

SHIPBUILDING TRANSFER OF TECHNOLOGY MODEL
FROM THE RECIPIENT PROSPECTIVE

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Dedicated to:

To my beloved wife Sitalechmi, children - Tarcayani, Harshini and Yashwanth Naidu for their support, patience and encouragements.

To my beloved father Jayaraman Naidu and mother Mangammah for their prayers and unconditional love.

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ABSTRACT

This longitudinal qualitative case study identifies the receiver caused barriers in International Transfer of Technology (ToT) program involving PSC-ND's New Generation Patrol Vessel Project from Germany to Malaysia. In line with qualitative research methodology, a number of data sources and data collection methods were employed. Observation of individual Technical Procurement Specification meetings with technology source and regular attendance at the weekly project progress review meeting was part of this study. The author was involved with the organizations from the inception of the ToT project. Events were observed as they unfolded and the researcher was often present when decisions were being made in response to these events and the eventual outcomes reported. Apart from attending management meetings information was gathered from interviews and other relevant documents as well as author's field notes based on observation and informal discussion. A total of 60 interviews were conducted lasting about one hour with participants of the ToT program, senior management staff and Technology Source mainly representative of OEM, Training Subcontractors from Australia and German Naval Group. Interviews were taped and transcribed. Data analysis involving data reduction, display and verification were undertaken throughout the duration of the study. Analysis of the data resulted in development of various themes that interpret the meaning of data. The research identified that both the government Joint Monitoring Committee and PSC-ND Project Managers' contributed to the poor project management practices in the ToT Management. Besides lack of formal ToT Management, the research identified various barriers in the key activities of Identification of Technology of Interest, Technology Acquisition, Technology Absorption and Adaptation and Technology Innovation. The study has recommended a comprehensive ToT Management Model to effectively manage ToT.

ABSTRAK

Kajian kes kualitatif 'longitudinal' ini telah mengenal pasti proses pemindahan teknologi serta rintangan dari penerima teknologi untuk satu program pemindahan teknologi untuk projek pembinaan Kapal Peronda Generasi Baru TLDM dari Jerman ke Malaysia. Selaras dengan metodologi kajian kualitatif, pelbagai kaedah pengumpulan dan sumber data telah digunakan. Penulis telah terlibat dengan projek ini semenjak peringkat awal. Maklumat berkaitan kajian ini telah diperolehi semasa penulis menghadiri pelbagai mesyuarat pengurusan serta rundingan dengan pihak OEM. Catatan perhatian telah direkodkan semasa kejadian. Selain dari itu maklumat juga telah diperolehi hasil dari temuduga, kajian dokumen serta temuduga kumpulan fokus. Sejumlah 60 temuduga telah dilaksanakan. Setiap temuduga mengambil masa lebih kurang satu jam. Responden untuk temuduga telah dipilih berdasarkan kriteria yang telah ditentukan. Responden ini terdiri dari peserta program pemindahan teknologi, pengurusan PSC-ND, wakil OEM, wakil GNG, serta pakar runding latihan dari Australia. Hasil temuduga telah direkodkan semasa temuduga. Selepas temuduga, rekod telah ditranskripkan secara 'verbatim'. Analisa data merangkumi tiga proses utama iaitu tapisan data, tayangan data dan verifikasi data. Analisa data telah membantu dalam menghasilkan kategori serta tema dari pemrosesan data. Kajian ini telah mengenal pasti bahawa pengurusan PSC-ND dan Jawatankuasa Pengawasan Bersama Kerajaan telah menyumbang ke arah kelemahan pengurusan projek pemindahan teknologi. Kajian juga telah mengenal pasti kekangan dalam proses mengenalpasti teknologi yang diperlukan, perolehan teknologi, penyerapan dan penyesuaian teknologi serta aplikasi dan inovasi teknologi. Proses mengkaji data secara terperinci telah membantu menghasilkan model yang dapat membantu proses pengurusan pemindahan teknologi dengan lebih berkesan.

