, trial run	Using modified machine to manufacture products

Source: Self-conceptualized based on literature.
Figure 1.1 Innovation phases.

In 1971, Pedraglio accumulated data from 51 American firms on NPD. The data indicate the mortality rate throughout the innovation process. It was evidenced that only two percent (2%) of the NPD initiatives result in a successful product. Figure 1.2 displays the results from Pedraglio's study.



Source: Pedraglio (1971) cited in Holt (1988)

Figure 1.2 Mortality rate through the innovation process.

Along a similar vein in the 1980s, Cooper (1988) conducted a study on the implementation of NPD in the United States (US) industry. The findings were:

- Approximately half of the resources devoted to product innovation are spent on failed projects.
- 63 percent (%) of executives are "somewhat" or "very disappointed" in the results of the firms' NPD efforts.

These findings were further substantiated by Page (1993), whereby he established that a large portion of product development budgets resulted in new product failures.

Despite the tools and techniques developed, product development projects are still prone to failure (Cormican & O'Sullivan, 2004). In 2007, Rodriguez et al. in an empirical study of 345 cases of new products found an alarming 48.7 percent (%) failure.

Business process reengineering (BPR) projects were not spared as well, with a lot being abandoned. It has been reported that 70 percent (%) of BPR projects ended in failure (Cafasso, 1993; Hammer & Champy, 1993; Santon, Hammer & Power, 1993; Sterbel, 1996).

Tidd et al. (2001) stated that studies in the 1990s on advanced manufacturing technology (AMT) suggested failure rates of over 50 percent (%). Failure rates of total quality management (TQM) programmes were as high as 80 percent (%) one year after inception.

Carr (1996), conducted research on the degree of success of innovation projects in US organizations. The results are stated in Table 1.1 below:

Table 1.1
Success of Innovation Projects

Type of change	Degree of success		
	Successful (%)	Neutral (%)	Failed (%)
Total quality management (TQM)	29	50	21
Revitalization	16	50	34
Vision, values, attitudes	32	-	-
Business process systems (BPS)	27	-	-
Information technology	20	-	-

Source: Carr (1996) cited in Cozijnsen et al. (2000)

From Table 1.1, it can be estimated that 70 to 80 percent (%) of the projects failed, either completely or partially. Neutral refers to projects that showed no improvement and were classified as partial failures by Carr.

Cozijnsen et al. (2000) conducted a similar study in Holland, involving 50 innovation projects in Dutch organizations. The outcome showed that only 23 percent (%) of the innovation projects were successful and another 23 percent (%) achieved partial success. Successful innovation projects were defined as having achieved 50 percent (%) or more of the objectives set for the project, whereas partial success was defined as achieving between 25 to 50 percent (%) of the objectives. The study concluded that 54 percent (%) of the projects failed.

Software development projects are also prone to failures. Standish Group International (1995) reported that about 28 percent (%) of all software development projects never deliver a final product. It was also indicated that another 46 percent (%) of the projects are challenged. US companies and government agencies incur an estimated US $145 billion annually for software project problems. Almost 10 years later, Standish Group (2004) still established an 18 percent (%) projects failure with another 53 percent (%) being challenged. These projects were labelled as "challenged" because they were behind schedule, exceeded their budget by millions of dollars and failed to meet user needs. By the same token, Linberg (1999) emphasized that 80 percent (%) of software development projects are excessively late and over budget.

Statistics compiled by a market research company, established that 70 percent (%) of enterprise resource planning (ERP) implementations fail to achieve the corporate goals and it was also published that there was a large-scale implementation failures (Bingi, Sharma & Godla, 1999; Buckhout, Frey & Nemec, 1999). According to another comprehensive survey conducted by Robbin-Gioia (2002), 51 percent (%) of American companies said their ERP system implementation was unsuccessful. In the Malaysian context, Arokiasamy (2004) found 59.42 percent (%) of the

participating manufacturing organizations incurring losses caused by delay of ERP implementation. 40.58 percent (%) of these organizations incurred losses below RM 1 million, 13.04 percent (%) between RM 1 million to below RM 2 million and another 5.80 percent (%) had losses above RM 2 million.

