AN INVESTIGATION OF DECISION SUPPORT KNOWLEDGE PRODUCTION, TRANSFER AND ADOPTION FOR IT OUTSOURCING

A Thesis submitted by

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Abstract

Information Technology Outsourcing (ITO) is a widely-adopted strategy for IT governance. ITO decisions are very complicated and challenging for many organisations. During the past three decades of ITO research, numerous decision support artefacts (e.g. frameworks, models, tools) to support organisational ITO decisions have been described in academic publications. However, the scope, rigour, relevance and adoption of this research by industry practitioners had not been assessed.

This study investigates the production, transfer and adoption of academic research-generated knowledge for ITO decision support through multiple perspectives of ITO researchers and practitioners (e.g. IT managers, IT consultants) to provide insights into the research problem.

A mixed-methods research approach underpinned by the critical realism paradigm is employed in this study. The study comprised three phases.

In Phase A, the scope of extant research for supporting ITO decisions is identified through a systematic literature review and critical assessment of the rigour and relevance of this body of research is conducted using a highly regarded research framework. One hundred and thirty three articles on IT outsourcing (including cloud sourcing) were identified as ITO decision support academic literature. These articles suggested a range of Multiple Criteria Decision Making (MCDM), optimisation and simulation methods to support different IT outsourcing decisions. The assessment of these articles raised concerns about the limited use of reference design theories, validation and naturalistic evaluation in ITO decision support academic literature. Recommendations to enhance the rigour and relevance of ITO decision support research are made in this thesis.

Phase B involved interviewing and surveying academic researchers who published academic literature on ITO decision support artefacts. This phase reports researchers' reflections on their ITO research experience and knowledge transfer activities undertaken by them. The findings indicate researchers' motivations, knowledge transfer mechanisms, and communication/ interaction channels with industry may explain effective knowledge transfer. *Impact-minded* researchers were significantly more effective than *publication-minded* researchers in knowledge transfer.

In Phase C, interviews and a survey of practitioners engaged in IT outsourcing shed light on practitioners' use of academic-generated knowledge. Academic research was the least used source of decision-making knowledge among ITO practitioners. Practitioners preferred to seek advice from their peers, IT vendors and consultants to inform their ITO decision making. Two communities of users and non-users of academic research were identified in our sample of ITO practitioners, with non-users forming the majority. Six factors that may influence the use of academic research by practitioners were identified. Non-users of academic research held perceptions that academic research was not timely, required too much time to read, was far from the real world and that it was not a commonly-used knowledge source for practitioners. Also, non-users of academic research read academic research less frequently and did not perceive themselves as an audience for academic research.

This study engaged two fields of research: ITO decision support and academic knowledge transfer/utilisation (including research-practice gap). ITO decision support research provide the specific context for a critical assessment of academic knowledge production, transfer and adoption. For ITO DSS, this study identified the scope, rigour and relevance of the field, and improvement opportunities. This study confirms that a research-practice gap exists in the ITO decision support field as previously suggested by some scholars. Also, this study made a significant contribution to the highly complex and contested field of research utilisation and the research-practice gap. The relationship between research and practice in terms of knowledge production, transfer and utilisation is modelled using social system theory. Multiple theories are applied through a retroductive (abductive) analysis to shed light on the root causes of the research-practice gap. This study suggests that the lack of adequate appreciation of research relevance in academic reward schemes and the academic publishing structure are the main root causes of the research-practice gap in the knowledge production side. Moreover, various institutional mechanisms exist in knowledge transfer and adoption domains that influence the knowledge adoption channels of practitioners. As a result, academic research does not become a priority source of ITO decision support knowledge for practitioners. This study suggests that to overcome the barriers to academic research adoption by practitioners, the effective structural coupling mechanism between the system of science (knowledge production domain) and organisation systems (knowledge consumption domain) needs to be identified and activated.

Keywords 1) Decision Support System Adoption; 2) Information Technology Outsourcing; 3) Academic Knowledge Transfer; 4) Social System Theory; 5) Research-Practice Gap; 6) Information Systems Research Evaluation

List of Publications from Current Research

Rajaeian, MM, Cater-Steel, A & Lane, M 2016, 'Do they read your research? An investigation of practitioners' use of IT outsourcing and cloud sourcing research', in *Australasian Conference on Information Systems (ACIS 2016)*: *Proceedings of the Australasian Conference on Information Systems (ACIS 2016)* Wollongong.

Rajaeian, MM, Cater-Steel, A & Lane, M 2015, 'IT outsourcing decision factors in research and practice: a case study', in *Australasian Conference on Information Systems (ACIS 2015)*: *Proceedings of the Australasian Conference on Information Systems (ACIS 2015)* Adelaide.

Certification of Thesis

This thesis is entirely the work of **Mohammad Mehdi Rajaeian** except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Student and supervisors' signatures of endorsement are held at USQ.

Professor Aileen Cater-Steel

Principal Supervisor

Dr Michael Lane

Associate Supervisor

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Abbreviations

Abbreviation	Description
ABS	Australian Bureau of Statistics
AHP	Analytic Hierarchy Process
ANP	Analytic Network Process
ASP	Application Service Provider
BSC	Balanced Scorecard
CBR	Case-Based Reasoning
CEO	Chief Executive Officer
CIO	Chief Information Officer
CR	Critical Realism
DSS	Decision Support System
DoI	Diffusion of Innovation
EY	Ernst & Young
ELECTRE	ELimination Et Choix Traduisant la REalité (ELimination and Choice Expressing REality)
GA	Genetic Algorithm
HBR	Harvard Business Review
IAOP	International Association of Outsourcing Professionals
IS	Information Systems
IT	Information Technology
ITO	Information Technology Outsourcing
KBT	Knowledge-Based Theory
KT	Knowledge Transfer
MADM	Multi-Attribute Decision-Making
MCDM	Multiple-Criteria Decision Making
MODM	Multi-Objective Decision-Making
OPBOK	Outsourcing Professional Body of Knowledge
PROMETHEE	Preference Ranking Organisation METHod for Enrichment of Evaluations
RBR	Rule-Based Reasoning
RBV	Resource Base View
RQ	Research Question
TCT	Transaction Cost Theory
TOPSIS	Technique for Order of Preference by Similarity to Ideal Solution
VIKOR	VIseKriterijumska Optimizacija I Kompromisno Resenje (Serbian)
USQ	University of Southern Queensland

Chapter 1. Introduction

1.1. Background to the research

This study was conducted to address the gap in IT outsourcing (ITO) decision support research regarding knowledge about the rigour and relevance of the research in this field and the adoption of the academic-generated knowledge by ITO practitioners. On the one hand, ITO practitioners face complicated ITO decisions that involve many interrelated decision variables and need to balance numerous risks and rewards involved in ITO decisions. On the other hand, academic researchers have published a plethora of decision support tools (methods, frameworks, etc.) to help practitioners, but the scope, rigour and relevance of this body of literature was not well established. Furthermore the adoption of the academic research-generated decision support knowledge by ITO practitioners was not well understood, due to the lack of empirical research that has investigated the uptake of decision support research on IT outsourcing to date.

This introductory chapter provides a background to the research reported in this thesis and states the research problem addressed. This chapter is organised into eight sections. Section 1.1 provides the background to the study. The research problem is described in §1.2, followed by the justification for the research in §1.3. Section 1.4 introduces the methodology used in the study. The structure of the thesis is described in §1.5, and the key definitions used in the study are provided in §1.6. The delimitations of scope and key assumptions are provided in §1.7, and the chapter ends with a conclusion in §1.8. Figure 1-1 portrays the overall structure of this chapter.

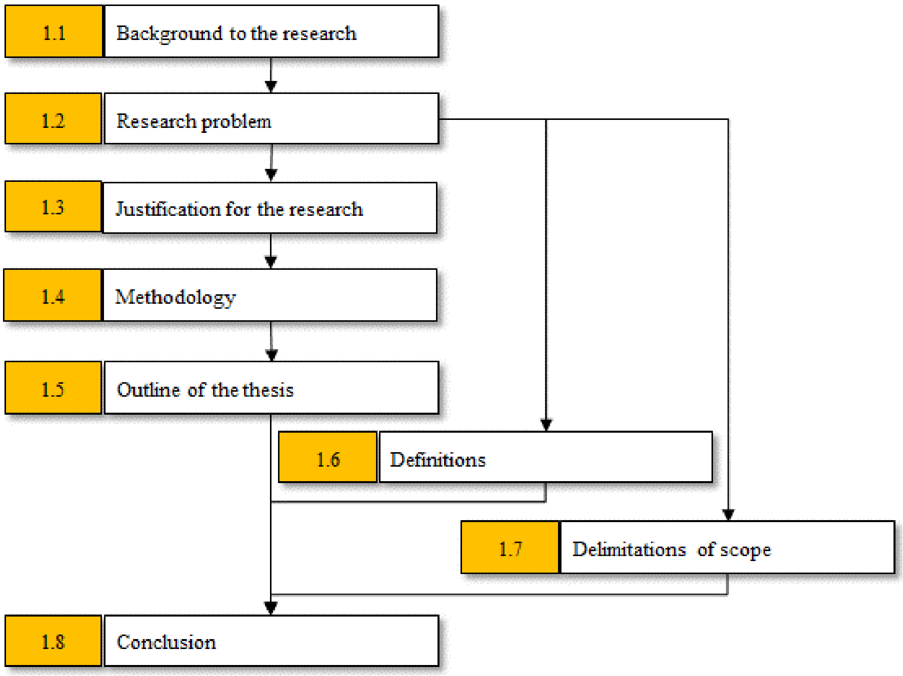


Figure 1-1 Structure of chapter 1

1.2. Research problem

IT outsourcing is an established IT governance strategy, and ITO decisions are vital for organisations. The ITO industry is expanding continuously, shaped by complex multi-sourced environments and disruptive technologies such as cloud computing (Lacity, Yan & Khan 2017, p. 77; Lacity et al. 2010; Liang et al. 2016). Consequently, the ITO field has become increasingly complicated (Liang et al. 2016). The research into IT outsourcing is extensive and IT outsourcing decisions have been the subject of both *descriptive* and *normative* research for nearly three decades. The *descriptive* strand, with the adoption of various theories from different disciplines, seeks to understand the ITO decisions and ITO outcomes (Lacity et al. 2010). The *normative* strand is concerned with how organisations can make effective ITO decisions. A significant body of normative ITO decision support research is focused on developing model-driven Decision Support Systems (DSS). Model-driven decision support systems are a class of DSS that use quantitative models including algebraic, decision analytic, financial, simulation, and optimisation models to provide decision support functionality (Power & Sharda 2007; Power, Sharda & Burstein 2015). This body of research is *prescriptive* in nature and targets organisational decision makers involved in different IT outsourcing decisions.

Research Problem 1

The need for and the importance of literature reviews in the IS discipline has been recently highlighted (e.g. Boell & Cecez-Kecmanovic 2015; Paré et al. 2015) because literature reviews provide a reflection on prior research and provide a foundation for future studies. Although there are several journal articles that provide reviews of the *descriptive* ITO literature (e.g. Blaskovich & Mintchik 2011; Dibbern et al. 2004; Gonzalez, Gasco & Llopis 2006; Lacity et al. 2010; Lacity, Khan & Willcocks 2009), to date, to the best of my knowledge, there is no comprehensive review of the normative/prescriptive strand that represents ITO decision support models/tools. Moreover, no assessment of this body of literature was found to provide a comprehensive account to practitioners who might be in search of a decision support tool for their ITO decisions or to researchers who wish to expand the depth and breadth of the field. This study is motivated by the observation of the lack of a critical review and assessment of ITO decision support research in the literature. To address this gap, the following research questions are investigated in the study:

RQ1: What type of decision support artefacts have been suggested in the literature to support organisational IT outsourcing decisions?

RQ2: What level of rigour has been applied by researchers who developed model-driven artefacts to support organisational IT outsourcing decisions?

Research Problem 2

First, while empirical research suggests that a rational and formalised ITO decision-making process results in better decision outcomes (Aubert, Patry & Rivard 2005; Sven & Björn 2011; Westphal & Sohal 2016), the lack of a structured and systematic approach to ITO decision making in practice is frequently highlighted in the literature. Furthermore, some studies warned about the limited impact of ITO research on decision making in practice or the existing inconsistencies between ITO decision making in theory and practice (Brannemo 2006; De Looff 1995; Kramer, Klimpke & Heinzl 2013; McIvor 2000; Palvia 1995; Westphal & Sohal 2013, 2016). For instance, Westphal and Sohal (2016, p. 1) noted: “ITO decisions seem to be made without the use of any of the decision models [proposed by researchers]”. More specifically, the need to investigate the ways in which ITO practitioners gain knowledge to guide the governance and management of ITO decision processes was raised by Sven and Björn (2011). Despite the concerns raised in the literature, no study has been found that investigates the extent to which ITO practitioners use this research-generated knowledge.

Second, programs that aim to facilitate and foster the dissemination of academic-generated knowledge to industry emphasise the role and responsibility of the *knowledge producer* in the dissemination of created knowledge (Chai & Shih 2016). Knowledge transfer (KT) can occur through various knowledge-related collaboration activities by academic researchers with non-academic organisations, called *academic engagement* by Perkmann et al. (2013, p.424). Prior studies have revealed several knowledge transfer activities undertaken by academic researchers and various factors that affect the extent of researchers' engagement in knowledge transfer (e.g. demographics, career trajectory, attitudes, and motivation). However, the literature is largely silent on factors that determine the *effectiveness* of these knowledge transfer activities. This study is motivated by the observation of a gap in the literature about effective academic knowledge transfer, and by recent research (Franco & Haase 2015) that raised the problem of underappreciated career effects of academic engagement and its possible discouraging impact on the engagement of academic researchers with industry. Also, this study was motivated by the call for empirical research to investigate rigour, relevance, and knowledge transference in IS research (e.g. Becker et al. 2015; Jabagi et al. 2016; Straub & Ang 2011). For instance, Straub and Ang (2011, p. viii) argued that the relevance gap and knowledge transfer in IS research "has never been empirically studied. Finding scientific evidence for whether academe is influencing practice is a challenge yet to be met".

To address these gaps and obtain a holistic view, this study investigated the problem from two perspectives: 1) the production and transfer of ITO decision-making knowledge, generated by academic researchers, to the practice world, and 2) the adoption of research-generated knowledge for ITO decision-making by industry practitioners.

To investigate the knowledge-transfer activities employed by academic researchers in the IT outsourcing decision support field, the study addressed the following research questions:

RQ3: What knowledge-transfer activities are employed by academic researchers in the IT outsourcing decision support field?

RQ4: What factors may explain effective knowledge transfer from academic researchers to practitioners?

To examine the adoption of academic-generated decision-making knowledge for ITO by industry practitioners, the following research questions were addressed:

RQ5. To what extent are practitioners' IT sourcing decisions informed by academic research compared to rival external sources of decision-making knowledge?

RQ6. What factors may hinder the adoption of research-generated knowledge by IT practitioners?

The conceptual model shown in Figure 1-2 illustrates the research objectives and questions about the three key areas of knowledge production, transfer and adoption.