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LIST OF ABBREVIATIONS

1	CAQDAS	Computer Aided Qualitative Data Analysis Software
2	COSYS M-100	Combat System M-100
3	COSYS M-110	Combat System M-110
4	CPAF	Commercial Package Achievement Fee
5	DID	Data Identification Description
6	EADS	European Aeronautic Defence and Space
7	EXCO	Executive Council
8	FDI	Foreign Direct Investment
9	GMD	Group Managing Director
10	GNG	German Naval Group
11	GoM	Government Of Malaysia
12	HOD	Head Of Department
13	HR	Human Resource
14	IAMOT	Internal Association For Management of Technology
15	IP	Intellectual Property
16	IPR	Intellectual Property Right
17	ITTM	Integrated Technology Transfer Model
18	JMC	Joint Monitoring Committee
19	JV	Joint Venture
20	KLIA	Kuala Lumpur International Airport
21	KM	Knowledge Management
22	LDC	Less Developed Countries
23	MARS	Material Acquisition and Resource Scheduling

24	MIGHT	Malaysian Industry Government For High Technology
25	MNC	Multinational Corporation
26	MNE	Multi National Enterprise
27	MOT	Management Of Technology
28	MSC	Multimedia Super Corridor
29	NGPV	New Generation Patrol Vessel
30	NTTC	National Technology Transfer Centre
32	OEM	Original Equipment Manufacturers
33	OJT	On Job Training
34	OLM	Onboard Level Maintenance
35	PMBOK	Project Management Body of Knowledge
36	PMP	Project Management Professional
37	PN17	Practice Note 17
38	PRC	People Republic Of China
39	PSC	Penang Ship Corporation
40	PSC-ND SDN. BHD.	Penang Ship Corporation – Naval Dockyard Sendirian Berhad
41	PV	Patrol Vessel
42	R&D	Research And Development
43	RMN	Royal Malaysian Navy
44	RMNTS	Royal Malaysian Naval Training System
45	ROI	Return of Investment
46	S&T	Science And Technology
47	SAP	Scientific Advisory Panel
48	SDC	Source Data Collection
49	SMA	Scientific Management Associate

50	SME	Subject Matter Expert
51	SUNY	State University Of New York
52	TA	Technology Acquisition
53	TA&TS	Technical Assistance & Technical Support Team
54	TNA	Training Needs Analysis
55	TOI	Technology Of Interest
56	ToT	Transfer Of Technology
57	TPS	Technical Procurement Specification
58	TR	Technology Recipient
59	TS	Technology Acquisition
60	UNCLOS	UN Convention Laws Of The Seas
61	UNCTAD	United Nations Conference on Trade and Development

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter introduces the phenomenon of Receiver Caused Barriers in Technology Transfer in Penang Shipbuilding Corporation –Naval Dockyard Sdn Bhd (PSC-ND). It discusses the background of the study, a brief history of PSC-ND Sdn Bhd, the research problem, research objectives, and justification for the study, organization of the thesis and key definition and concepts.

1.2 Research Background

On September 5, 1998, the Government of Malaysia (GoM) signed a contract worth RM 5.35 billion with PSC-Naval Dockyard Sdn. Bhd. (PSC-ND) for the design, construction and delivery of first batch of 6 out of 27 New Generation Patrol Vessels (NGPV). The first two of the six vessels was built in Germany while the next four is currently being built by PSC-ND in Malaysia. The NGPV project was conceived in 1990, following Malaysia's signing of the UN Laws of the Seas Treaty (UNCLOS). UNCLOS resulted in Royal Malaysian Navy (RMN) being entrusted with new responsibilities which calls for it to be capable of undertaking blue water operations for extended periods far beyond Malaysian territorial waters in three dimensions – surface, sub-surface and in the air. It will simply be a self-defence system, operating either stand-alone or in concert with other Malaysian naval or aerial assets as an integral part of the surface combatant force in the RMN. In peacetime, the NGPV will contribute to the development of operational tactics and doctrines by involving in national and international exercises. Besides that the NGPV will also conduct maritime surveillance, patrol and response tasks, which include fisheries patrols, law enforcement tasks and protection of offshore resources and infrastructures.