The information above and results from other independent surveys are summarized in Table 1.2 as follows:

Table 1.2

Innovation Projects Failure Rates

AUTHOR/YEAR	**INNOVATION PROJECTS**	**FAILURE RATES**
Pedraglio (1971) Cooper (1988) Griffin (1997b) Sivadas & Dwyer (2000) Rodriguez, Perez & Gutierrez (2007)	NPD	98% 50% of resources spent on failures 41% 50% 48.7%
Cafasso (1993) in Guimaraes & Armstrong (1998) Hammer & Champy (1993) in Al-Mashari & Zairi (1999) Santon, Hammer & Power (1993) and Strebel (1996) in Cao, Clarke & Lehaney (2001)	BPR	70%
Tidd, Bessant & Pavitt (2001)	AMT TQM	Over 50% 80% (1 year after inception)
Bingi, Sharma & Godla, (1999) Buckhout, Frey & Nemec (1999) Arokiasamy (2004)	ERP	70% 59.42% delayed <u>Losses incurred</u>: < RM 1M – 40.58% > 1M <2M – 13.04% > 2M – 5.80%
Cozijnsen et al. (2000)	Innovation Projects	54%
Linberg (1999)	Software Development	80%
Ibrahim (2005)	IT	74.5% respondents below 30 (age) 100% above 50 (age)

Table 1.2 Continued

AUTHOR/YEAR	INNOVATION PROJECTS	FAILURE RATES
Surveys – Information Systems Projects		
Kweku Ewusi-Mensah (1994)	IT	44% of respondents experienced - total abandonment 16% - partial abandonment
Standish Group International (1995)	Software Development	28% - terminated 46% - challenged
OASIG (1995)	IT	70%
CHAOS Report (1995)	IT	31.1%
KPMG UK (1995)	IT	62%
OASIG (1996)	IT	40% - failed 80% - delivered late & over budget
KPMG Canada (1997)	IT	61%
Conference Board (1997)	ERP	40%
Gartner Group (2000)	IT	40%
Standish Group (2001)	IS	23% - failed 49% - challenged
Conference Board (2001)	ERP	40% (within 1 year of going live)
Robbins-Gioia (2002)	ERP	51%
AMR Research (2002)	CRM	12% - failed to be implemented 47% - adoption problems
Hackett Group (2003)	Applications	30%
CHAOS Report (2003)	IT	15% - failed 51% - challenged
Oxford University & Computer Weekly (2003)	IT	84%
Standish Group (2004)	IT	18% - failed 53% - challenged

From the statistics and figures stated above it can be postulated that there is a very large percentage of innovation project failures. This seems to be an ongoing phenomenon for more than 30 years now. Although there has been extensive research done with regards to innovation thus far, the research seems to have been rather inconclusive. With the earlier delineation in mind (refer page 3), it is further attested by the figures above that the different phases approach for innovation research has not been given due consideration in past research. Existing literature on innovation has always had a prevailing view that one size fits all. Furthermore as

mirrored by many other scholars such as Cozijnsen et al. (2000); Damanpour (1991); Dong (2001); Klein and Knight (2005); Klein and Sorra (1996); Sundbo (2001) the implementation phase has been neglected all this while although it is a crucial phase. These could be the possible causes for the statistics and figures mentioned above.

Wolfe (1994), in reviewing past research on organizational innovation has also stressed that researchers did not clearly address the phase of the innovation process that the study focused on and how a study's outcome variable is conceptualized. According to Cozijnsen et al. (2000), in recent decades, extensive research has been done to investigate how an ideal innovation project should be carried out, however the research does not formulate success criteria.

On the contrary, Jensen and Harmsen (2001) claimed that past research on NPD has established success factors. However, there are only a few organizations which have implemented these identified success factors. This was established via the fact that recent studies show organizations making the same mistakes as 30 years ago (Jensen & Harmsen, 2001). It is also noteworthy that these success factors for NPD may have referred to all phases and not a specific phase like implementation. These leads one to question – are the identified factors comprehensive and also how can these factors be made more accessible to the organizations? Another possible reason for this disparity might be due to the success factors established are not identified according to the different innovation phases.