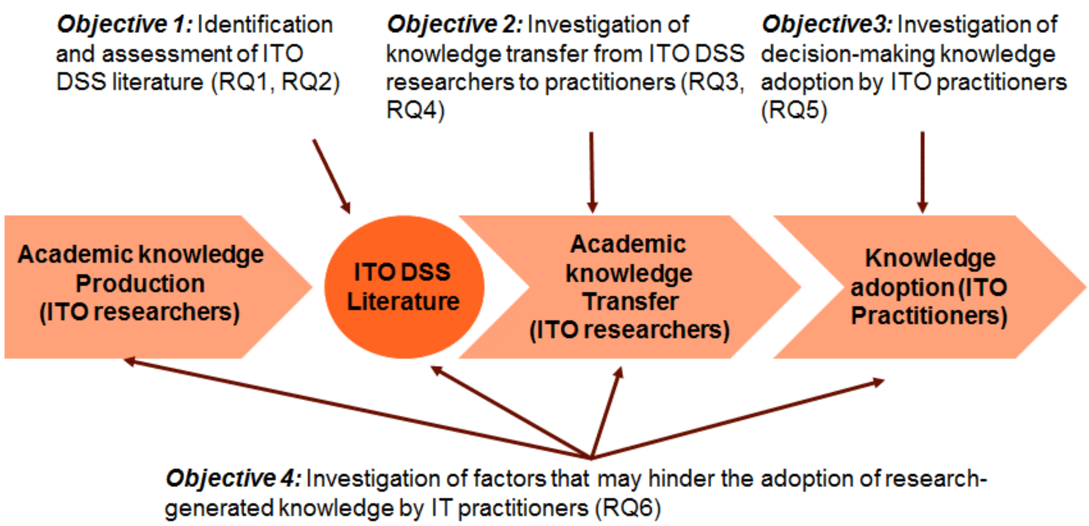


Figure 1-2 Research Conceptual Model

The relationships between the research problems, research objectives and research questions are shown in Table 1.1.

Table 1.1 Research problems, objectives and questions

Research problem	**Objective**	**RQs**
Academic researchers developed various decision support tools for ITO, but 1) the scope and rigour of ITO DSS literature has not been assessed 2) the adoption of academic-generated ITO decision support knowledge is unknown and was claimed to be limited in practice.	To identify and assess the state of the art DSS research on ITO decisions	RQ1 RQ2
	To investigate the transfer of ITO DSS research by academics to practitioners	RQ3 RQ4
	To investigate the adoption of ITO decision-making knowledge by practitioners	RQ5
	To investigate barriers to adoption of research-generated knowledge by IT practitioners	RQ6

1.3. Justification for the research

The research provides four significant contributions. *First*, the ITO market has been growing over the past three decades (Gartner 2013) and has been a common and widespread strategy for IT governance. Despite the widespread adoption of ITO, not all organisations are satisfied with their ITO initiatives. There are numerous cases of ITO failure or dissatisfaction reported in the literature (e.g. Barthélemy 2001; Cabral, Quelin & Maia 2014; Erber & Sayed-Ahmed 2005). Some organisations that adopted ITO later decide to abandon their ITO initiative and bring their IT back in-house due to dissatisfaction with ITO outcomes or internal or external organisational changes. The following instance from practitioners' media (CIO.com) exemplifies one case in which an organisation changed their IT sourcing model over time and highlights the importance of a comprehensive and prudent ITO decision-making process for organisations.

> *"Kellwood's multimillion dollar IT outsourcing deal with EDS served it well for many years. But after significant organisational changes and intense investigation of the 13-year deal, it became clear that insourcing was the best way for the apparel maker to save money moving forward … Analysis revealed that … insourcing IT would not only streamline IT services and provide greater flexibility than outsourcing; it would also generate even more cost savings"(Overby 2010).*

As another example, in 2002 JPMorgan announced its seven-year, five billion dollars outsourcing arrangement with IBM, which was at the time the largest outsourcing deal on record. However, in 2005, the company decided to end the contract with IBM and bring its IT back in-house (Overby 2005).

These examples clearly show the complexity and the risks involved in ITO decisions. The complex nature of ITO decision-making is a well-recognised and agreed upon fact among academic ITO researchers (Lacity, Willcocks & Rottman 2008; McIvor 2008; Smith & McKeen 2004). The increase in adoption, volume and complication of ITO prompted academic researchers to develop decision models, frameworks and tools to support practitioners in their ITO decision making. However, these decision-support artefacts were not available in one place e.g. in a literature review paper, and have not been critically assessed regarding rigour and relevance.

Therefore, it is worthwhile to examine the literature and develop a comprehensive account and assessment of suggested decision-support artefacts to help ITO decision makers (practitioners) to become aware of and use these artefacts and ITO researchers to improve them. This study is significant in its assessment of the body of knowledge pertaining to the ITO decision-support field, identification of its weaknesses, and suggestions of a rigorous foundation for future designs of ITO decision support systems.

Second, Business/Management and Information Systems are applied and profession-based disciplines. In these disciplines, it is essential that research is relevant to practice, and research-generated knowledge is presented in such a way that its practical value is clear and understandable (Kanellis & Papadopoulos 2009). The "*raison d'être* for MIS[1] research" (Lee 1999b, p. 8) is the IS profession or IS corporate function (i.e. IS practice). Some scholars (e.g. Gill 2010) argued that "business schools are producing a large amount of research that is entirely irrelevant to practice" (p.238). While, without research outcomes relevant to practice, the very existence of such applied research disciplines could be questioned (Gill 2010; Rosemann & Vessey 2008). In the ITO DSS field, a vast amount of knowledge created through academic research does not become applied in practice (Siegel et al. 2003). Hence, industry

[1] MIS (Management Information Systems) is a commonly used term in the US for IS (information systems)

practitioners (IT decision makers) may be oblivious to research-generated knowledge. Therefore, it is worthwhile to research the transfer and adoption of academic-generated knowledge in the ITO DSS field and identify factors that may hinder adoption of this knowledge in practice or could facilitate effective knowledge transfer and adoption.

Third, this study is significant because it *empirically* investigates the relevance and adoption of a niche domain of Business/Management and Information Systems research. Despite persistent concerns about the research-practice gap in these disciplines (Becker et al. 2015; Benbasat & Zmud 1999; Rosemann & Vessey 2008), *empirical* studies that investigate the relevance of research to practice and the research-practice gap are scarce both in Business/Management and Information Systems disciplines (Bartunek & Rynes 2014; Jabagi et al. 2016). For instance, a recent review of the academic literature on the research-practice gap in the Management field (Bartunek & Rynes 2014) showed that the number of articles that address a gap of some type between Management research and practice has increased since 2000, but the majority of the publications (87%) do not report *empirical* research and "consist primarily of normative opinion statements" (p.1183). Similarly, Kieser, Nicolai and Seidl (2015) reviewed the research-practice gap literature in Management and concluded that the majority of literature in this area lacks scientific rigour. Thus, there is a clear need for rigorous empirical research on the research-practice gap issue, and this study can contribute toward this goal in the ITO decision-making field.

Last, this study provides significant contributions to the academic knowledge transfer and research-practice gap literature. The insights obtained from this study can be leveraged to improve the practical relevance of academic ITO research, facilitate the effective knowledge transfer from academia to industry, and offer solutions to bridge the gap between academic research and practice, particularly in Business/Management and Information Systems disciplines.

1.4. Methodology

This study uses a mixed-method research approach (Creswell & Clark 2011; Venkatesh, Brown & Bala 2013; Venkatesh, Brown & Sullivan 2016) under the

Critical Realism (Bhaskar 1975, 1978, 1989) paradigm to investigate the complex, socio-technical and multifaceted topic of ITO DSS knowledge production, transfer and adoption. The study comprises three phases.

In phase A, a *systematic literature review* (Okoli 2015; vom Brocke et al. 2015) is followed to identify ITO DSS articles. Then the identified articles have been assessed using Hevner et al.'s (2004) Information System Research Framework, and other relevant frameworks through *document analysis*.

In phase B, a *mixed-method* approach comprising *semi-structured interviews* and a *survey* of ITO DSS researchers was applied to investigate knowledge transfer from academic researchers to industry.

In phase C, a *mixed-method* approach comprising *semi-structured interviews* and a *survey* of ITO practitioner (ITO decision makers and consultants) was used to investigate adoption of research-generated knowledge for ITO decision-making.

1.5. Outline of the thesis

The thesis is organised into eight chapters as shown in Figure 1-3. Chapter 1 provides a background to the study and an introduction to the research. The justification for the study and methodology, definitions and delimitations of the scope of the study are provided in this chapter. The arrows show the links between the eight chapters.

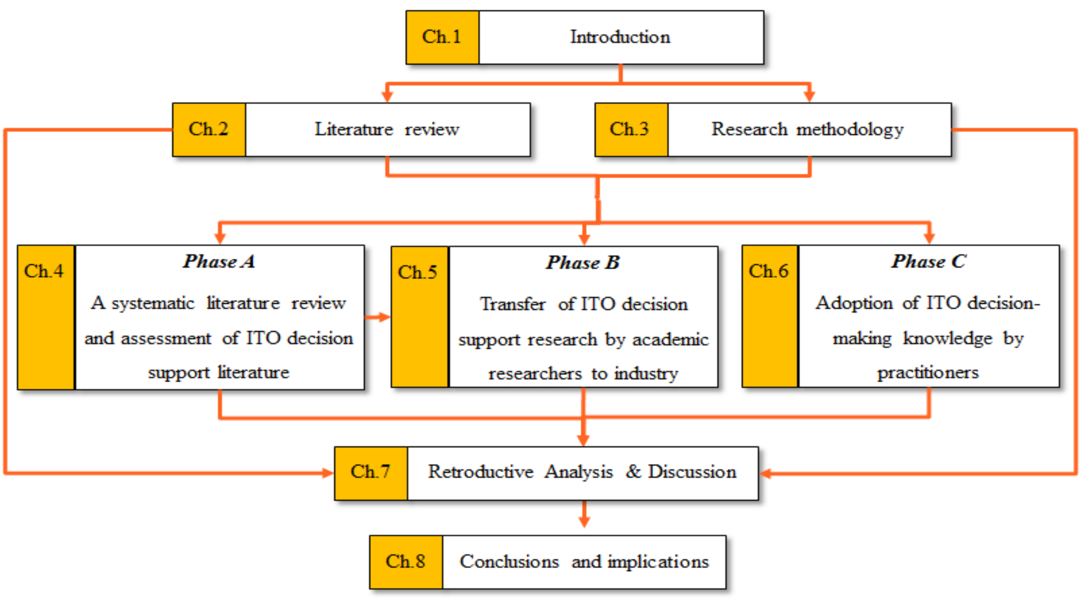


Figure 1-3 Structure of the thesis

Chapter 2 provides a review of the related literature. This review summarises and critically assesses the prior research relevant to the research problem and provides the theoretical grounding for the study.

Chapter 3 discusses the research approach, comprising paradigm/philosophy, design, and methodology of this study. In this chapter, the mixed-method approach and the Critical Realism research paradigm are reviewed and justified. Also, the data collection method comprising semi-structured interviews and questionnaire surveys, and the study's ethical considerations are explained.

Chapter 4 provides a summary and assessment of ITO DSS literature that resulted from the systematic literature review and document analysis. This chapter reports the scope and assessment of rigour and relevance of the available ITO DSS research.

Chapter 5 is focused on the transfer of ITO decision support research by academic researchers to industry. This chapter describes the qualitative and quantitative analysis applied to the researchers' interview and survey data. The results of analysis of semi-structured interviews and the survey of ITO researchers are reported.

Chapter 6 is focused on the adoption of ITO decision-making knowledge by ITO practitioners. This chapter describes the qualitative and quantitative analysis applied to the practitioners' interview and survey data.

The results of analysis of multiple interview-based case studies, cross-case analysis of the case studies, interviews with IT consultants and the survey of ITO practitioners are described.

Chapter 7 includes a retroductive analysis and discussion of the research findings. The goal of the retroductive analysis is to infer the causal mechanism underlying the empirical events investigated in the study. Throughout Chapter 7, the findings from the three research phases are related back to the research problem and the prior literature to provide answers to the research questions. This chapter shows how the results of this study confirm, reject or extend the prior literature about the research questions.

Chapter 8 provides the conclusions and recommendations of this study. The results of the analysis are used to answer the research questions. The contribution of the research to the body of knowledge and implications of the research for theory and practice are presented. Then limitations of the study are discussed and recommendations and areas of future research proposed.

1.6. Definitions

In this section, the definitions of the key terms used in this thesis are provided for clarification purposes.

IT Outsourcing (ITO): IT Outsourcing, also known as Information Systems (IS) outsourcing, is defined as “handing over to a third party, management of IT/IS assets, resources, and/or activities for a required result” (Willcocks & Kern 1998, p.2).

Offshoring: In offshoring or offshore outsourcing the service provider and the client firm are located in different countries (Carmel & Tjia 2005).

Net-sourcing: Net-sourcing means accessing centrally managed business applications provided by Application Service Providers (ASPs) to multiple users from a shared facility over the Internet for rent or pay per use (Kern, Lacity & Willcocks 2002; Loebbecke & Huyskens 2006).

Cloud sourcing: “[Cloud computing] is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location. The resources required to provide the requisite quality-of-service levels are shared, dynamically scalable, rapidly provisioned, virtualised and released with minimal service provider interaction. Users pay for the service as an operating expense without incurring any significant initial capital expenditure, with the cloud services employing a metering system that divides the computing resource in appropriate blocks” (Marston et al. 2011).

Decision support systems (DSS): Decision support systems are designed artefacts that support decision-making activities and can be classified as i) communications-driven, ii) data-driven, iii) document-driven, iv) knowledge-driven, and v) model-driven systems (Power, Sharda & Burstein 2015).

Degree of complexity: degree of complexity of a decision is related to the number of factors considered and their inter-relationships. High complexity is associated with unclear preferences and environmental change (Nilsson 2008).

Degree of structure: The degree of structure of a decision is defined as the degree of cause/effect knowledge and access to an established procedure for decision making (Nilsson 2008)

Model-driven DSS (also called model-oriented DSS or computationally oriented DSS): A class of DSS that uses quantitative models including algebraic, decision analytic, financial, simulation, and optimisation models to provide decision support functionality (Power & Sharda 2007; Power, Sharda & Burstein 2015).

Knowledge production: the activity of generating research findings (Gray et al. 2014).

Knowledge transfer: the movement of knowledge from one place to another (Gray et al. 2014).

Knowledge translation: the mediating interventions to shape knowledge products to enhance their accessibility, relevance or usability in practice (Gray et al. 2014).

Research/Knowledge use or utilisation**:** the tangible ways in which knowledge is taken up, adopted, implemented and used in practice. In other words, research-based knowledge travels to and leads to change in the fields for which it is intended (Gray et al. 2014).

1.7. Delimitations of scope

This section describes the scope delimitations for this research.

First, in Phase A and Phase B of this study, the scope of normative ITO literature was delimited to *model-driven* ITO decision support. This delimitation excluded the *qualitative* literature that provides advice for ITO decision making. This delimitation was necessary to conduct the review and assessment of ITO decision support literature within the time and resource constraints of a PhD study. Also, due to the focus of this study on organisational decision-making, the literature about decision-making at the application level or technical level (e.g. the optimum cloud configuration) was excluded from the review.

Second, in Phase B of the study, qualitative case studies were geographically limited to four large organisations in Queensland, Australia due to time and resource constraints of the study.

Third, in Phase C, while the study acknowledged the multifaceted nature of knowledge transfer, to realise an empirical investigation of knowledge transfer, the focus was on the knowledge transfer activities of the academic researchers (as knowledge producers). In other words, the knowledge transfer activities that might have been undertaken by other parties, e.g. mass media were out of the scope of this study.