In addition to giving new mission capabilities to the RMN, the NGPV project will help develop the national maritime industry in general, and the shipbuilding and defence industries in particular. One of the core requirements of this project is to acquire Transfer of Technology (ToT) to enable PSC-ND to acquire the competency required to build the NGPV.

The technology transfer program for this project is based on a On Job Training (OJT) Program with design authority of the NGPV i.e., German Naval Group (GNG) in Hamburg, Germany. Figure 1 shows the overall OJT Program overview. After the completion of the OJT program, the technology recipient will be assisted by the GNG SME in Lumut during the second phase of the ToT through a Technical Assistance and Technical Support (TA/TS) program.

TECHNOLOGY TRANSFER FROM GNG

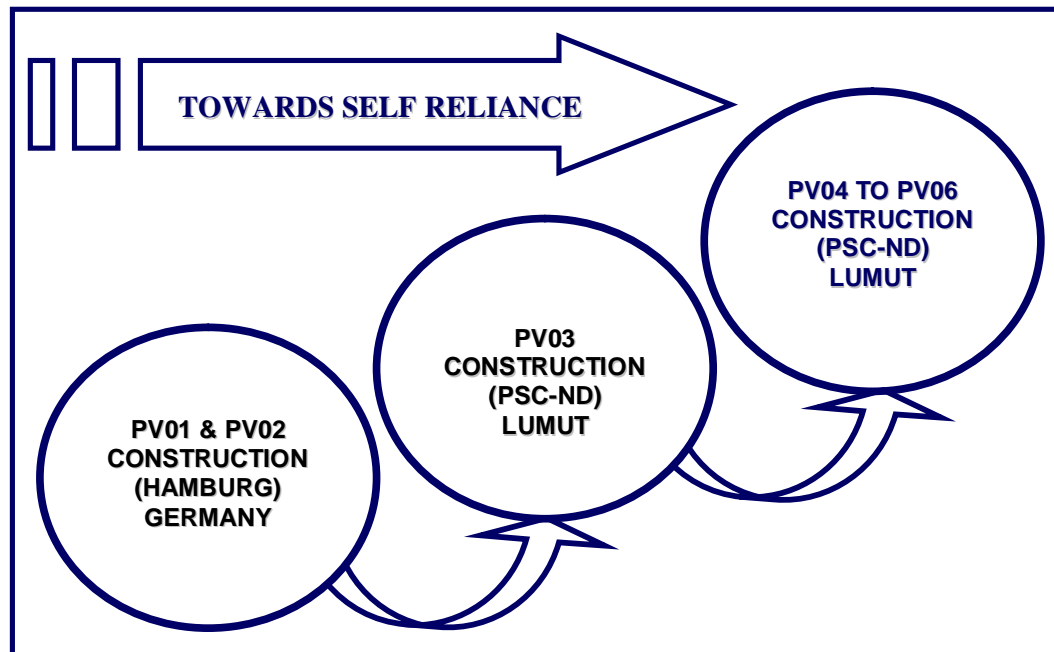


Figure 1.1: OJT Program Overview

1.3 Researcher's Background

In qualitative case study, the investigator is the primary instrument for gathering and analyzing data. As such, the researcher can respond to the situation by maximizing opportunity for collecting and producing meaningful information (Merriam, 1988).

The author joined PSC-ND Sdn Bhd as a Training Manager on 1 Mac 2000. He was part of the Project Management Team responsible for the New Generation Patrol Vessel (NGPV) Project. The NGPV project was a high profile national defence project with major emphasis on Transfer of Technology. The author was actively involved in executing the ToT program developed in 1999.