In the Malaysian context, the Malaysian Science and Technology Information Centre (MASTIC) under the Ministry of Science, Technology and Innovation (MOSTI) has conducted national surveys of innovation in the manufacturing sector since 1995. The first National Innovation Survey was carried out in 1995 for the period between 1990 and 1994. Subsequently, a second survey was conducted for the

period 1997 to 1999 and a third survey from 2000 to 2001. The objective of these surveys was to study the innovative activities in technological product and process innovation in the manufacturing sector in Malaysia. Technological products and process innovations were defined as technologically new products, processes and significant technological improvements in products and processes (Oslo Manual, 1992). The second national survey (National Survey of Innovation in Industry, 2001), established that only 21 percent (%) of the organizations were involved with innovation and the third national survey (National Survey of Innovation in Industry, 2003) indicated 35 percent (%). The response rate for the second national survey was 26.1 percent (%) and the third survey was 18.7 percent (%) from a sample of 4000 organizations. These surveys indicate that the government is serious about innovation and treat it as extremely important. The figures also demonstrate an increase in innovation activities in the Malaysian organizations. However, with a percentage as low as 35 percent (%), it leads one to question – could this be due to problems at the implementation phase? There are possibilities that organizations might have embarked on innovation projects but abandoned the projects at the implementation phase. In terms of research, there is a lack of study on the subject matter in the Malaysian context (Mohamed, 1995). Arokiasamy (2004) emphasized that his study on critical success factors for successful ERP implementation could be among the first few in Malaysia. An empirical study conducted in the shipping and telecommunication industries in Klang Valley by Yahya and Ho (2000) established that a majority of information technology (IT) projects implementation experienced cost overruns. They advocated that many IT projects encounter problems during implementation and result in being abandoned. Along a similar line, Arokiasamy (2004) established that 59.42 percent (%) of the manufacturing organizations, which

participated in his study, experienced delays in ERP implementation. This resulted in estimated losses being as high as RM 2 million for some organizations. In fact, it was concluded that despite the ERP system having been around for more than 10 years in Malaysia and perceived as beneficial by organizations, factors that contribute to successful implementation in the Malaysian manufacturing organizations remain ambiguous (Arokiasamy, 2004). Supplier managed inventory (SMI) system implementation was also reported as at moderate levels of success only (Tan, 2004). Ibrahim (2005) investigated IT projects failure in public higher learning institutions. The study did not quantify the percentage of IT projects failure but noted respondent experiences. It was found that 74.5 percent (%) of respondents below 30 years of age have experienced failures in projects. For those above the 50 years age group, all (100%) of them have experienced project failures before.

Given the above background, this study intends to address the implementation phase. The study will focus on successful implementation of innovation in the manufacturing organizations in Malaysia. It will investigate critical factors necessary during the implementation of an innovation project, leading the project to be successful. Thus, looking into successful innovation through the implementation perspective.

For many organizations, projects are a means to respond to those requests that cannot be addressed within the organization's normal operating conditions. When an organization wants to embark on an innovation, the normal process structure utilized is the project form. Montoya-Weiss and Calantone (1994) revealed that 78.7 percent (%) of the past studies in their NPD review were project based. This study embraces projects as the unit of analysis for innovation implementation.

There is a robust, documented stream of studies that looks into the determinants of project success. Project team presence has been established as a critical force. Brown and Eisenhardt (1995, p. 367) stressed, "a project team is the heart of the product development process and the focus of much research is the project team." Project team members are the people who actually do the work involved in any project. For example in NPD projects, the team members are the people who transform vague ideas, concepts and product specifications into the design of new products. Basically, projects are accomplished by teams and when it comes to implementing projects the project team and project leader are two crucial components (Jiang, Klein & Discenza, 2002). It can be concluded that a project team is central and paramount to the success of innovation project implementation. Cohen and Bailey (1997) emphasized that studies on project teams frequently lacked in-depth team descriptions. Anchored on this notion, this study shall delve more deeply into the subject of project team characteristics. Project team characteristics shall include functional diversity, ownership, leadership behaviour, cross-functional cooperation and team skills. These variables have been consistently used to discriminate between successful and unsuccessful projects in previous studies (Bstieler & Gross, 2003; Cooper, 1993; Cooper & Kleinschmidt, 1994; Griffin, 1997a; 1997b; Wixom & Watson, 2001). Some of the previous results have been contradictory, for instance Bstieler and Gross (2003) discovered that only the project leader plays a role and the other project team characteristics were non-significant.