1.8. Chapter summary

Chapter 1 has provided the foundations for this thesis and introduced the research. In this chapter the research problem was introduced and a justification for the study outlined. The methodology was briefly described, key definitions used in this PhD thesis were provided and the delimitations of the research scope were described.

Chapter 2. Literature review

2.1. Introduction

The aim of this chapter is to establish the theoretical foundation upon which this PhD Thesis is based. To achieve this goal, the relevant literature is critically reviewed, and research issues, e.g. gaps or unanswered questions in three problem domains in the literature, are identified.

This chapter then discusses the existing knowledge and theories for the related two research problems investigated in this study and identifies the gaps in the literature. §2.2 and §2.3 provide the background literature about the first research problem that is the lack of knowledge about scope, rigour and relevance of ITO decision support research. Section 2.2 provides an overview of ITO research with a focus on descriptive ITO decision-making research. Section 2.3 briefly describes the decision analysis theory that underpins the model-driven ITO decision support literature presented in Chapter 4. Section 2.4 establishes the theoretical groundings for investigation of the second research problem. In section 2.4 several theories that provide insight to the study of knowledge transfer from academia to industry, adoption of knowledge by industry practitioners, and the research-practice gap are discussed. The final section is a summary of this chapter. The structure of this chapter is shown in Figure 2-1.

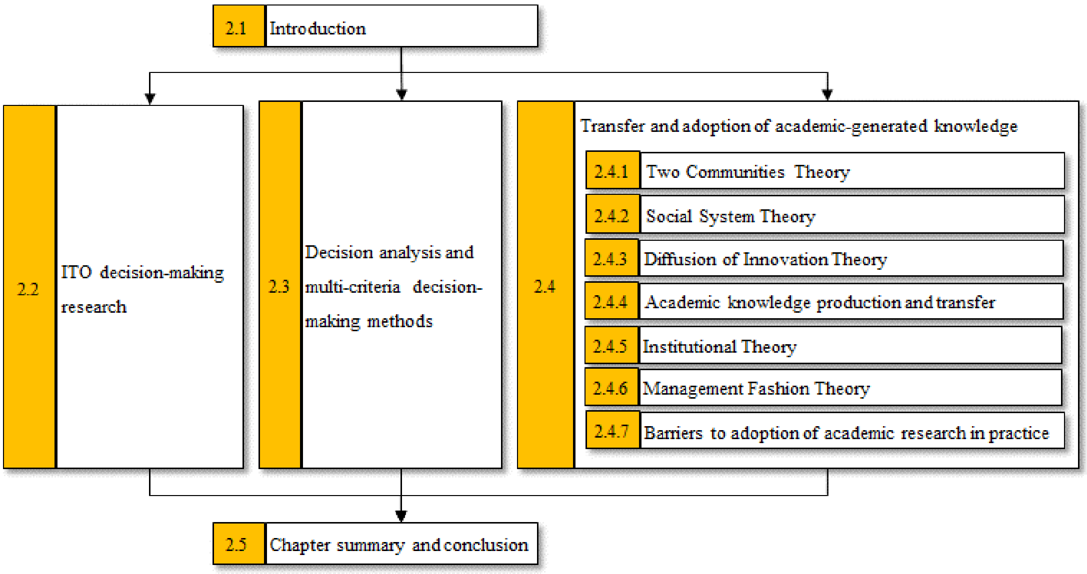


Figure 2-1. Structure of chapter 2

2.2. ITO decision-making research

IT Outsourcing, also known as Information Systems (IS) outsourcing, is defined as "handing over to a third party, management of IT/IS assets, resources, and/or activities for a required result" (Willcocks & Kern 1998, p.2). Dibbern et al. (2004, p. 11) defined ITO as "the organisational arrangement instituted for obtaining IS services from external entities and the management of resources and activities required for producing these services". Examples of IT/IS activities include systems operations, applications development and maintenance, network and telecommunications management, help desk and end-user support, and systems planning and management (Grover, Cheon & Teng 1994). In this study, IT outsourcing is used as a generic term that covers various ways to obtain IT resources/services from external organisations including IT offshoring, net-sourcing, and cloud-sourcing. Net-sourcing refers to multiple users accessing centrally managed business applications provided by Application Service Providers (ASPs) from a shared facility over the Internet for rent or pay per use (Kern, Lacity & Willcocks 2002; Loebbecke & Huyskens 2006). In offshoring or offshore outsourcing the service provider and the client firm are located in different countries (Carmel & Tjia 2005). Cloud computing can be viewed as an evolution of ITO because it enables organisations to purchase IT resources and capabilities from another organisation as a service, over a network (Yigitbasioglu, Mackenzie & Low 2013). Cloud sourcing has been increasingly adopted in recent years, and its adoption continues to grow (Huang 2016). Cloud sourcing involves similar decisions to traditional ITO such as the *decision to adopt cloud services* and *service/provider selection* (Lacity & Reynolds 2014). Nevertheless, cloud computing differs from IT outsourcing in some aspects. One key difference is the lack of fixed long-term contracts for cloud services that gives more control and flexibility to clients compared to traditional IT outsourcing (Khajeh-Hosseini et al. 2011).

Although outsourcing encompasses a broad range of sourcing options, purchasing goods or services cannot be considered as outsourcing, except in the case of make or buy decisions in which the goods or services were previously provided internally (Lacity & Hirschheim 1993) or could have been provided internally. For instance, when an organisation purchases Microsoft Office software, the decision cannot be considered as outsourcing, since the internal provision of this type of software is almost never an option.

While the origins of information systems outsourcing can be traced back to 1960s, it was Kodak's 1989 contract with IBM that has been credited with the widespread interest in outsourcing (Applegate & Montealegre 1991; Dibbern et al. 2004). IT Outsourcing started as a mechanism to lower costs, has grown steadily and is now a widely accepted practice in the management of IT. ITO has evolved from the one vendor – one client arrangement, to complex arrangements involving multiple providers and multiple clients. Outsourcing now embraces partnerships and alliances that are called *co-sourcing* deals where client and vendor share risk and reward. The deals have moved beyond simple cost-savings to include value-based outsourcing, equity-based outsourcing, e-Business outsourcing, and business process outsourcing (Dibbern et al. 2004). Along with the growth of the ITO market and ITO types/models, an extensive body of academic research has accumulated that studied ITO decisions and ITO outcomes (Lacity et al. 2010).

The main decision makers in ITO decisions are IS/IT executives (e.g. CIOs) and other top management executives (e.g. CEOs), and decisions are usually made through group decision-making processes (Apte et al. 1997; Dibbern et al. 2004; Lacity et al. 2010). External consultants also play a major role in the process that impacts on the ITO decisions (IAOP 2010; Lacity & Willcocks 1997), and according to Ernst &

Young (EY), the use of consultants for support and advice in ITO decision making is increasing (EY 2013).

The various decisions that have been subjected to research in the *ITO decisions* category include: to outsource or not?, which IT supplier is better to select? Should the organisation consider offshore outsourcing? (Blaskovich & Mintchik 2011; Dibbern et al. 2004; Lacity et al. 2010). Figure 2-2 has mapped these decisions across two distinct phases of the IT outsourcing process – the decision process and the implementation process.

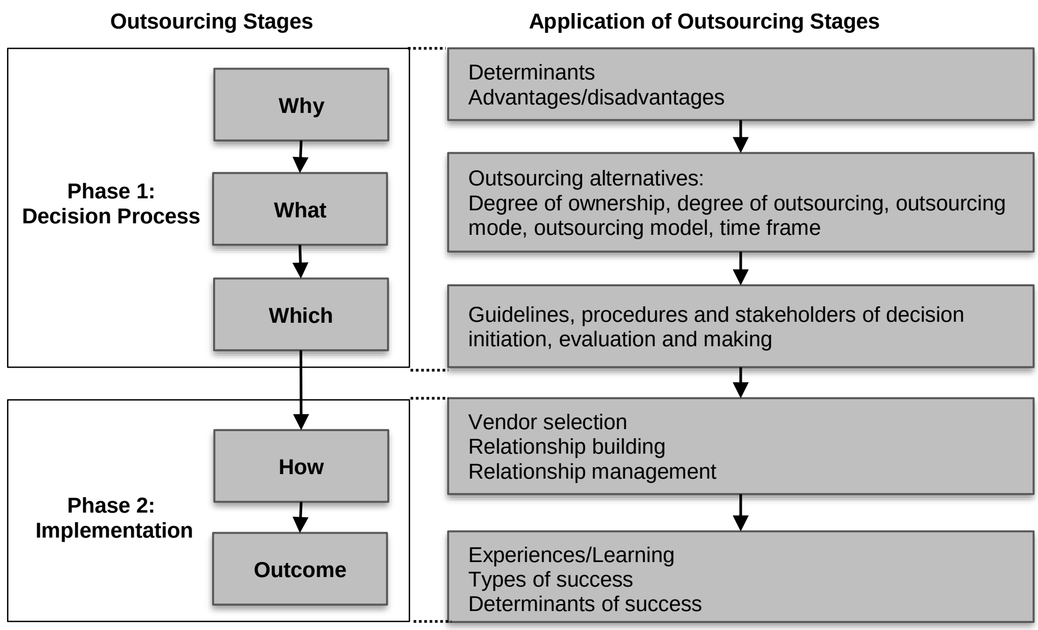


Figure 2-2. Stage model of IT/IS outsourcing

Source: Adapted from Dibbern et al. (2004)

Organisations should first decide whether to outsource or not. In other words, they should answer *why* an organisation might consider outsourcing its IS/IT functions? This question is not always easily answered. To answer this *why* question, the *determinants* or *antecedents* that might contribute to a decision to outsource and the *risks and rewards*, or *advantages and disadvantages*, associated with outsourcing should be determined. Most ITO decisions involve many complexities due to involvement of many factors in decision making (Ang & Cummings 1997), both technological and business oriented (Gulla & Gupta 2011), some of them with uncertain value (Zhang, Jiang & Huang 2012), and very convoluted interrelationships among the factors (Liu & Li 2013).

The high level of complication of IT outsourcing decisions has led to the use of many theories from diverse disciplines since no single theory fully explain the range of complex practices involved in ITO (Blaskovich & Mintchik 2011; Hancox & Hackney 2000; Tiwana & Bush 2007). Table 2.1 lists theories that researchers have applied to investigate IT outsourcing and test a large number of relationships between independent and dependent variables.

Table 2.1 Theories applied in IT outsourcing research

Category	Theories applied	Example articles
Economic Theories	Transaction Cost Theory (TCT)	Lacity and Willcocks (1995)
	Agency Theory	Hancox and Hackney (2000)
	Knowledge-based Transaction Costs (KTC)	Jain and Thietart (2013)
	Path Dependence Theory	Vetter, Benlian and Hess (2011)
	Prospect theory	Jain and Thietart (2013)
Social/ organisational Theories	Social Exchange Theory	Goo et al. (2007)
	Innovation Theories (e.g. Innovation Diffusion Theory)	Hu, Saunders and Gebelt (1997); Loh and Venkatraman (1992)
	Power and Politics Theories	Lacity and Hirschheim (1993)
	Relationship theory	Kern and Willcocks (2001)
	Social Capital Theory	Chou, Chen and Pan (2006)
	Theory of Institutional Isomorphism	Blaskovich and Mintchik (2011)
	Cognitive Dissonance Theory	Vetter, Benlian and Hess (2011)
Strategic Theories	Resource-Based Theory/View (RBT/RBV)	Cheon, Grover and Teng (1995);
	Strategic Management theories (Taxonomy of Defenders, Prospectors, and Analyzer, theories of Strategic Advantage, …)	Alvarez-Suescun (2007); Watjatrakul (2005) Aubert et al. (2008)
Other	Knowledge-Based Theory (KBT)	Tiwana and Bush (2007)
	Contrast Priming Theory	Stafford (2011)
	Commitment–Trust Theory	Goo and Huang (2008)
	Game Theory	Elitzur and Wensley (1997)

Source: developed from Dibbern et al. (2004) and Lacity et al. (2010)

Research has determined that the main factors that motivate firms to outsource their IT/IS include cost reduction, focus on core capabilities, access to external expertise/skills, access to technology/innovation, business/process performance improvements, flexibility enablement, commercial exploitation (to partner with a supplier to commercially exploit existing client assets or form a new enterprise), scalability, rapid delivery, cost predictability and headcount reduction/stabilisation (Lacity et al. 2010; Lacity, Khan & Willcocks 2009; Lacity, Khan & Willcocks 2011).

On the other hand, ITO can challenge organisations with several risks and challenges. These include loss of control, security/intellectual property risks, high transaction costs and potential conflicts in relationships with the IT service provider(s). Furthermore, characteristics of the client firm (outsourcer) that could affect the ITO decision include: firm size, industry, prior firm/IT department performance, IT department size, culture, critical role of IS in the firm, information intensity, firm's experience with outsourcing, financial position, and business strategy (Lacity et al. 2010; Lacity, Khan & Willcocks 2009; Lacity, Khan & Willcocks 2011).

The second main decision in the ITO process is what to outsource? The answers to *why to outsource?* from the previous stage can be used as criteria to evaluate the options available when asking *what to outsource?* Five fundamental parameters should be considered at this stage: first, degree of outsourcing, which can be *selective* or *total* depending on the extent of IT assets, leases, staff and management responsibility for delivery of IT services that is transferred to the vendor in the outsourcing arrangement (Lacity, Willcocks & Feeny 1996); second, *ownership* of the outsourcing arrangement which can be external (wholly owned by vendor), partial (joint-venture), or internal (spin-offs wholly owned subsidiary); third, outsourcing *mode* which can be single vendor - single client, single vendor - multiple clients, multiple vendors- single client, or multiple vendors - multiple clients; fourth, time frame (short term or long term); and finally, sourcing model (traditional ITO, cloud computing, etc.) (Dibbern et al. 2004).

The next question faced is *which choice to make?* This question refers to *procedures* for arriving at an outsourcing decision, *guidelines* to help organisations assess the various selection criteria, and their choice, and the actual *selection* of the final decision (Dibbern et al. 2004). The actual decision-making processes that lead to ITO decisions are still not well understood (unknown) and considered as a *black-box* that needs to be investigated (Blaskovich & Mintchik 2011). What we know about the ITO decision-making process is some of its attributes (characteristics) rather than the actual decision-making process as it is practised in the real world. For example, past studies revealed that ITO decisions are not necessarily the result of decision makers' rational choice, instead various political or institutional forces (e.g. mimetic or bandwagon effect) can influence them (Lacity & Hirschheim 1993). Hsieh and Huang (2008) argued that three main concepts characterise the ITO decision-making process practised in organisations. First, ITO decisions are negotiated outcomes, i.e. decisions are negotiated via internal or external interest groups rather than being made independently by the decision maker(s). Second, ITO decisions are context-dependent i.e. situated in a specific internal or external context that is influenced by environmental factors or organisational structures. Third, ITO decisions are not isolated, but interwoven (Langley et al. 1995) and interlinked with earlier decisions. Thus previous decisions may impact on subsequent decisions.

Once the decision to outsource has been made, the next question is *how to outsource*? The major decision in this stage is the vendor (service provider) selection. Vendor selection comprises consideration of various variables such as the vendors' location (onshore, offshore), expertise, service quality, cost and prior client/supplier working relationship (Dibbern et al. 2004).