The initial phase of the ToT program was going on smoothly for about one year. By middle of 2001, the author realized that his organization is creating barriers for ToT, despite investing hundreds of millions ringgit into the ToT program. Upon discussion with fellow professionals in the Training Department and his university professors, the author developed the interest to study the barriers and its implication towards the success of ToT as part of his doctorate research. The author is a strong advocate of pro-active management, thus keen to know how the receiver could be more responsible in managing the element of TOT Management within their area of influence. Literature review of various ToT model shows that there is as significant theoretical gap in the ToT Management especially from the perspective of managing receiver caused barriers. Even though the Government of Malaysia is spending billions of Ringgit in defence projects with emphasis on technology transfers, there is no significant study on the effectiveness of past and current technology transfer programs and effective methods to manage these programs.

The author joined the International Association of Management of Technology (IAMOT) in 2002 to further enhance his knowledge on Technology Management. Appendix A is the author's IAMOT membership reference. He has also presented papers in various seminars as shown in Appendix B as part of his professional development program.

Since 2001, the author attended various courses in Project Management and enrolled as a member of Project Management Institute (PMI). The author qualified as a Project Management Professional (PMP) of USA based Project Management Institute in 2008. PMP is a globally recognized qualification for project management Appendix C is the PMP certificate of the author. The author's experience as a military officer, training manager and relevant practical and professional experience in Technology Management and Project Management is certainly an asset to facilitate data collection and interpretation to achieve the objectives of this study.

1.4 Organizational Background

1.4.1 RMN Dockyard

The Royal Malaysian Navy (RMN) Dockyard was commissioned in 1984 and it was organic to the RMN's Organization. Its primary mission was to carry out Depot Level Activities, including Refits, Docking and Essential Defects (DED), Slipping and Emergency Repairs, for RMN Ships and provide engineering and technical support services to Intermediate Level Activities conducted by Fleet Technical Support Unit.

1.4.2 Naval Dockyard Sdn. Bhd.

On September 1, 1991, RMN Dockyard was corporatized and known as Naval Dockyard Sdn. Bhd. (NDSB). The main change was that employees are no longer Government Servants but that of the Company, it has a business relationship with RMN, as Client together with the Company as a service provider.

1.4.3 PSC-Naval Dockyard Sdn. Bhd.

The Company was privatized on December 11, 1995 with PSC Industries Berhad becoming the controlling shareholder. The name was changed to PSC-Naval Dockyard (PSC-ND) Sdn. Bhd. Under the Privatization Agreement, the Company is assured all RMN ship repair businesses under the 'Rights Granted' clause.

New businesses – shipbuilding, heavy engineering and the PV Project, were introduced to the company. Management and management systems were also changed. PSC-ND invested in various software packages as shown in table 1.1 to enhance the business processes.

Table 1.1: Business Process Improvement Software

S/No	Software	Business Process
1.	SAP	Financial Management
2.	MARS	Material Management
3.	FORAN	Design Management

The introduction of MARS also meant the discontinuation of the previous materials management system called 'Progress'. Some staff recalled, "Upon introduction of MARS, 'Progress' was literally cut-off all electronic data lost except for hard copies". To some, this meant the loss of all previous data on ship repair and materials.

The new management changed the organization; material management and production planning functions were abolished. The project management team system was introduced. This was a major change, a commercial approach rather than a typical functional government system. Unfortunately, the redefinition of roles and responsibility without the change in mindset together with acceptance weakened the system. To further reinforce commercial approach, PSC implemented a system of having operating companies for every business unit. The concept was for these companies to operate as independent business entities, lessen the burden bureaucracy

within PSCND (that was the impediment to 'progress') by providing a separate platform for management of these business.