Besides project team characteristics, the capabilities of the managerial core are deemed to be a very strong supporting pillar. Managerial capabilities can break or make an innovation project implementation. Hyland, Davison and Sloan (2003) emphasized that for a team based structure especially cross-functional teams,

transformation and reconfiguration of resources and capabilities play a vital role. Bajwa, Garcia and Mooney (2004) stressed that internal and external integration tools are critical for the implementation phase. Internal integration helps to coordinate the activities of the project team participants and resolve all technical problems that are encountered with implementation. External integration facilitates collaboration with all external stakeholders to ensure smooth implementation. Besides resource exploiting and managerial integrating capabilities, Khan (1999) debated the need of path navigating capability. These studies indicate the necessity of managerial capabilities in innovation project implementation. However, dynamic managerial capabilities is conspicuously absent in the literature. Thus, it is necessary to explore further the alignment between project team characteristics and dynamic managerial capabilities that may impact on the success of innovation project implementation. In this study, dynamic managerial capabilities will include resource exploiting, internal and external integrative capabilities and path navigating capability.

Literature has advanced numerous taxonomies of innovation. Among these, three have gained the most attention. Each centres on a pair of types of innovation: administrative versus technical, product versus process, radical versus incremental (Cooper, 1998; Damanpour, 1991). Administrative versus technical dimension reflects the location of the innovation, whether it takes place at the technical core (primary activities) of the organization or at the support level (secondary activities). Product versus process dimension looks at whether the innovation occurs in the organization's offering or the way the final offering is being made. Radical versus incremental dimension refers to the degree of novelty. Scholars have argued that type of innovation may be an important moderator to the relationship between success

factors and performance of a project. Kleinschmidt and Cooper (1991) established that different types of innovations were associated with different success factors and levels of performance. Montoya-Weiss and Calantone (1994) questioned the validity of past results regarding success factors because only 31.9 percent (%) of the studies considered the type of innovation. However, Damanpour (1991) via a meta-analysis argued that types of innovation are not highly effective moderators of the determinants-innovation relations. Griffin (1997a) established that cross-functional teams associate more with radical than incremental projects. Similarly, Hitt, Nixon, Hoskisson and Kochhar (1999) stressed that the use of cross-functional teams may not be necessary with all types of innovation. Thus, this study shall investigate types of innovation as a moderator.

1.2 Problem Statement

Innovation is critical because it is the nexus of competition for many organizations. In spite of the increasing need of innovation in order to remain competitive, organizations are unable to materialize innovation. Attempts are being made; however success is limited. There is compelling evidence of innovation failures in organizations (Carr, 1996; Cozijnsen et al., 2000; Jensen & Harmsen, 2001; Repenning, 2002; Tidd et al., 2001; also refer Table 1.2). Many innovation projects fail due to the lack of proper management of the implementation phase (Cozijnsen et al., 2000; Klein & Knight, 2005; Klein & Sorra, 1996; Reger, Gustafson, DeMarie & Mullane, 1994; Repenning, 2002; Sundbo, 2001; Yahya & Ho, 2000; Yusuf et al., 2004). Practitioners are still essentially guessing about how to implement innovation. For an organization to be successful at innovation, the implementation phase needs to be examined. It has been emphasized that the implementation phase is one of the

most difficult phases (Anderson & King, 1995). Amongst the three phases of the innovation process, the implementation phase has been the least researched though many have referred to it as the most important phase (Cozijnsen et al., 2000). How can an organization be more successful in implementing innovation? A wide variety of critical success factors suggested for specific innovation projects include management involvement, commitment, communication, infrastructure, project management, strategic management, champion, resources, user participation, team skills, project team, goal congruency, project acceptance (Coronado & Antony, 2002; Kumar, Maheshwari & Kumar, 2003; Milis & Mercken, 2002; Wixom & Watson, 2001; Zhao & Co, 1997). The relevant literature lacks clear conclusions about what factors have positive effects on successful innovation implementation (Cozijnsen et al., 2000). These shortcomings present research opportunities.