Several case studies (e.g. Brannemo 2006; De Looff 1995; McIvor 2000; Westphal & Sohal 2013) showed that most practitioners do not make IT outsourcing decisions based on models proposed by academic researchers. For instance, interviews with 30 people involved in outsourcing decisions (De Looff 1995) revealed that formal methods and theoretical foundations for information systems outsourcing decisions are lacking and practitioners make decisions based on ideology, fashion and personal expectations instead of systematic analysis of actual consequences in comparable situations. In some cases, the decision was made early on, and the rest of the process was merely an attempt at justification (De Looff 1995; Lacity & Willcocks 1995; Palvia 1995).

Another set of interviews with senior managers in 12 organisations also showed the lack of a practical framework that could be used by organisations that attempted to integrate the key parts of the outsourcing decision (McIvor 2000). Dibbern et al. (2004) found that the decision on what to outsource was dependent on the specific situation within the individual organisation and the perceptions and preferences of the main decision makers. More recent research on ITO decision making in practice confirmed that even though there are many theoretical models for sourcing published in the literature, companies are not using these theoretical models and there is still a lack of support for ITO decisions (Brannemo 2006; Westphal & Sohal 2013).

Recent case study research that investigated the ITO decision-making process in practice also confirms no evidence of application of academic-prescribed decision aids in practice (Haveckin 2012; Kramer, Klimpke & Heinzl 2013; Silva, Lima & Molinaro 2013; Sven & Björn 2011). For instance, Sven and Björn (2011, p. 158) reported that "When analysing the outsourcing decision process it seems clear that the organisation (read, the CEO and the Board) had decided on outsourcing before the outsourcing decision project started". They also discussed many problems caused by the decision process and emphasised the need for well-developed ICT governance and management. Dibbern, Chin and Heinzl (2012) called for further research to examine how the alternative rationales of the IS outsourcing decision and the interaction between them are aggregated to result in a final outcome.

From the practitioners' world, Gartner (2008) reported that more than 70 percent of organisations make sourcing decisions without a sourcing strategy or any kind of methodical, systemic approach. Another practitioner-based source is the Outsourcing Professional Body of Knowledge (OPBOK) (IAOP 2010) that describes the best practices of outsourcing around the globe and provides guidance on ITO decision making. The OPBOK is used as the basis for IT outsourcing training and the Certified Outsourcing Professional (COP) certificate (IAOP 2010). My analysis of the OPBOK revealed two points. Firstly, there is not any quantitative decision models/ techniques included in OPBOK. Secondly, the decision models and frameworks are not rooted in the academic literature. My analysis of OPBOK's list of references showed that only two academic journals are cited in a few places in the book: Harvard Business Review (HBR) and Sloan Management Review, which both are practitioner-oriented academic journals. Thus, there is no reference to empirical ITO research papers in the OPBOK.

2.3. Decision analysis and multi-criteria decision-making methods

Decision analysis is widely recognised as a sound *prescriptive* theory (Zavadskas & Turskis 2011). According to Parnell et al. (2013, p. 2) the term *decision analysis* was coined by Howard (1966) and defined as "a body of knowledge and professional practice for the logical illumination of decision problems" and regarded as the application of *decision theory* (Howard 1968). A more detailed definition of *decision* *analysis* is provided by Clemen and Reilly (2001, p. 2): "Decision analysis provides effective methods for organising a problem into a structure that can be analysed. In particular, elements of a decision's structure include the possible courses of action, the possible outcomes that could result, the likelihood of those outcomes, and ultimate consequences (e.g., costs and benefits) to be derived from the different outcomes".

To overcome *bounded rationality* (Simon 1955, 1977) and restrictions of humans to evaluate trade-off alternatives, scholars have been in pursuit of methods to support decision makers to make optimal decisions. As a result, the *Multi-Criteria Decision-Making (MCDM)* or *Multiple-Criteria Decision Analysis (MCDA)* discipline has emerged, and various methods have been developed over the past five decades (Tzeng & Huang 2011). MCDM methods have been applied to solve real world problems with multiple and conflicting criteria in various domains. MCDM methods are divided into two categories: *Multi-Objective Decision-Making (MODM)* and *Multi-Attribute Decision-Making (MADM)* (Hwang & Yoon 1981; Tzeng & Huang 2011). MODM methods include decision variable values that are determined in a continuous or integer domain with either an infinite or a large number of choices, to best satisfy the decision makers' constraints, preferences or priorities. MADM methods, on the other hand, have been used to solve problems with discrete decision spaces and a predetermined or a limited number of choices, requiring criterion comparisons, and involving implicit or explicit trade-offs (Zavadskas & Turskis 2011).

A brief description of the most frequently adopted MCDM decision-making approaches to support ITO decisions is provided in Table 2.2. These methods are widely used in the ITO decision support literature as discussed in chapter 4.

Table 2.2 A brief description of the MCDM approaches applied in ITO literature

Decision method	Description	Pioneer author(s)
AHP (Analytic Hierarchy Process)	AHP simplifies complex problems by arranging the decision attributes and alternatives in a hierarchical structure and ranks the alternatives by use of a series of pairwise comparisons and relies on the judgements of experts to derive priority scales.	Saaty (1977, 1980, 2008)
ANP (Analytic Network Process)	A generalisation of AHP for dealing with the decisions that cannot be structured in the hierarchy because of the interdependence and interaction between decision attributes.	Saaty (1996, 2001)
ELECTRE (Elimination Et Choix Traduisant la REalité)	ELECTRE belongs to outranking methods and is based on pairwise comparison of the alternatives in which every option is compared to all other options.	Roy (1968)
PROMETHEE (Preference Ranking Organisation METHod for Enrichment of Evaluations)	This method provides the decision maker with a ranking of choices/alternatives based on preference degrees. A preference degree is a score between 0 and 1 which shows how much a choice/alternative is preferred over another one.	Brans, Vincke and Mareschal (1986)
TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution)	The fundamental concept of TOPSIS is that the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution. It allows trade-offs between criteria, where a poor result in one criterion can be neutralised by a good result in another criterion.	Hwang and Yoon (1981); Yoon (1987)
VIKOR (VIseKriterijumska Optimizacija I Kompromisno Resenje)	VIKOR employs linear normalisation to rank alternatives and determines the solution (named compromise) that is the closest to the ideal	Opricovic (1998); Opricovic and Tzeng (2004)
Weighted-Criteria Evaluation	Simple Additive Weighting (SAW) or Weighted Sum Model (WSM) determines a weighted score for each alternative by adding the contributions of each attribute multiplied by their weights.	Fishburn (1967)
Goal programming	Goal programming is the application of linear programming to solve problems with multiple objects that can be conflicting.	Charnes and Cooper (1957); Charnes, Cooper and Ferguson (1955)
LINMAP (Linear Programming Technique for Multidimensional Analysis of Preference)	LINMAP receives the pair-wise alternatives' comparisons given by the decision maker as input and generates the best compromise alternative (or solution) that has the shortest distance to the positive ideal solution.	Srinivasan and Shocker (1973)
Fuzzy set theory	Fuzzy set theory has been designed to mathematically represent uncertainty and vagueness and provide formalised tools for dealing with imprecision inherent to decision-making problems that involve subjective evaluation indices in which the assessment relies on decision-makers' linguistic judgment that carries inherent impression, vagueness and to some extent uncertainty due to variation in human perception.	Zadeh (1965, 1975)

2.4. Transfer and adoption of academic-generated knowledge

Knowledge transfer research constitutes an extensive body of literature. Review of this domain of literature is challenging due to several reasons. First, nomenclature is diverse and characterised by poor definitional clarity and discipline-specific terminology. In this domain, terminologies used frequently intersect and confuse, with the same terms used to convey different meanings, or different terms to convey the same or similar meaning e.g. *knowledge translation*, *knowledge utilisation*, *knowledge diffusion* (Gray et al. 2014). Second, the theoretical perspectives useful for investigation of knowledge transfer from academia to industry spread across disciplinary boundaries. For instance, Estabrooks et al. (2006) identified eighteen models of knowledge translation across four disciplines: organisation studies, social science, nursing and health promotion.

In this thesis, the definitions provided by Gray et al. (2014) are adapted. In the following definitions knowledge refers to academic research-based (or research-generated) knowledge:

Knowledge production: the activity of generating research findings.
Knowledge transfer: the movement of knowledge from one place to another.
Knowledge translation: the mediating interventions to shape knowledge products to enhance their accessibility, relevance or usability in practice.
Knowledge adoption: the tangible ways in which knowledge is taken up.
Knowledge use or utilisation: the tangible ways in which knowledge is taken up, adopted, implemented and used in practice. In other words, research-based knowledge leads to change in the fields for which it is intended.

A significant body of academic knowledge transfer/adoption literature presents a debate on the practical relevance of academic research to practice and the gap between academic research and practice. This debate is a recurring theme in the field of Information Systems (IS) (Gill & Bhattacherjee 2009a; Hassan et al. 2013; Klein & Rowe 2008; Lee 1999a; Looney et al. 2014; Pearson, Pearson & Shim 2005; Rosemann & Vessey 2008; Westfall 1999) and Management (Bansal et al. 2012; Brennan 2008; Daft & Lewin 1990; Fincham & Clark 2009; Ghoshal 2005; Hodgkinson & Rousseau 2009; Kieser & Leiner 2009; Kieser, Nicolai & Seidl 2015; O'Brien et al. 2010; Pfeffer 2007; Reed 2009; Starkey & Madan 2001).

In the Business/Management discipline, this debate existed at least from the early attempts to establish administration as a scientific discipline in the 1950s (Bartunek & Rynes 2014). The gap or divide between academic research and practice is called different terms in the literature e.g. *research-practice gap* (Bansal et al. 2012; Carter 2008; Robinson 1998); *relevance gap* (Bartunek & Rynes 2010; Bartunek & Rynes 2014; Brennan 2008; Thomas 2009; Van de Ven & Johnson 2006); or *academic-practitioner gap* (Bartunek 2007). This persistent gap questions the relevance and practical value of academic research. Van de Ven and Johnson (2006) suggested three categories of reasons as the root cause of this problem: knowledge production problem, knowledge transfer problem or a notion that theory and practice are distinct kinds of knowledge.

In the remainder of this section, I review the main theories that underpinned prior research on academic knowledge production, transfer and adoption and the key findings of prior research in this domain. Also, I present a summary of factors suggested in the literature that may contribute to the research-practice gap.

2.4.1. Two Communities Theory

Repeated claims are well recognised that researchers and practitioners are from two different worlds or their perspectives regarding valid knowledge is not the same (Bansal et al. 2012; Bartunek & Rynes 2014). The *two communities theory* (Caplan 1979) was the first theory that advocated the distinction between the two worlds of research and practice. The theory is an adaptation of the argument advanced by Snow (1964) that described the differences between *hard sciences* and *humanities*. Snow argued that natural scientists and humanities scientists live in two different cultures, therefore hold different beliefs, values, norms and preferred modes of thinking (Caplan 1979; Wingens 1990). The 'two communities theory' later emerged from analysis of the data from interviews with 204 upper-level US government executives regarding their use of social science knowledge in policy-related issues. Caplan (1979, p. 461) found that "the items representing the two communities position accounted for the largest proportion of explained variance between users and nonusers". According to the two communities theory (Caplan 1979, p. 459) "… social scientists and policy makers live in separate worlds with different and often conflicting values, different reward systems, and different languages".

Although Caplan did not explicitly use the term 'culture' to describe the differentiation factors of the two communities, scholars (e.g. Jacobson 2007; Kothari & Wathen 2013; Wingens 1990) interpreted his theory as a cultural conception. Caplan argued that particular attention should, therefore, be given to theories that "… stress the lack of interaction between social scientists and policymakers as a major reason for non-use" of academic research by policy makers (Caplan 1979, p. 461).

Influenced by the assumptions of the two communities theory, that the science-practice gap is cultural and bridgeable, various communication theories were promoted (e.g. Backer 1991) as a basis of intervention and promotion strategies to improve the interaction and communication between the inhabitants of the two communities. Nevertheless, Caplan was cautious about the translation of his finding into simplistic strategies to create alliances between researchers and policy makers, arguing that "achieving effective interaction of this sort necessarily involved value and ideological dimensions as well as technical ones" (Caplan 1979, p. 461). Furthermore, Caplan acknowledged that there could never be a single system to link policymakers and researchers.

Because of the lack of clearly defined terms, concepts and propositions that can be empirically tested, the *two communities theory* has been considered to be a *metaphor* rather than a theory (Dunn 1980). For instance, Wingens (1990, pp. 31-2) wrote: "Strangely enough, nowhere in the literature is there a more substantive, elaborate, and coherent description of what is called the two communities theory than the one given here [that is social scientists and policy makers live in separate worlds with different and often conflicting values, different reward systems, and different languages]". A recent study (Newman, Cherney & Head 2016) used data from a survey of 2,084 public servants from the state and federal levels in Australia and concluded that the two communities metaphor is not an accurate description of the relationship between the practice world (policy) and academia and posed the view that the real two communities exist *within* the practitioners: i.e. users and non-users of academic-generated knowledge.

The two communities metaphor has been adopted by many authors over the years (e.g. Landry, Amara & Lamari 2001; Lavis et al. 2002; Nelson et al. 1987) and supports the notion that interaction between these two communities does influence the use of research. For instance, Nelson and others discussed seven major differences in perspectives between social scientists and policy makers and suggested “accessibility, informal communication, and research syntheses” as the three factors related to knowledge utilisation (Nelson et al. 1987, p. 537). Some research *partially* supported the two communities approach. For instance, Slob et al. (2007) in their case study, reported language and resources as two major barriers of research utilisation but evaluated the two community theory as not adequate to describe the uptake of academic research by practitioners (e.g. policymakers).

2.4.2. Social System Theory

In this section, first, the key concepts in social system theory are reviewed (in §2.4.2.1). Next, a brief discussion about the relevance of social system theory for IS research is presented (in §2.4.2.2). Lastly, the application of social system theory to the study of knowledge transfer and the research-practice gap is provided (in §2.4.2.2).

2.4.2.1 Background to social system theory

Social system theory (Luhmann 1984, 1995, 2006) is a general system theory based on the concept of *autopoiesis.* The term *autopoiesis* which means self-(re)production was originally coined by the two cognitive biologists Humberto Maturana and Francisco Varela, from two Greek words, *autos* (=self), *poiein* (= to produce). They were attempting to define the life, by determining what distinguishes the living from the non-living. They concluded that a living system reproduces itself, and referred to this self-reproduction as autopoiesis. According to Maturana and Varela (1980), the autopoietic system recursively reproduces its elements through its own elements, as a plant or animal reproduces its own cells with its own cells. Luhmann adopted the idea of biological autopoietic systems, modified it to a general and trans-disciplinary concept of autopoiesis, and applied it to the social domain, i.e. non-biological systems.

According to Luhmann (2006, p. 38), “system is the difference between system and environment” and each system is an environment for others. In other words, it is the *difference* that makes the distinction between a system and its environment possible. For example, a communication system is distinguished as a system because it draws the distinction between communication and non-communication. Every communication is in the system and everything else constitutes the environment for the communication systems. Luhmann's system theory establishes three main types of autopoietic systems as shown in Figure 2-3. The diagram shows the systems on three levels. Luhmann (1995, p. 3) noted that "comparisons among different types of systems must restrict themselves to one level".