The ship repair platform business was placed under Ship Repair Sdn. Bhd. (SRSB), a subsidiary of PSC-ND. The ship repair electronics business, went under companies of other PSC subsidiaries, such as Naval and Communication Defence System (Navcom), INDS and C3I System. The new company for weapons business was Arsenal Sdn. Bhd. Service providers too were placed under subsidiaries such as the design team into Naval Tech and trading under Dominion Industries. Joint venture companies such as PSC Bofors and Aero Marine (AMS) were operated independently.

1.5 The Problem Statement

Practitioners of International Technology Management have observed that the technological transfer program that have led to increased productivity in particular organizations in some countries have failed in other places (Alkfaji, 1995). The erratic reactions of organizations to new technologies have prompted some researches to speculate that few organizations hold the characteristics that govern effective Transfer of Technology (ToT). Technology Transfer has been traditionally regarded as a diffusion process by which innovations, knowledge, and the operational behaviours necessary to sustain the new technology are transmitted. Technology recipient in most cases are of lesser-developed countries and overly dependent on the transferor for the success of ToT (Radosevic, 1999).

The party best equipped to organize or classify the technology is technology source. Technology source often has a clearer perspective and understanding of the technology. However, the technology source frequently does not understand the precise technology requirements of the technology- recipient, nor the specific context in which the technology recipient plans to apply the technology. The technology source also commonly has minimum knowledge regarding the experience and aptitude of the technology user which leads to mismatch in expected pre-requisites

and existing ability of the technology recipient. This mismatch often results in failure of effective ToT.

Conversely, the technology recipient understands the context in which the technology is applied, but neither understands the knowledge in sufficient depth nor necessarily knows that it exists, in order specifically determine and acquire it. To put it simply as stated by Koulopoulos (1999), the technology provider knows the answer, but not the question, and must thus organize the technology by attempting to second guess the technology – seeker’s question. The technology – seeker, on the other hand, understands the question, but has insufficient perspective of the answer to know where it may be best found. This translates itself into ‘information overload but technology under load’. Effective management of ToT is critical to address the above mentioned issues of technology suitability and compatibility. However, in order for technology transfer to be successful, the culture of the transferee must be conducive for effective ToT (Dunning, 1995). Organizational and technical infrastructures are needed for effective ToT.

The ToT program in Malaysia, specifically in defence industry is lacking in comprehensive ToT Management (Eui, 2004). There has been no study on any form of ToT effectiveness in previous defence procurement exercises. Thus, currently there is no empirical evidence on the effectiveness of the ToT program. Available literature in ToT management does not consider local organizational culture in ToT effectiveness. This study will investigate various receiver caused barriers in ToT and determine effective management of these barriers. A guideline for effective management of the identified barriers will be developed. The proposed ToT management guideline will provide significance assistance in ToT management to ensure success of the ToT.

1.6 Research Questions

Based on the above discussions, the following research question has been identified:

- (i) What are the motivation for technology transfer among corporate level leaders, business level leaders and organizational level staff of PSC-ND?
- (ii) How does the process of Transfer of Technology occur in the PSC-ND's NGPV Project?
- (iii) What are the receivers caused barriers in the Transfer of Technology in the PSC-ND's NGPV Project?
- (iv) How do technology recipients caused the barriers that impede the effectiveness of the technology transfer program?
- (v) What are the implications of the receiver caused barriers towards the NGPV Project?

1.7 Scope of the Study

The scope of this study covers the activities related to the planning and implementing of TOT at PSC-ND from the year 1999 to 2004. The justification for single case study is discussed in Chapter 4. The study covers the barriers caused by the receiver. The rationale for focussing on the receiver caused barriers is due to constraints and contractual barriers for the representative of the technology source to share their views on this research topic. Besides that, literature review shows that the past studies mostly investigate the element of ToT from the perspective of technology source. There is no study done on the barriers caused by various stakeholders of technology transfer in the context of Malaysian Armed Forcer. The NGPV Project is one of the major ToT programs of the Malaysian Armed Forces

(NGPV Contract, 1998). The focus on receiver caused barriers is also consistent with the proactive approach towards management as described by Covey (2004) as “being proactive is more than taking initiatives. It is recognizing that we are responsible for our own choices and have freedom to choose based on principles and values rather than moods or conditions. Proactive people are agents of change and choose not to be victims, to be reactive, or to blame others”.