In summary the problem statement in this research reads:

"What are the project team characteristics that influence innovation implementation success and what roles do dynamic managerial capabilities and the types of innovation play in the above relationship?"

Therefore, it is very important that this study is undertaken to understand the reasons and factors that determine successful implementation of innovation. These factors will definitely differ from success factors at the initializing phase and the development phase. This research will focus on various industries in Malaysia.

Based upon the above discussions, in summary, this research is motivated by the following considerations:

1. Ambiguity in past research in terms of the phase studied – success factors formulated are generalized to innovation but disregarding a specific innovation phase.

2. Implementation phase has not been studied much. However, researchers have advocated that most innovation projects fail due to the lack of proper management of the implementation phase.
3. Success factors necessary at the implementation phase have not been established conclusively.
4. Almost no similar research has been conducted in the Malaysian context, even though the government is putting serious efforts to encourage innovation and innovative activities.
5. The dearth of study that comprehensively investigates the moderating effect of dynamic managerial capabilities and types of innovation on the relationship between project team and success of innovation project implementation.

1.3 Objectives of the Study

This study is motivated by the need to understand factors necessary for successful implementation of innovation in manufacturing organizations in Malaysia. The study aims to look at the following:

- To describe the success of implementing innovation for manufacturing organizations in Malaysia.
- To investigate the relationship between project team characteristics and success of innovation project implementation.
- To identify project team characteristics that determine success of innovation project implementation.
- To investigate whether dynamic managerial capabilities moderate the relationship between project team characteristics and success of innovation project implementation.

- To investigate whether types of innovation moderate the relationship between project team characteristics and success of innovation project implementation.

1.4 Research Questions

In achieving the above objectives, this research will be designed to answer the following research questions:

1. To what extent are the manufacturing organizations in Malaysia successful in implementing innovation?
2. What is the relationship between project team characteristics and success of innovation project implementation?
3. Does the dynamic managerial capabilities moderate the relationship between project team characteristics and success of innovation project implementation?
4. Does the types of innovation moderate the relationship between project team characteristics and success of innovation project implementation?

1.5 Significance of the Study

The contributions of this study are two fold; that is towards theoretical implications and organizational practices. As a whole, this study is expected to contribute towards the study of groups and innovation management. In terms of theoretical significance, this study intends to improve on existing literature by addressing three issues. Firstly, there has been limited research carried out at the implementation phase. This study intends to establish project team characteristics that are critical to the success of innovation project implementation. Secondly, literature has posited the importance of dynamic managerial capabilities but little empirical evidence is available. This study will provide insight into the role of dynamic managerial capabilities in moderating

the relationship between project team characteristics and success of innovation project implementation. Thirdly, types of innovation have not been treated as a multi dimensional construct in most literature. This study will explore whether types of innovation moderate the relationship between project team and success of innovation project implementation. All of these will lead to contributions towards the existing theory and knowledge of innovation implementation.

The practical significance lies in the attempt of this study to provide an operational framework for implementing innovation successfully in organizations. This framework can serve as a practical guide for practitioners who can then implement innovation. For practicing managers, the appropriate selection of team members vis-à-vis the characteristic will enhance the success of innovation project implementation. The dynamic managerial capabilities practiced by the managerial core will further enhance success. It will bring organizations closer to experiencing innovation projects meeting the goals set. Thus, enhancing organizational performance and effectiveness.

1.6 Scope of the Study

This study is limited to the implementation phase of innovation. The focus of the study is to examine project team characteristics. The project team characteristics which will be explored are leadership behaviour, functional diversity, ownership, cross-functional cooperation and skills. The project team characteristics and success of innovation project implementation relationship will be limited to dynamic managerial capabilities and types of innovation as the moderators. The coverage of the study will be manufacturing organizations in Malaysia.

1.7 Definition of Key Terms

Key terms, which will be regularly used throughout this study, are briefly defined as follows:

Innovation refers to an internally generated or purchased device, system, policy, program, process, product or service that is new to the adopting organization (adapted from Damanpour & Evan, 1984; Zaltman, Duncan & Holbek, 1973).

Implementation refers to the extent to which innovation is operationalized and implemented in the organization correctly (Cozijnsen et al., 2000; Vrakking, 1995; Zaltman et al., 1973).