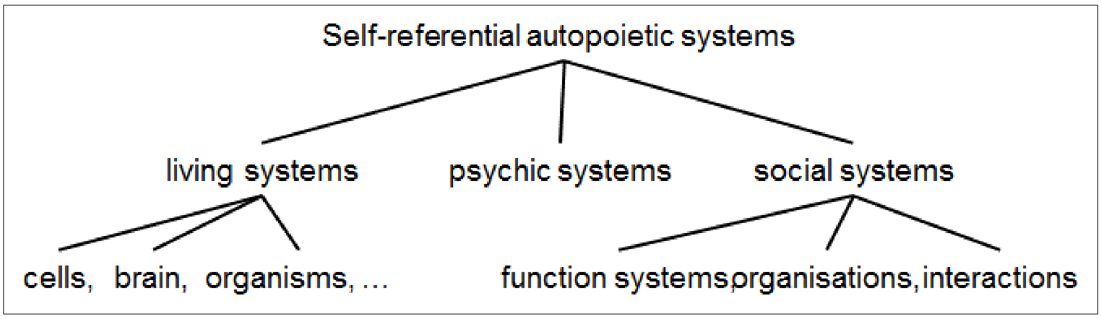


Figure 2-3. Types of self-referential autopoietic systems

Source: Luhmann (1990)

Living systems consist of biochemical elements, and the psychic system consists of thoughts and perceptions (Luhmann 1995). In Luhmann's theory, the human being is conceptualised as a conglomerate of living and psychic systems (Seidl & Becker 2005).

Unlike the traditional definitions of social systems based on its *members* (i.e. system as a group of people), Luhmann describes society based on *communication*. He wrote:

> "Social systems use communications as their particular mode of autopoietic reproduction. Their elements are communications which are recursively produced and reproduced by a network of communications and which cannot exist outside of such a network" (Luhmann 1986, p. 174).

Luhmann's notion of communication differs from the conventional concept of communication as the transfer of information from a sender to receiver. The autopoietic perspective suggests that communication should not be understood as parcels of information that move from sender to the receiver. Instead, information is being created with the receiver through interaction with the receiver's existing cognitive framework (Maturana & Varela 1980). Communication cannot be observed directly but through actions. Luhmann's notion of communication is not limited to communications by language, instead has different forms such as economic communication, scientific communication, legal communication and so on. For instance, when someone pays for coffee this is understood as economic communication. Luhmann (1995) suggests a functional model of communication consists of three components: an utterance (announcement), information and understanding. Luhmann defined information as “a selection from a repertoire of possibilities”, in accordance with Shannon and Weaver (1949) (Seidl 2004, p. 7). Every communication selects what is being communicated from everything that could have been communicated. With utterance, Luhmann refers to how (i.e. the form) and why (i.e. the reason) something is being communicated. “Understanding is conceptualised as the distinction between information and utterance. For communication to be understood the information has to be distinguished from the utterance: what is being communicated must be distinguished from how and why it is communicated.” (Seidl 2004, p. 7). For example, in the education system that uses grade as its code, when an examiner publishes the grade results (announcement) and uses letter grades such as A, B, C, D, F (information), and students listen to or read the results (selection) the communication happens. If any of these three elements are missing (e.g. no one reads the results or the person who reads them is not familiar with grading scale), then communication will not function (Moeller 2006; Seidl 2004).

In Luhmann’s theory, the meaning of communication is determined by the understanding. Thus, Luhmann’s communication theory shares the *principle of hermeneutics* that “not the speaker but the listener decides on the meaning of a message, since it is the latter whose understanding of the set of possibilities constrains the possible meaning of the message, no matter what the speaker may have had in mind” (Baecker 2001, p. 62).

Luhmann asserts that human body and mind are not internal elements of the communication or social systems and stresses that *human being does not and cannot communicate, only communication can*. He wrote:

> “Within the communication system we call society, it is conventional to assume that humans can communicate. Even clever analysts have been fooled by this convention. It is relatively easy to see that this statement is false and that it only functions as a convention and only within communication. The convention is necessary because communication necessarily addresses its operations to those who are required to continue communication. Humans cannot communicate; not

> even their brains can communicate; not even their conscious minds can communicate. Only communication can communicate" (Luhmann 1994, p. 371).

In other words, although communication cannot take place without human beings, human beings (e.g. human brain or body) are inaccessible within communications (Moeller 2006).

Regarding relation to their environment, autopoietic systems are characterised by *interactional openness* and *operative closure*. Interactional openness means autopoietic systems have contact with their environment. However, they are operatively closed in that the operations of the system are determined internally and the systems' environment can never determine what operations come about. For example, living cells exchange energy and matter with their environment, but the inputs (energy and matter) cannot change how a cell operates (e.g. processes the energy and matter) (Seidl 2004). Similarly, in a science system, the program of science is established and (re)defined within the system of science. The operational closure of autopoietic systems implies that they are autonomous about their operations. Furthermore, self-(re)production means that it produces its own boundary between itself and its environment. In the case of a biological cell, such boundary is a membrane (Moeller 2006). In addition to *autopoiesis* that refers to the reproduction of the elements of a system, autopoietic systems produce (determine) their own structure that is referred to as self-organisation.

The relationship between systems and their environments is derived through a mechanism called *structural coupling*. Structural coupling is a kind adaptation, in which the environment does not specify the adaptive changes that will occur (Mingers 1994). Through structural coupling "environmental events can *trigger* internal processes in an autopoietic system, but the concrete processes triggered (and whether any processes are triggered at all) are determined by the structures of the system" (Seidl 2004, p. 4). In this manner, the autopoiesis of the system is preserved. As shown in a symbolic representation of this process in Figure 2-4, the system responds to the environmental triggers. For example, sound waves can trigger our hearing system (ears, brain and neural networks connected them), but the sensation of certain sounds and deciding what wave frequencies we hear is determined by the internal structure of the hearing system, not by the environment (e.g. the voice itself).

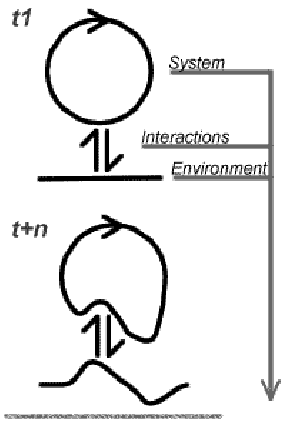


Figure 2-4. Structural coupling of system-environment

Source: Quick (2003)

Luhmann (1995) distinguished three types of social systems: society, (face-to-face) interaction and organisation. Society is the system that encompasses all communications. Hence, there is only one world society, and the borders of society are the borders of communication. Moreover, the society includes the other two social systems (interaction and organisation), because these represent two specific types of communications. Within the society, a variety of subsystems that serve particular functions (e.g., economy, art, science, religion) exists (Luhmann 1995). Each of these subsystems communicates according to the specific *code* it carries. The code of the economic system is payment/non-payment; the code of the political system is power/non-power.

The code of communication for the legal system is either just or unjust; other codes cannot relate to other legal communications and thus cannot be carried through the legal (communication) system. All scientific communications are part of the scientific system that aims to produce scientific knowledge. For the scientific system, the code of communication is truth/untruth. Knowledge is considered *scientific*, only if it is produced in accordance with the established *scientific* theories and methods (i.e. program of science) (Moeller 2006; Seidl & Becker 2006).

Functional systems constitute the environment for each other. Each system reproduces itself self-referentially and registers communications of other functional systems as an *irritation (*or more precisely, *perturbation)*, which it processes according to its own logic (Mingers 1994). For instance, the economic system would register tax regulations (legal communications) only regarding its consequences for payments/non-payments and may react to the tax increase by raising the sales prices.

In Luhmann's theory, no functional system can *cause* a specific reaction in another system. Instead, it "triggers certain developments or resonance" (Moeller 2006, p. 234). Moreover, no functional system can control any other functional system; there is no dominance of any system over another. The different systems are only structurally coupled to each other, i.e. their structures are adjusted to each other in such a way as to allow them to react to their respective operations.

Interactions are communication systems which are based on the perception of the physical presence of their participants. Every interactional communication refers to the fact that all participants perceive each other as being present. Thus, a face-to-face contact is a precondition of the interaction. Interactional systems are operatively closed, and only communications carrying the code 'presence/absence' take part in the reproduction of them (Moeller 2006; Seidl 2004). Luhmann conceptualises organisations as social systems which reproduce themselves on the basis of decisions. In other words, organisations are systems that consist of a chain of decisions. Luhmann does not appreciate *the actor* as a theoretical concept because, in his conceptualisation, organisations (and other social systems) are not entities that can be described as a group of individuals (Nassehi 2005). In Luhmann's conceptualisation, a decision is a specific form of communication: "*compact communications* which communicate their own contingency (contingency here in the sense of 'also possible otherwise').

In contrast to an ordinary communication which only communicates a specific content that has been selected (e.g. 'I love you'), a decision communication communicates also – explicitly or implicitly – that there are other alternatives that could have been selected instead (e.g. 'I am going to employ candidate A and not candidate B')" (Seidl 2004, p. 16). The autopoiesis of the organisation is a process of connecting decisions: every decision is the product of earlier decisions and gives rise to subsequent decisions. Every decision serves as a decision premise for later decisions. Luhmann describes this process of decisions connecting to each other with the concept of uncertainty absorption, the idea of which he takes from March and Simon (Seidl & Becker 2006): "Uncertainty absorption takes place when inferences are drawn from a body of evidence and the inferences, instead of the evidence itself, are then communicated" (March & Simon 1958, p. 165). All given information for a decision and all remaining uncertainty is transformed into the selection of one alternative over the others. Uncertainty absorption takes place in the connection between decisions. Decisions do not inform about the uncertainties involved in making the decision, hence for the subsequent decisions the uncertainties are hidden or absorbed by the first decision (Seidl & Becker 2006). Like all autopoietic systems, organisations are autonomous i.e. the organisation itself determines its own structures and operations "Without the ability to decide on its own structures the organisation would be the mere continuation of its environment" (Seidl 2004, p. 20). Also, no external operations can take part in the network of decisions nor can any decisions get out of this network. In other words, the environment does not *directly* interfere with the reproduction of decisions.

2.4.2.2 Applications of social system theory in IS research

Demetis and Lee (2016) asserted that despite what the name of *information systems* discipline implies, system theory based studies have been largely absent in IS research: "this academic discipline has not availed itself of the rich intellectual heritage of systems science (of which some notable exceptions include the work of Checkland (2000) and of Alter (2013))" (p.116). Demetis and Lee (2016) argued that systems science (including general system theory and Luhmann's social system theory) can benefit the IS discipline by providing a new way of theorising, and facilitation of communication between academia and industry due to its transdisciplinary nature that makes it understandable to people across different disciplines.

Some IS scholars have adopted Luhmann's system theory in their research. Examples include Drechsler and Trepper (2014) for their study of agile methodologies, Krogh (2009) to discuss different views on knowledge in the firm, Morner and von Krogh (2009) for the study of knowledge creation in open-source software projects, and Ask et al. (2007) for investigation of IT governance.

2.4.2.3 Social system theory approach to research utilisation

Wingens (1990) appears to be the first to adopt the system theory approach to understand the research-practice gap and the problem of poor knowledge transfer between academia and practice. Wingens (1990) argued that system theory has the potential for a reformulation of the two communities metaphor in a way that eliminates its principal limitations: individualistic perspective and cultural conception. From a system theory perspective, the difference between the social systems of science and practice is *functional* or *structural* rather than individual or cultural. He wrote: “like any other social systems, ‘science’ and ‘policy [/practice]’ have, in the course of their development, become differentiated into two functionally different social systems using different communication media … to reduce complexity and create a boundary between the system and its environment, thereby allowing the system to sustain” (Wingens 1990, p. 35). Wingens (1990) highlighted two major consequences of adopting the system theory approach for knowledge utilisation research. First, the differentiated systems of science and policy (or organisations) are ruled by different types of rationality that means these types of rationality cannot be compared to each other but only assessed self-referentially within their respective system. Second, the different types of rationality dominating the two systems cannot be blended.

Fujigaki (1998) applied autopoiesis system theory to scientific publication systems and showed that the accumulation of knowledge is achieved by the operation of the publishing system. Upon publishing, academic researchers communicate their findings or thoughts to be disseminated among the members of the scientific community. The scientific publications create a chain of communication through citation.

In the Management discipline, several scholars (Kieser 2002; Kieser & Leiner 2007, 2009; Kieser, Nicolai & Seidl 2015; Kieser & Nicolai 2005; Nicolai & Seidl 2010; Rasche & Behnam 2009; Seidl & Mohe 2007) used Luhmann’s social system theory as a basis to study the relevance gap and the gap between Management science and practice. Based on social system theory, these scholars argued that Management *science* and *practice* comprise two self-reproducing social systems (i.e. networks of communication), hence each has its unique communication code. In Management science, the primary communication element is the scientific publication and integration into the network of scientific communication which appears in the form of cross-references between articles (Nicolai, 2004). Scientific publications follow the methods established within the system of science and base their argument on previous scientific communications to be considered scientific (Seidl 2007). However, in the *system of practice*, communications are based on different symbolically-generalised communication mediums (Kieser & Leiner 2009). In the same vein, Kieser, Nicolai and Seidl (2015) described the different acceptable types of knowledge communicated among practitioners: “whether a communication is theoretically or empirically supportable, and in this sense true or false, is not of core concern. Instead, functionality - that is, whether something works or does not work - is essential in communication between practitioners”. In sum, Luhmann-based studies stress the systemic difference between science and practice and claim that scientific communication is only meaningful within the scientific system. Thus the notion of knowledge *transfer* from science system to practice is problematic (Kieser, Nicolai & Seidl 2015; Seidl 2009).

On the basis of the assumption that Management research and practice are two distinct autopoietic systems, Kieser and Leiner (2009, p. 516) concluded that “the rigour-relevance gap in Management research is unbridgeable”. Furthermore, some Luhmann-based studies overemphasised the communication barrier between management consultancy firms and business organisations (Kieser 2002; Mohe & Seidl 2009), and undermined the role of collaborative research in reducing the relevance gap (Kieser & Leiner 2007).

Although some scholars (e.g. Fincham & Clark 2009) engaged in the debate within this particular school of thought and provided some counterpoints, there is a major flaw that has not yet been identified. I argue that assuming the *practice world* as an autopoietic system is a misinterpretation of Luhmann’s system theory. The practice world is not placed in Luhmann’s abstract categorisation of autopoietic systems. In the context of research-practice gap and knowledge transfer/utilisation studies, the term practice world is used in the literature as a term that distinguishes between the scientific organisation (mainly universities) and non-scientific organisations. In other words, practice world refers to a group of organisations that are potential users of academic research. The fact is that in Luhmann’s theory “organisations are not necessarily confined to the communicative borders of just one function system” (Moeller 2006, p. 44). For example, as illustrated in Figure 2-5, a university is usually active in both education and science systems and often plays an economic role. Function systems do not focus on just one kind of organisation.