Managing receive caused barriers is within the area of influence of PSC-ND, thus the authors agree with Covey’s (1988) suggestion that proactive people should focus on their circle of influence and should prioritize the work on areas they can do something about.

1.8 Justification for Study

The international ToT from developed to developing countries continue to be an important stimulus to industrialization and economic growth for the latter. In the military context, the ToT program is vital towards self reliance of the technology recipient. Based on the potential gain of ToT, developing countries like Malaysia is investing multi billions Ringgit in ToT programs. However, practitioners of International Technology Management have observed that the technological transfer led to increased productivity in particular organizations and have failed in other places (Alkfaji, 1995). Effective ToT Management is critical for the success of any ToT Program. The ability of the technology recipient to manage the ToT Program is imperative to ensure the Return of Investment (ROI) from ToT and freedom from the continuous dependence on technology source. The outcome of this research has the potential to contribute towards effective management of ToT in PSC-ND and can be adopted as the framework for technology transfer model for future defence project in Malaysia. The purpose of this research would be to contribute to the body of knowledge of technology transfer with regard to the identified theoretical gap from literature review. The expected practical outcome from this research is the Integrated ToT Management Model to facilitate effective management of ToT.

1.9 Definition of Key Terms.

Table 1.2 shows the definition of key terms of this study.

Table 1.2: Definition of Terms

S/No	Term	Definition
1.	Docking Essential Defects (DED)	Defects that can only be rectified during docking period.
2.	Depot Level Maintenance (DLM)	Maintenance and Repairs that needs specialised or sophisticated tools and test equipment which can be done in a depot.
3.	Emergency Repairs	Urgent defects that requires immediate rectification.
4.	NGPV	New generation Patrol Vessel Project of Royal Malaysian Navy (RMN) is a program to replace RMN's old patrol boats built in 1960's. The NGPV is built based on MEKO 100 German technology. NGPV is designed to have low radar detectability, low noise and low heat dissipation.
5.	Refit	Periods where a ship undergoes repair and maintenance.
6.	Slipping	Small class of ships undergoing minor repairs which requires docking.
7	Tacit technology	Technology that is difficult to be transferred to another person by means of writing down or verbalizing it. Tacit knowledge often consists of culture and values. Effective transfer of tacit knowledge generally requires extensive personal contacts and trust.
8.	Technology Management	A set of management discipline that allows organisation to manage its technological fundamentals to create competitive advantage.
9.	Technology Transfer	The process of sharing technology to a wider range of users who can then develop and exploit the technology into new products, processes and applications.

10. UNCLOS United Nations Convention of the Law of the Sea (UNCLOS) is the international agreement that resulted from the third United Nations Conference of the Law of the Sea. The law defines rights and responsibilities of nations in their use of world's ocean, establishing guidelines for businesses, the environment and management of marine resources.

1.10 Organization of Thesis

This thesis comprises six chapters. Chapter 1 introduces the research problem and objectives of the study. Chapter 2 presents the related literatures on ToT and how this literature affects the research orientation of this study. Chapter 3 presents the development of a new model of ToT management with emphasis on managing receiver caused barriers. Chapter 4 discusses the research design and methodology adopted in this study. The limitation of the study will also be explained in this chapter. Chapter 5 explains the result of analysis and discussion based on data collected from observation, questionnaire survey, interview, focus group and document review. Chapter 6 concludes the thesis. The benefits of this study to PSC-ND and the proposed further research in this area are explained in this chapter. Figure 1.2 shows the organization of the thesis