Success of innovation project implementation is the degree to which the defined goals of adopting the innovation have been achieved (Cozijnsen et al., 2000).

Project is a temporary endeavour undertaken to create a unique product or service (PMBOK Guide, 2004).

Project team refers to a group of individuals responsible for completing the project work (Jiang et al., 2002).

Project team characteristics refer to quality that is typical of the group of individuals in the project team (Collins Cobuild English Language Dictionary, 1987).

Project leader refers to a person who takes an inordinate interest in seeing that the project is fully implemented (Cooper and Kleinschmidt, 1994).

Leadership is defined as the choice of the direction of activity and the establishment of a working environment that positively encourages and supports that activity (Harborne & Johne, 2002; 2003).

Leadership behaviour refers to task and people orientation behaviour or actions (Flamholtz, 1986; 1990).

Task oriented behaviour refers to actions that emphasise on technical or task aspects of the job (cited in Robbins, 1998).

People oriented behaviour refers to actions that emphasise on interpersonal relations (cited in Robbins, 1998).

Functional diversity refers to the degree in which members from different functional areas with an equal stake in and commitment to the project, these players are designated members by their own functional management and are given specified release time for the project (Cooper and Kleinschmidt, 1994).

Ownership refers to the extent a team member works on the project on a full-time basis or allocates a high percentage of time on the project and being involved in the project right from the beginning until the end (Ammeter & Dukerich, 2002).

Cross-functional cooperation refers to the interpersonal relations, teamwork and communication among project team members from multiple functional areas working together to accomplish project goals (Pinto & Pinto, 1990).

Interpersonal relations refer to the relationships amongst the team members (DuBrin, 2001).

Teamwork refers to a set of values that encourages listening, responding constructively to views expressed by others, providing support and recognizing the achievement of others (Katzenback & Smith, 1993).

Communication is defined as the vehicle through which personnel from multiple functional areas share information that is critical to the successful implementation of projects (Pinto & Pinto, 1990).

Project team skills refer to the skill level of the members assigned to the project (Barry, Mukhopadhyay & Slaughter, 2002).

Technical / technology management skills refers to technical expertise and skills; also the ability to deploy technologies effectively and profitably (Lee, Trauth & Farwell, 1995).

Business functional skills refers to general business knowledge, interpreting business problems and understanding the business environment (Lee et al., 1995).

Interpersonal and management skills refer to behavioural skills or the ability to deal with people (Lee et al., 1995).

Dynamic managerial capabilities refer to the capabilities with which managers build, integrate and reconfigure organizational resources and competencies (Adner & Helfat, 2003).

Types of innovation refer to administrative versus technical, product versus process and radical versus incremental (Cooper, 1998; Damanpour, 1991).

Radical innovation is innovation that results in revolutionary digression from product concepts and technological practices (Sciulli, 1998).

Incremental innovation is innovation that results in a lesser degree of departure from existing practices (Dewar & Dutton, 1986).

Administrative innovation refers to changes that affect the policies, allocation of resources and other social structure related factors (Daft, 1978).

Technical innovation refers to the adoption of an idea that directly influences the basic output processes (Daft, 1978).

Product innovation refers to changes in the end product or service offered by the organization (Utterback, 1994).

Process innovation refers to changes in the way firms produce end products or services (Utterback, 1994).

1.8 Summary and Organization of Remaining Chapters

This chapter has provided the background of the current study. This study will be focusing on the success of innovation project implementation for manufacturing organizations in Malaysia. Chapter One also established the problem statement, research objectives and the research questions. Besides these, it also highlights the scope and significance of the study. Lastly, Chapter One incorporated the definition of key terms to be used in the study.

The remaining chapters of this study will be organized as follows; Chapter Two will cover the literature review. Here, previous research carried out on the related subject matter will be discussed. From the literature review, the theoretical framework for this research will be established. Chapter Two will also identify the dependent and independent variables together and develop the hypotheses set for this research.

Chapter Three covers the research approach, subjects, questionnaire and statistical methods. Chapter Four will discuss data gathered and analysis related to hypotheses testing. It will also include evaluation of findings. In Chapter Five, which is the final chapter, there will be discussion, implications, limitations and suggestions for future research.