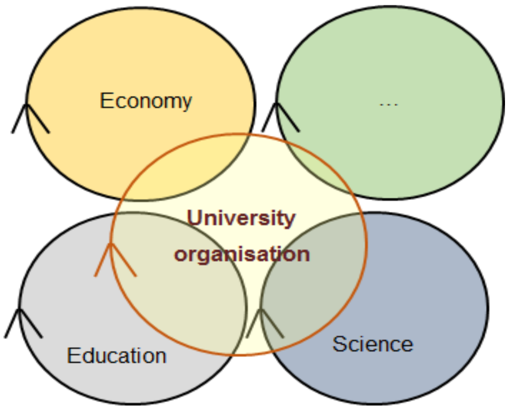


Figure 2-5. Intersection of University organisation system with autopoietic functional systems

Source: Author

Practice world cannot be taken as the sum of all functional systems excluding the system of science. I argue that if such self-referential system of practice can be conceptualised as some scholars (e.g. Kieser & Leiner 2007, 2009; Rasche & Behnam 2009) claimed, what is its code of communication? Scholars who refer to a self-referential system of practice comprising all functional systems excluding the system of science, either overlook to define it based on its code of communication or consider the *decision* as its code of communication. In the latter case, the system of practice is nothing but a group of *organisations* not a group of function systems. In Luhmann's theory, functional systems are abstract concepts and not restricted to any organisational boundary. For example, economic transactions are not limited to companies and corporations; education does not only take place at universities and schools. Even science does not only take place in scientific organisations (e.g. universities) but, for example, in military organisations. In fact, decision making can take different forms such as economic decisions, political decisions and so on. Some organisations are even systematically hybrid regarding their function system. Luhmann himself used the example of universities: "the coupling between the system of science and the system of education is manifested in the organisation of the university. Education and the economy are coupled through academic certifications and diplomas that regulate access to jobs" (Moeller 2006, p. 51). In sum, the practice world consists of a group of organisations and each may operate multiple systemic functions. From the organisation perspective, they operate on the basis of decision communication. However, from the functional standpoint, communication with *multiple codes* is possible within an individual *organisation*, but not within an individual *functional* system. Hence, I contend that the assumption that the *practice* *world (or system of practice) is an autopoietic system comprising all function systems except the science system*, is not accurate, hence any argument based on this assumption is flawed.

2.4.3. Diffusion of Innovation Theory

Diffusion theory represents a long history of efforts to understand the spread of ideas and actions within social systems (Green et al. 2014). The French sociologist and legal scholar Gabriel De Tarde is considered as the originator of the core idea of the diffusion of innovations (Singhal 2009). Gabriel De Tarde (1899) outlined diffusion as a process that occurs in three phases: *repetition*, in which there is an *inventor* and an *imitator*; *opposition*, in which there are diverse interpretations of the mimicry, especially with diverse or changing circumstances; and *adaptation*, in which a new balance is achieved by the imitators after reconciling these interpretations. In a similar vein, Gustav Le Bon (1897) viewed diffusion as the result of *collective behaviour*. Modern diffusion of innovation (DoI) theory was articulated by Everett Rogers in five editions of his book (1962-2003).

Rogers (2003, p. 19) defined diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system”. Innovation is defined as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers 2003, p. 12). In DoI theory, diffusion is a social process and considered as a particular type of *communication* concerned with the spread of innovations.

Communication is “the process by which participants create and share information with one another in order to reach a mutual understanding” (Rogers 2003, p. 18). Communication channels provide the means for transmission of messages. According to the diffusion of innovation theory (Rogers 2003), *mass media* channels (channels that involve a mass medium such as radio, television, newspapers and so on) are more effective in creating *awareness* about the innovations, whereas *interpersonal* channels (channels that involve a face-to-face exchange between two or more individuals) are more effective in forming and changing attitudes toward the innovation, and thus influencing the decision of adoption or rejection. According to DoI theory "information about an innovation is often sought from peers, especially information about their subjective evaluations of the innovation" (Rogers 2003, p. 66).

Today, with personal communication devices (e.g. smartphones) and the Internet, the interpersonal-mass communication link is blurred (Singhal 2009). To determine the innovation's diffusion curve over time, DoI classifies members of the social system as innovators, early adopters, early majority, late majority and laggards. DoI asserts that the rate of adoption of innovations will form a bell-shaped (normal distribution) curve, with a few people adopting in the beginning (early adopters), followed by mass adoption by early majority and late majority, and then a diminution (Rogers 2003).

As shown in Figure 2-6, at the individual level, the rate of adoption of innovation is considered to be affected by five categories of determining variables: perceived attributes of innovation (relative advantage, compatibility, complexity, trialability and observability), type of innovation-decision, communication channels, nature of the social system, and extent of change agents' promotion efforts. At the organisational level, DOI considers the *organisational innovativeness* as the dependent variable influenced by three groups of independent variables: individual (leader) characteristics (attitude toward change), internal characteristics of organisational structure (centralisation, complexity, formalisation, interconnectedness, organisational slack, and size), and external characteristics of the organisation (system openness).

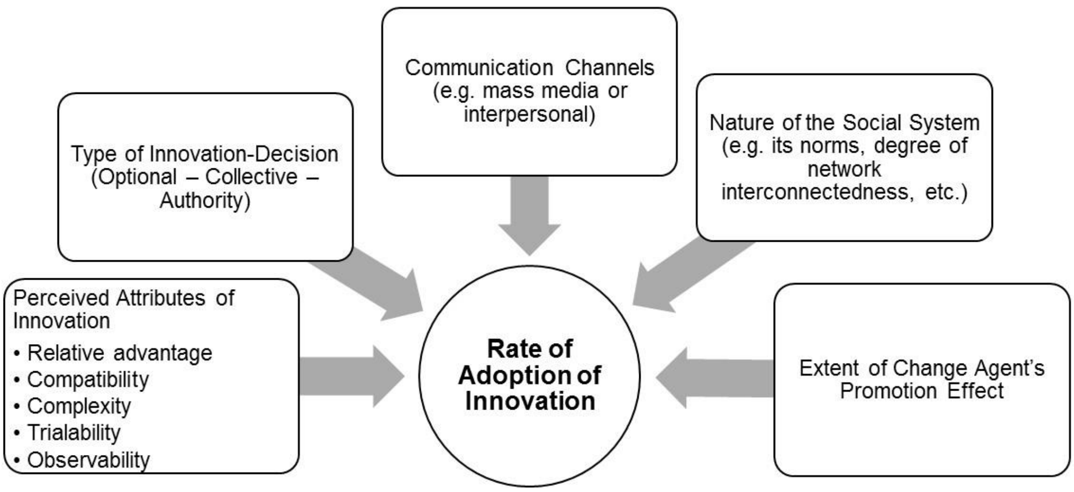


Figure 2-6. Variables determining the rate of adoption of innovations at individual level

Source: Adapted from Rogers (2003)

Despite its enormous popularity, diffusion of innovation theory has been criticised by some researchers as having a *pro-innovation bias* and separates the members of a social system into the superior innovator's group and the inferior imitator and implicitly reinforcing the dominant institutional order. Furthermore, McMaster and Wastell (2005, p. 383) wrote: "failure to find any empirical support for diffusionism reveals both its mythical character and its ideological rationale in lending moral legitimacy to colonialistic projects. Empirical examples demonstrate both the ubiquity of the diffusionist mindset in IS research and practice, and its linkage to pseudo-colonial activities in the home domain".

DoI theory has been widely used in different disciplines such as Management Accounting (e.g. Tucker & Parker 2014; Tucker & Lowe 2014), Health (e.g. Greenhalgh et al. 2004) and Information and Library Science (e.g. Haddow & Klobas 2004) as a theoretical lens to study the research-practice gap and the spread of research-generated knowledge to the practice world.

Green et al. (2014) highlighted the inadequate notice of diffusion-based literature to the knowledge production issues (supply side). They contended that there are "misguided expectations from a misreading of diffusion theory and dissemination research that the truths discovered by science, whatever their fit with daily life or practice, should automatically influence behaviour" (Green et al. 2014, p. 166).

I argue that DoI-based studies on academic knowledge transfer or research-practice gap suffer from a common problem. The problem is the use of DoI theory in a context that violates one (implicit) assumption of DoI theory, that is the singularity of the social system. According to Rogers (2003, p. 45), "Diffusion occurs within a social system … the social system constitutes a boundary within which an innovation diffuses". In other words, diffusion studies were conducted in a context that the diffusion/adoption takes place in a *single* social system. For instance, in the various diffusion studies such as diffusion of goods (e.g. mobile phones, drugs, refrigerators), services (e.g. kindergarten), and information (e.g. terrorist attack news) (Rogers 2003) the assumption is that communication about these innovations *will* reach the potential adopter over a period. Hence the focus is on the rate of adoption. Moreover, a possible need to cross the boundaries between different social systems is neglected in DoI theory. Thus, the diffusion-based study of academic knowledge transfer/utilisation implicitly assumes that communication of academic research to practice *will* happen over time. Considering the differences between the research and practice settings, such an assumption is questionable. I clarify the difference between the two settings with one example. There might be some who have not adopted TV yet, but nearly all people are aware of TV. In contrast, there are many scientific findings in different disciplines, but we cannot assume that practitioners are aware of them or will naturally become aware over a period.

2.4.4. Academic knowledge production and transfer

Knowledge is a source of competitive advantage for companies (Grant 1996). The value of knowledge for organisations is due to its ability to provide organisations with a basis for better decision making and informed actions (Davenport & Prusak 1998). This knowledge can be acquired from a *knowledge source* (Tsai 2001), or it can be generated by the company itself (Nonaka & Takeuchi 1995). External knowledge sources include, but are not limited to, universities and academic research institutions (Agrawal 2001), consultants (either as individual or firm) (Ko, Kirsch & King 2005) or other companies acting in different roles such as ‘supplier’ (Kotabe, Martin & Domoto 2003) or ‘competitor’ (Darr & Kurtzberg 2000).

Prior studies identified two categories of personal motivational factors that drive academic research: extrinsic rewards (e.g. tenure, promotion, income increase), and intrinsic rewards (e.g., an individual’s personal satisfaction from solving research puzzles, achieving peer recognition, contribution to the discipline) (Chen, Gupta & Hoshower 2006).

The various influences that help spread the innovation (e.g. new knowledge) are on a continuum between *dissemination* where the spread of innovation is active and planned, and *diffusion* where the spread of innovation is passive and unplanned (Greenhalgh et al. 2004). A key advance of dissemination science over classical diffusion studies is the conceptualisation and operationalisation of the *societal sector* as the social system is of interest rather than just the proximate community. A societal sector is a collection of focal organisations operating in the same topical domain (such as ITO practitioners or academic researchers) without respect to proximity, as identified by the similarity of their services, products, or functions, together with those organisations that critically influence the performance of the focal organisations (Dearing 2008).

Some scholars (e.g. Gill & Bhattacherjee 2009a) argued that in addition to rigour and relevance considerations, special attention is required to the effective communication of the research-generated knowledge to relevant practitioner audiences, to achieve real-world impact. Gill and Bhattacherjee (2009a) emphasised the significance of attention to the “dual mission” of knowledge creation and knowledge dissemination within the IS discipline. In the same vein, Hevner et al. (2004) provided guidelines to conduct design science research and included *research communication* as an integral part of design science research projects (guideline 7). However, as Drechsler, Hevner and Gill (2016) acknowledged, the extant knowledge about effective dissemination of DSR-generated knowledge to practitioners is scarce.

Programs that aim to facilitate and foster the dissemination of academic-generated knowledge to the industry have become widespread in many countries (Chai & Shih 2016). These programs emphasise the role and responsibility of the *knowledge producer* in the dissemination of created knowledge. Knowledge transfer (KT) can occur through various knowledge-related collaboration activities by academic researchers with non-academic organisations, called *academic engagement* by Perkmann et al. (2013, p.424). Nevertheless, investigation of effective academic knowledge transfer is a challenge since knowledge is multifaceted and the paths of knowledge transfer from academia to practice can be indirect (Weiss 1979).

Prior studies have revealed several knowledge transfer activities undertaken by academic researchers and various factors that affect the extent of researchers’ engagement in knowledge transfer (e.g. demographics, career trajectory, attitudes, and motivation). However, the literature is largely silent on factors that determine the *effectiveness* of these knowledge transfer activities. From a communication theory perspective on the knowledge transfer process (Kuiken & van der Sijde 2011; Szulanski 1996), in this study, I consider three main criteria for *effective academic knowledge transfer*. First, evidence must exist that the academic engagement has resulted in the transfer of knowledge, whether direct or indirect. Second, the transferred knowledge must be generated from academic research. Third, uptake of the communicated knowledge by practitioners (industry) should be evident. In other words, to ensure the effectiveness of academic knowledge transfer, there must be evidence that the message (i.e. knowledge) has been delivered to the intended receivers (i.e. practitioners). For example, in the case of transfer of knowledge by writing a book, the knowledge transfer will not occur until the practitioner has read the book. If the communicated knowledge is then used by practitioners, then research impact can be claimed.

Factors that motivate academic researchers to interact and engage with industry have been previously explored in the literature. Academic engagement with practice can improve the quality of research and teaching through learning in the context of the application (Arza 2010) and provide researchers with access to learning opportunities such as the field-testing practical application of their research outcomes to obtain new insights (D'Este & Patel 2007; Lee 2000). Furthermore, academic researchers can gain access to state-of-the-art tools, equipment and technologies (Acworth 2008; Santoro 2000) and feedback from practice on research ideas and results (Arvanitis, Kubli & Woerter 2008), while gathering new ideas for future research when they cooperate with industry (Lee 2000; Welsh et al. 2008). Also, some studies reported enhancement of researchers' reputations, prestige and recognition as positive outcomes (Siegel et al. 2004), and personal monetary benefits (Perkmann & Walsh 2008). Recent studies revealed that academics may engage with industry due to their personal willingness to make their knowledge base available to industry (Iorio, Labory & Rentocchini 2014) or because they sense the necessity of accomplishing their *third mission* (Labory, Iorio & Rentocchini 2015), that is providing service to the practitioner community and promoting innovation through knowledge/technology transfer (Ankrah et al. 2013). The third mission motive was found to be the dominant factor in some studies (e.g. Labory, Iorio & Rentocchini 2015) that investigated academic knowledge transfer across multiple disciplines such as Life Sciences, Chemistry, Mathematics and Physics, Technological Sciences and Medical Sciences.

Prior studies have revealed a variety of channels and activities that academic researchers use to transfer research-generated knowledge to industry. These activities, summarised in Table 2.3, include: creation and diffusion of knowledge through publications, transmission of knowledge through teaching, informal knowledge transfer, patenting, spin-off formation (also called spin-out) and consulting activities (Franco & Haase 2015; Landry et al. 2010; Olmos-Peñuela, Castro-Martínez & D'Este

2014; Perkmann & Walsh 2007). The types of publications for knowledge dissemination can vary from scholarly articles in academic journals or conferences to practitioner-oriented media such as books, magazines, online media, blogs, etc. In particular, social media (e.g. Twitter) has gained attention as a powerful tool for the distribution of academic research findings to the public (Talbot & Talbot 2015).

Collaborative research is also perceived as a knowledge transfer or knowledge diffusion activity (Frenken, Hölzl & Vor 2005; Olmos-Peñuela, Castro-Martínez & D'Este 2014; Perkmann et al. 2013). This view is in line with the New Theory of Knowledge Production (Gibbons et al. 1994) that claims the observation of a change from traditional *Mode 1* discipline-based research to interdisciplinary *Mode 2* knowledge involving industry or service partnerships. Another possible means of knowledge transfer is through new product development in which knowledge becomes embedded in a product (Madhavan & Grover 1998). In the context of this study, a common type of product is a decision support system (DSS) which is a designed artefact (i.e. software) that supports decision-making activities (Power, Sharda & Burstein 2015). A recent study (Franco & Haase 2015) found that use of university-industry interaction channels depends on researchers' motivations and disciplinary affiliation.