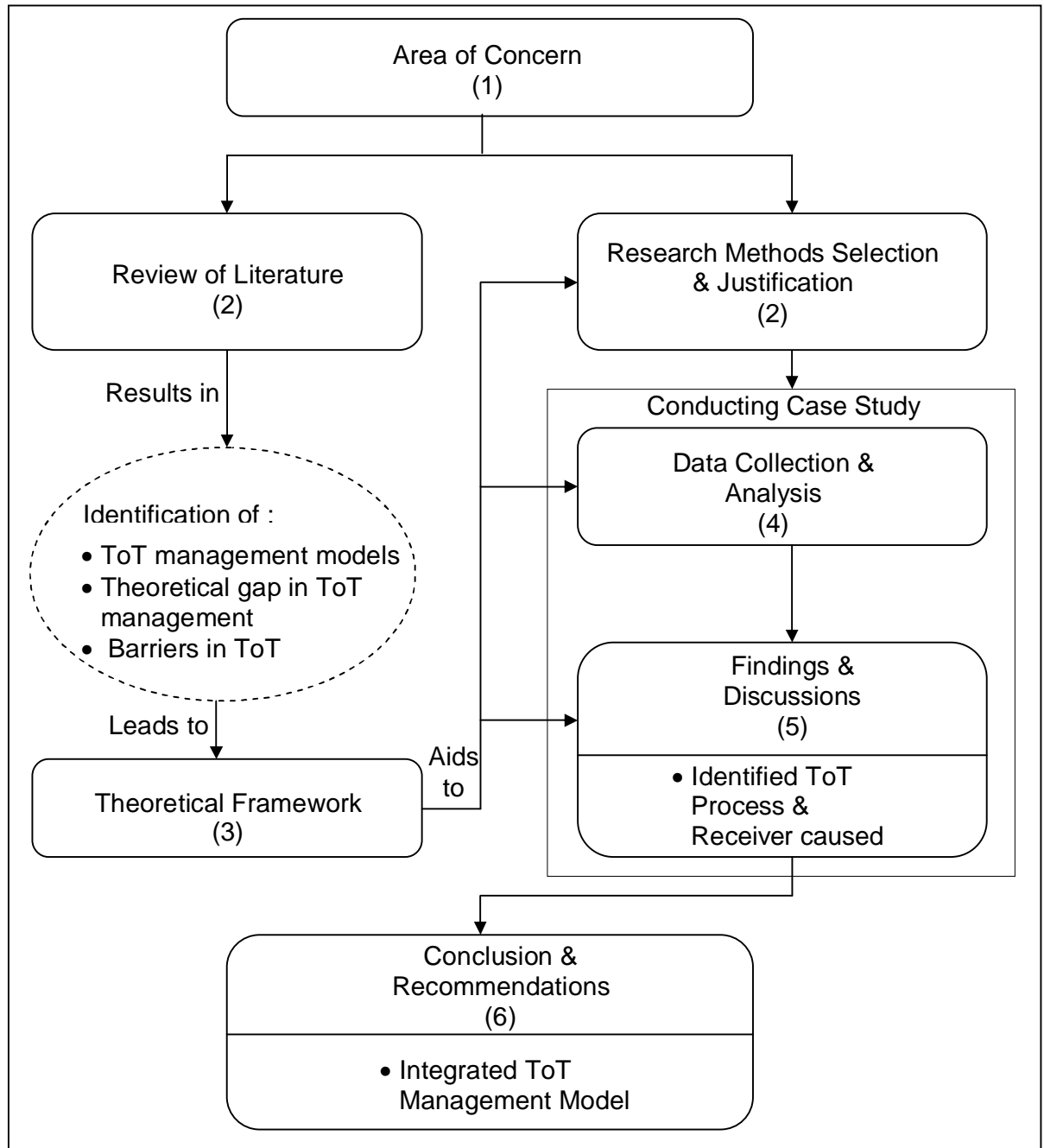


Figure 1.2: Thesis Structure

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