Table 2.3 Knowledge transfer activities undertaken by academic researchers

Knowledge Transfer Activity	**Description**
Scientific publications	Publication of codified scientific knowledge transferred in the pool of open science (Journal or Conference articles)
Practitioner-oriented publications	Books, magazines, online/social media, blogs, etc.
Teaching	Knowledge transfer achieved when students graduate and are hired by companies and other types of employers
Informal knowledge transfer	Informal pathways through which knowledge is exchanged across academia and members of companies and other types of organisations, e.g. presentation to practitioners at events (e.g. seminars) or to specific organisations, interpersonal communications with practitioners, etc.
Consulting services	Activities commissioned by industrial clients or government agencies including contract research and consulting
Spin-off formation	Development and commercialization of technologies undertaken by academic inventors through the creation of a spin-off company they own at least in part
Granted patents	Rights to anyone who invents or discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof
New product development	Knowledge transfer through new product development in which knowledge becomes embedded in a product
Collaborative research	Collaborative arrangements to conduct research undertaken by both academic and non-academic organisations

Source: Adapted from Landry et al. (2010)

Prior empirical studies confirmed the effect of *individual* factors including demographics, career trajectory, productivity, attitudes, motivations, identity, and *scientific disciplines* as an institutional factor on the extent of academic engagement undertaken by academic researchers (Perkmann et al. 2013). However, previous research on some other *institutional* factors such as regulation and public policy, and *organisational* factors including technology transfer support, formal incentives, university/department quality, leadership, department climate, has yielded conflicting results.

Empirical research into academic knowledge transfer is methodologically challenging due to the multifaceted nature of knowledge transfer (Easterby-Smith, Lyles & Tsang 2008). It is recognised that not all knowledge transfer activities are formally recorded because many academics do not disclose their formal or informal knowledge transfer activities to their university administrators (Hall, Link & Scott 2003; Siegel, Waldman & Link 2003; Siegel et al. 2004; Thursby, Thursby & Gupta-Mukherjee 2007). Also, several limitations exist in prior studies that measured the engagement activities of academics and tried to identify possible associations between some factors and the extent of engagement. First, the effectiveness of knowledge transfer activities is commonly neglected. In other words, the majority of research in this area assumed that all of the transfer activities undertaken are capable of transferring knowledge *effectively*. Consequently, the variation in the effectiveness of different knowledge transfer methods is overlooked. Second, prior studies implicitly assumed that the knowledge communicated by academics to industry is generated from *academic research*. However, not all knowledge transfer activities are rooted in academic research. For instance, academic researchers may provide consultancy services to industry or engage in entrepreneurial activities without using academic research or even without having a strong research track record.

2.4.5. Neo-institutional Theory

Neo-institutional theory (Scott 1995) considers the processes by which structures, including schemas, rules, norms, and routines, become established as authoritative guidelines for social behaviour. Institutional theory is concerned with how these elements are created, diffused, adopted, and adapted; and how they fall into decline and disuse. Scott (1995, p. 33) asserted that “institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behaviour. Institutions are transported by various carriers – cultures, structures, and routines – and they operate at multiple levels of jurisdictions". As shown in Table 2.4 the three perspectives (or *pillars* as called by Scott) of the institutional theory have different underlying assumptions, mechanisms and indicators.

Table 2.4 Three pillars of institutions according to neo-institutional theory

	Regulative	**Normative**	**Cognitive**
Basis of compliance	Expedience	Social Obligation	Taken for granted
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules, laws, sanctions	Certification, accreditation	Prevalence, isomorphism
Basis of legitimacy	Legally sanctioned	Morally governed	Culturally supported, conceptually correct

Source: Scott (1995, p. 35)

The regulative pillar views institutions as regulatory authorities that determine reward or punishment through rules, laws and sanctions, to influence future behaviour. The regulative pillar stresses that "individuals are instrumentally motivated to make their choices according to utilitarian, cost-benefit logic … actors behave expediently: They calculate rewards and penalties" (Scott 1995, p. 37).

The normative pillar focuses on normative systems including both *values* and *norms* that empower and enable social actions or impose constraints on them. "Values are conceptions of the preferred or the desirable together with the construction of standards to which existing structures or behaviour can be compared and assessed. Norms specify how things should be done" (Scott 1995, p. 37). In other words, normative institutional forces define both the goals and the legitimacy to pursue those goals. The third pillar focuses on the cognitive dimension of institutions. From a cognitive perspective, "what a creature does is, in large part, a function of internal representation of its environment" (D'andrade 1984, p. 88). Hence, to understand or explain actions, the actor's subjective interpretations need to be examined. From cognitive institutional perspectives, "routines are followed because they are taken for granted" and "other types of behaviour are inconceivable" (Scott 1995, p. 44). The cognitive dimension of institutional isomorphism is an imitation process. "Individuals and organisations deal with uncertainty by imitating the ways of others whom we use as models" (Scott 1995, p. 45).

The neo-institutional theory provides another lens for the study of knowledge adoption. From an institutional theory perspective, the choice of knowledge acquisition source could be viewed as a response to institutional forces that influence the individual or organisation to conform to the prevailing ideas of what is the legitimate and useful source of knowledge. These forces can act through three mechanisms: mimetic (e.g. following the leader and hope for the same result), coercive (e.g. legal requirement) or normative (e.g. copy practices offered by consultants) (Bjorck 2004).

2.4.6. Management Fashion Theory

Management fashion theory (Abrahamson 1991, 1996; Abrahamson & Fairchild 1999) in Business and Management studies asserts that, under conditions of uncertainty, organisations imitate and follow the innovation models promoted by fashion-setting organisations and that the diffusion rates and final levels of adoption of any given management innovation cannot be fully explained by a rational or efficient-choice perspective.

A management fashion is "a relatively transitory collective belief, disseminated by management fashion setters, that a management technique leads rational management progress" (Abrahamson 1996, p. 257). As shown in Figure 2-7 these fashion-setting organisations are mainly consulting firms, business mass-media publications, management gurus, and business schools. Management fashion theory acknowledges the influence of socio-psychological factors, in addition to techno-economic forces in decisions to adopt a management innovation.

In this theory, the adoption of management innovations (e.g. management techniques) by the fashion followers is considered mainly as a cultural phenomenon "shaped by norms of rationality and progress" (Abrahamson 1996, p. 257) that are believed to be rational by a particular reference group. Using bibliographic research Baskerville and Myers (2009) showed that similar to Management research and practice, Information Systems research and practice are characterised by fashions. In response to Baskerville and Myers (2009), Gill and Bhattacherjee (2009b) suggested that IS fashions can be better regarded as an "informing process" (p.670), because academic and commercial (practitioners') publishing decisions are driven by different forces, and "[IS] academic research is increasingly being decoupled from practice" (p.668), hence academic research topic trends (i.e. waves) can exist even in the absence of corresponding practitioner topic trends.

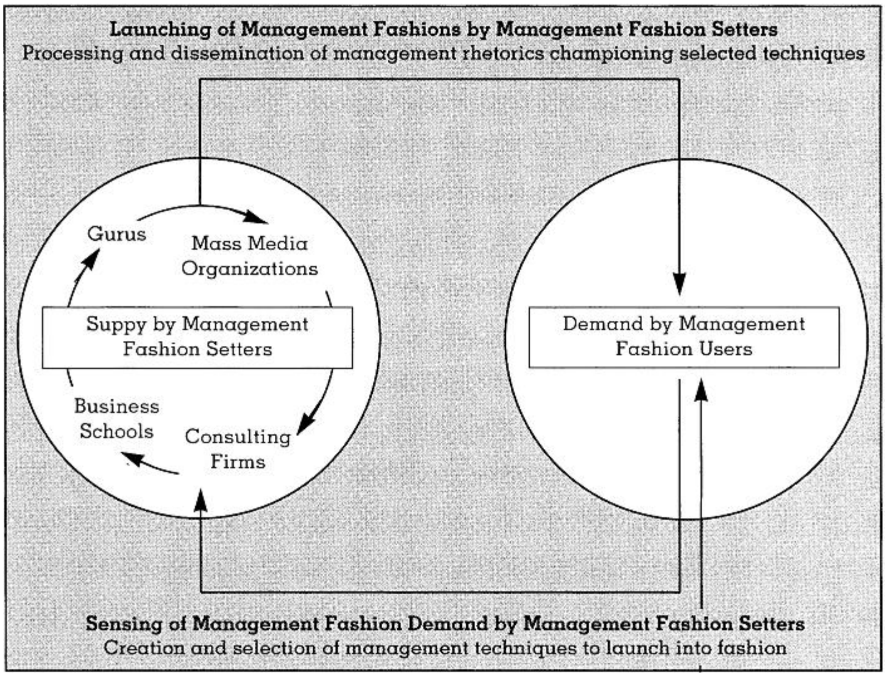


Figure 2-7. The management-fashion-setting process

Source: Abrahamson (1996, p. 265). Copyright © 1996, Academy of Management. Reprinted with permission of the publisher.

Abrahamson and Fairchild (1999) distinguished two type of collective learning fostered by fashion: *Real learning* and *Superstitious learning*. In the case of real learning, both the upswing and downswing of the fashion are triggered by carefully considered arguments (i.e. reasoned) or counterfactual evidence. Superstitious learning is where there is emotional or unrealistic enthusiasm in the upswing followed by disappointment in the downswing (Abrahamson & Fairchild 1999).

The fashion upswing and downswing each have three distinctive discourses. The upswing discourses can be problem discourse (proposing theories about the problem source motivating the fashion), solution discourse (describing the fashion with claims that it is all powerful in scope and impact), or bandwagon discourse (relating stories about firms successfully adopting the fashion). The bandwagon discourse is also called *bandwagon effect*, in which the "rate of uptake of beliefs, ideas, fads and trends increase the more that they have already been adopted by others" (Colman 2003). The three downswing discourses are debunking discourse (advocating a complete rejection of the fashion), surfing discourse (advocating a transition from one fashion to the next), and sustaining discourse (advocating the fashion despite falling interest (Abrahamson & Fairchild 1999; Baskerville & Myers 2009).

Based on Management Fashion theory, Abrahamson and Eisenman (2001) argued that Management scholars (academics) as knowledge producers and disseminators must intervene strategically in the management knowledge market to have an impact outside academia.

2.5. Barriers to adoption of academic research in practice

While theories presented in this chapter provided insight into the production, transfer and adoption of academic research, there is also an extensive body of literature that suggests several factors as the potential barriers to adoption of academic research in practice. Table 2.5 provides a summary of these factors, classified according to the three phases of knowledge production, knowledge transfer, and knowledge adoption.

The first category includes the factors related to the knowledge production phase. Some scholars claimed that academics are detached from the practice world and lack practical skills. Hence, they cannot understand the requirement of useful knowledge for practitioners, or do not have access to actual business situations to conduct practitioner-oriented research (e.g. controlled experiments) (Gummesson 2014a; Ryan 1977). For instance, Bennis and O'Toole (2005, p. 101) wrote: "today it is possible to find tenured professors of Management who have never set foot inside a real business, except as customers". Several other factors are reported in the literature that undermine the usefulness of the knowledge resulting from academic research (Beer 2001; Gibbons et al. 1994). Academic research has been accused of a lack of generalisability power that makes it applicable to local practice contexts (Carrion, Woods & Norman 2004; Nilsson Kajermo et al. 1998). Moreover, it is claimed that academic research lags behind the practice, and is not up-to-date enough to inform practice (Beyer & Trice 1982; Lee, Gosain & Im 1999).

Table 2.5 Barriers to academic research utilisation

Category	Barrier	Reference(s)
Knowledge production factors	Researchers are detached from practice.	(Bennis & O'Toole 2005; Fotache, Olaru & Iacoban 2015; Gummesson 2014a; Ryan 1977)
	Researchers lack practical experience/skills.	
	Researchers focus on traditional research rather than contextualised and collaborative (Mode 2) knowledge	(Gibbons et al. 1994; Salipante & Aram 2003)
	There are too few incentives for practical research in academic reward schemes.	(Bennis & O'Toole 2005; Cherney et al. 2012; Fotache, Olaru & Iacoban 2015; Ryan 1977; Westfall 1999)
	Researchers select/use/apply the wrong type of research methods.	(Coghlan 2011; Gummesson 2014a; Pascal, Thomas & Romme 2013; Robinson 1996)
	Research results lack generalisability to local practice context.	(Carrion, Woods & Norman 2004; Nilsson Kajermo et al. 1998; Pearson, Pearson & Shim 2005)
	Academic research lacks timeliness and is not up-to-date enough to inform practice (i.e. time-lag between research and practice)	(Beyer & Trice 1982; Lee, Gosain & Im 1999; Pearson, Pearson & Shim 2005)
	Reading academic research publications demands too much time for practitioners	(Cohen 2007; Nilsson Kajermo et al. 2010)
	The language of academic research publications is complex (e.g. uses jargon, mathematical formula), thus not easily understandable by practitioners	(DeNisi 1994; Parker 2012; Pearson, Pearson & Shim 2005; Sin 2008)
	The academic system (e.g. leading journals) has an emphasis on rigour over relevance and is reluctant to publish practitioner-oriented papers	(Benbasat & Zmud 1999; Fotache, Olaru & Iacoban 2015; Westfall 1999)
Knowledge transfer factors	There are too few incentives for engagement of academics with practice and knowledge transfer.	(Cherney et al. 2012; Ouimet et al. 2014)
	Communication between research and practice worlds and channels of transferring academic research to practice are missing.	(Darroch & Toleman 2005; Ryan 1977)
Knowledge adoption factors	Practitioners lack the skill/knowledge to understand/implement academic research.	(Carrion, Woods & Norman 2004; Carroll et al. 1997; Cohen 2007; Morago 2010)
	Practitioners lack time to search for relevant academic research	(Carroll et al. 1997; Nilsson Kajermo et al. 2010)
Knowledge transfer & adoption factors	Practitioners lack awareness of available academic research	(Carroll et al. 1997; Pearson, Pearson & Shim 2005)
	Practitioners do not have sufficient access to academic research publications.	(Darroch & Toleman 2005; Dobbins et al. 2007)

Another factor reported in the literature is the use of complex language featuring technical terms, jargon and mathematical formula, and subsequent difficulty of understanding research (DeNisi 1994; Parker 2012; Sin 2008). For instance, DeNisi (1994, p. 157) wrote: “we try to impress our colleagues with our intelligence and, in doing so, begin to adopt a jargon that no one outside our immediate circles could understand”. Pearson, Pearson and Shim (2005) surveyed 287 IS practitioners and found that IS practitioners perceive academic research dated and difficult to read, and find the recommendations included in academic research papers to be of little value. Another well-recognised factor in the literature is the effect of academic promotion schemes that significantly focus on publishing in high ranked journals. Academics are under pressure to publish in scholarly outlets, particularly *top-ranked* journals. Usually, writing for practitioners’ media or even practitioner-oriented academic journals such as Harvard Business Review has little or no effect on the promotion or other rewards that academic researchers may receive from their institutions. Moreover, there is little or no requirement for relevance imposed by academic publishers (Bennis & O’Toole 2005; Cherney et al. 2012; Ryan 1977). Cohen (2007, p. 1017) provided a clear description of the problem: “an article is deemed *top* if it is methodologically sound and covers all the issues raised by blind reviewers. Typically, reviewers press an author on methodology and theory but not on the practical application. In fact, most academic articles include a few sentences or paragraphs, at most, discussing practical application”.

Fotache, Olaru and Iacoban (2015) argued that professors get their tenure based mostly on their research but IS journals tend to publish theoretical papers and not practitioner-oriented papers, thus IS research diverged from critical concerns of IT/IS practitioners. In a similar vein, Westfall (1999) argued that practitioners do not perceive academic IS research relevant because the academic publishing system and academic reward system do not promote and support practical research. Another factor related to knowledge production in social sciences is the choice of research methodology, particularly the use of natural sciences methodologies that mainly belong to the positivist paradigm. Although there has been a debate on the effect of methodology on research relevance and in Management and IS research, several methodologies namely Design Science Research, Action Research, and Case Study Research have been advocated to have a higher capability of producing relevant knowledge for practice (Coghlan 2011; Gummesson 2014b; Hodgkinson & Starkey 2011; Kuechler & Vaishnavi 2011; Pascal, Thomas & Romme 2013).

The second category contains factors related to the knowledge transfer between academia and industry (practice world). Some scholars (e.g. Ryan 1977) claimed that channels for transferring academic research to practice are absent. Other authors (e.g. Cherney et al. 2012; Ouimet et al. 2014) highlighted the role of knowledge producers (i.e. researchers) in the knowledge transfer process and accused the academic reward schemes of negligence to reward engagement of academic researchers in the knowledge transfer process.

The third category includes factors focusing on the knowledge consumption (practitioners') side. One problem is claimed to be practitioners' lack of skill/knowledge to understand/implement academic research (Carrion, Woods & Norman 2004; Carroll et al. 1997; Cohen 2007; Morago 2010). Another factor reported in the literature is practitioners' lack of time to search for relevant academic research (Carroll et al. 1997; Nilsson Kajermo et al. 2010).

In addition to the above three categories, there are also factors that can be related to both phases of knowledge transfer and adoption. Lack of awareness of available academic research (Carroll et al. 1997; Pearson, Pearson & Shim 2005) can be related to the knowledge transfer phase e.g. dissemination of research results in channels that do not reach practitioners.

Also, lack of awareness can be due to practitioners' behaviour e.g. not reading the academic research. Another factor in this category is a lack of sufficient access to academic research (Darroch & Toleman 2005; Dobbins et al. 2007). Lack of sufficient access can be attributed to the knowledge transfer phase e.g. high cost of access to academic publications or to the knowledge adoption phase e.g. practitioners' unwillingness to pay for access to academic research.

The literature presented in this section provides fifteen hypotheses for the cause of deficiencies in relevance, transfer and adoption of research-generated knowledge:

H1: Researchers are detached from practice.

H2: Researchers' lack practical experience/skills.

H3: Researchers focus on traditional research rather than contextualised and collaborative (Mode 2) knowledge.

H4: There are too few incentives for practical research in academic reward schemes.

H5: Researchers select/use/apply the wrong type of research methods.

H6: Academic research lacks timeliness and is not up-to-date enough to inform practice.

The literature also provides two hypotheses about the factors that influence knowledge transfer.

H7: There are too few incentives for engagement of academics with practice and knowledge transfer.

H8: Channels to transfer academic research to practice are missing or unsuited.

H9: Practitioners lack time to search for relevant academic research.

H10: Reading academic research publications demands too much time for practitioners.

H11: The language of academic research publications is complex (e.g. uses jargon, mathematical formulae), thus is not easily understandable by practitioners.

H12: Practitioners do not have sufficient access to academic research publications.

H13: Practitioners do not adopt academic research because they lack awareness of available academic research.

H14: Practitioners lack the skill/knowledge to implement academic research.

H15: Practitioners' perceptions are a barrier to adoption of academic research.

2.6. Chapter summary and conclusion

This chapter provided a summary of literature relevant to the study and identified parent theories to be used as the theoretical underpinning of the study. Reviewing the literature identified the following gaps in the literature:

- Lack of knowledge about scope of ITO decision support research
- Lack of knowledge about rigour and relevance of ITO decision support research
- Lack of knowledge about academic knowledge transfer activities of ITO DSS researchers and the effectiveness criteria for those activities
- Lack of knowledge about adoption of ITO decision support research
- Lack of knowledge about factors that may contribute to a research-practice gap in ITO decision support research
- Lack of knowledge about barriers to adoption of ITO decision support research by practitioners
- Lack of knowledge about sources and channels of acquisition of decision-making knowledge by ITO practitioners.

As Green et al. (2014) rightly argued, no single theory explains the research-practice gap and the problem of underuse of academic research in practice. Moreover, most of the variables that determine the use of academic research in practice are beyond the control of any single stakeholder on either the researcher- or the user-side. Thus the integration of several theories to examine the research-practice gap and academic knowledge transfer seems a promising strategy.

The review of the literature afforded the development of the conceptual model for this study as shown in Figure 2-8. In this conceptual model, the theoretical bases that underpin each of research objectives/questions are identified.

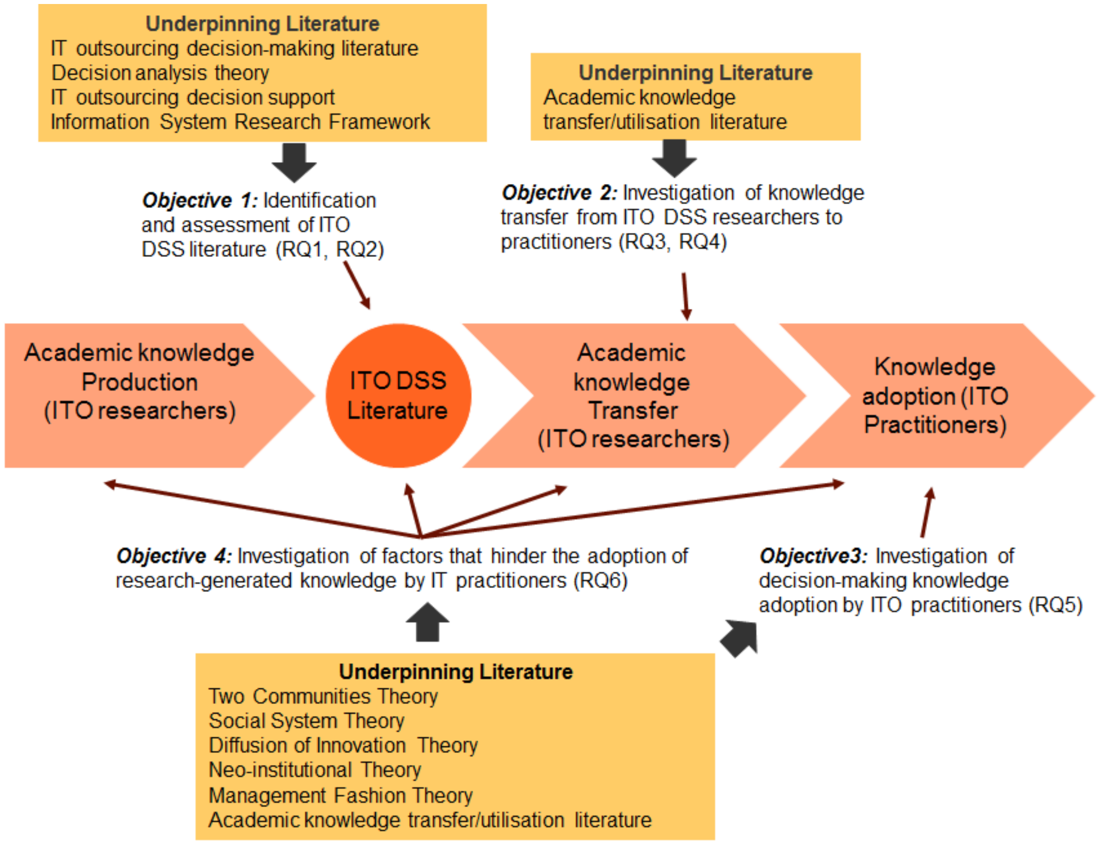


Figure 2-8. Research conceptual model and underpinning literature

Chapter 3. Research methodology

3.1. Introduction

This chapter provides the explanation and justification of the research paradigm, methodology and design undertaken for this research project. The critical realism paradigm and mixed-methods research approach used in this study is explained and justified. The mixed method approach comprises interview-based case studies in four Australian organisations, interviews with three academic researchers and three IT consultants, and two online surveys. The properties of the mixed-methods research approach used in the thesis are summarised in Table 3.1 and elaborated throughout this chapter.

Table 3.1 Properties of mixed-methods research used in the thesis

Property of mixed-methods research	**Research design decision**
Foundations of design decisions	
Purposes of mixed-methods research	Complementary Developmental Corroboration/Confirmation Compensation Diversity
Epistemological perspectives	Single paradigm
Paradigmatic assumptions	Critical Realism
Primary design strategies	
Design investigation strategy	Exploratory investigation
Strands/phases of research	Multiple phase design (3 phases)
Mixing strategy	Fully mixed methods
Time orientation	Sequential designs
Priority of methodological approaches	Equivalent status design
Sampling design strategies	Purposive sampling
Data collection strategies	Interviews and surveys
Data analysis strategy	Sequential qualitative-quantitative analysis
Inference decisions	
Type of reasoning	Retroduction (i.e. abduction)
Inference quality	Validity based on a Critical Realist Approach

Source: adapted from Venkatesh, Brown and Sullivan (2016)

This chapter is organised as follows. Section 3.1 introduces the research approach. Section 3.2 explains and justifies the research paradigm underpinning this study. A description of the research design and mixed-methods approach is provided in §3.4. Section 3.5 provides the details of data collection and data analysis methods used during research. Validity considerations are discussed in §3.6. The ethical considerations undertaken in this study are provided in §3.7. Lastly, §3.8 presents the summary and conclusions of this chapter. The overall structure of chapter 3 is shown in Figure 3-1.

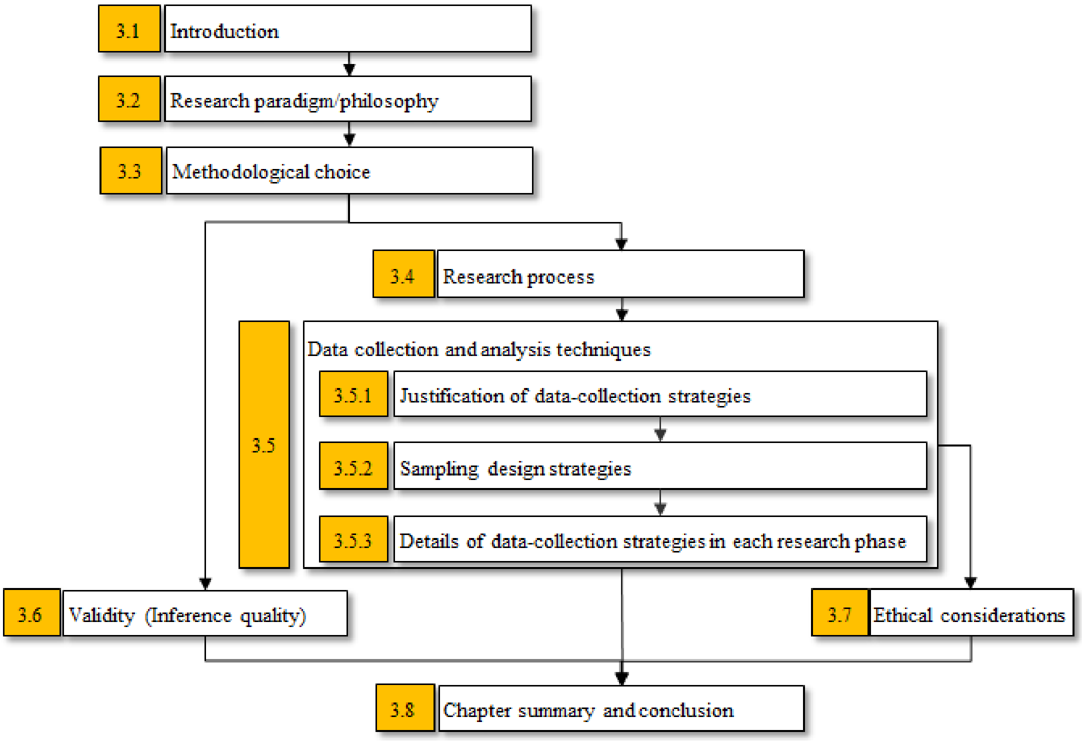


Figure 3-1. Structure of chapter 3

3.2. Research paradigm/philosophy

Paradigm is an overarching term related to the assumptions or beliefs about the world, how it works and how it may be understood (Kuhn 1996). Research paradigm or research philosophy embodies the important assumptions undertaken by the researcher about "development of knowledge and the nature of that knowledge" (Saunders, Lewis & Thornhill 2011, p. 101). Research paradigms are differentiated by three main characteristics: epistemology, ontology and axiology (Goles & Hirschheim 2000).

The word *epistemology* derives from the integration of two Greek words, *episteme* and *logos*. *Episteme* means knowledge or science, and *logos* denotes knowledge, theory and information (Johnson & Duberley 2003). Epistemology or *theory of knowledge* is concerned with the acquisition of knowledge, i.e. how we know what we know, what justifies us in believing what we believe, and what standards of evidence we should use in seeking truths about the world and human experience (Audi 2011). Any research requires the deployment of epistemology because it is the epistemological commitments that allow the researchers to evaluate knowledge (Neurath 1944).

Ontology is concerned with researchers' assumptions about the nature of reality. The reality is what exists and the ways in which it can be represented. Two aspects of ontology are *objectivism* and *subjectivism*. *Objectivism* considers that "social entities exist in reality external to social actors" (Saunders, Lewis & Thornhill 2011, p. 108). In contrast, *Subjectivism* portrays the position that "social phenomena are created from the perceptions and consequent actions of social actors" (Saunders, Lewis & Thornhill 2011, p. 108). *Axiology* is about judgments about values and the role of values in research, i.e. how the values influence the way research is conducted (Saunders, Lewis & Thornhill 2011).

There are differing views on the number and labels of different research paradigms, and on how to describe them. For instance, Johnson and Duberley (2003, p. 180) refer to research paradigms as "schools of thought" and classified them as positivism, neo-positivism, postmodernism, conventionalism, critical theory, pragmatic, and critical realism.

In this study, I have adopted the critical realism (CR) research paradigm (Bhaskar 1978, 1989; Collier 1994). In the view of critical realists, "an objective reality exists but that we can understand it only imperfectly and probabilistically" (Venkatesh, Brown & Sullivan 2016, p. 443). CR is often seen as a middle way between empiricism and interpretivism. From the empiricism view, "human beliefs about the external world only becomes valid knowledge when they have survived the test of experience" Johnson and Duberley (2003, p. 15). In contrast, interpretivism asserts that humans interpret the external thus our access to reality is only through social constructions (e.g. language) (Saunders, Lewis & Thornhill 2011).

Critical realism maintains a *realist* ontology, i.e. the idea of reality which exists independently of our knowledge or perception of it. However, CR allows for a degree of epistemological relativism/interpretivism as it considers the generation of knowledge as a human activity and depends upon the specific details and processes of its production (Bhaskar 1989). In other words, from an ontological perspective there is a reality quite independent of the mind, however, what we experience are sensations, the images of the things in the real world, not the things directly and our senses can deceive us. Critical realists deny having objective knowledge of the world and accept the possibility of valid alternative accounts of any phenomenon (Maxwell & Mittapalli 2010). In other words, knowledge is subject to the established facts, theories, methods, models and techniques of study that are used by researchers at a certain time and place, and "the process of scientific knowledge is viewed as historically emergent, political, and imperfect" (Zachariadis, Scott & Barrett 2013, p. 857).

Bhaskar (1978) introduced the stratified ontology of critical realism that distinguishes between three nested domains of reality: the *real*, the *actual*, and the *empirical.* Figure 3-2 illustrates an outline of these three ontological domains.

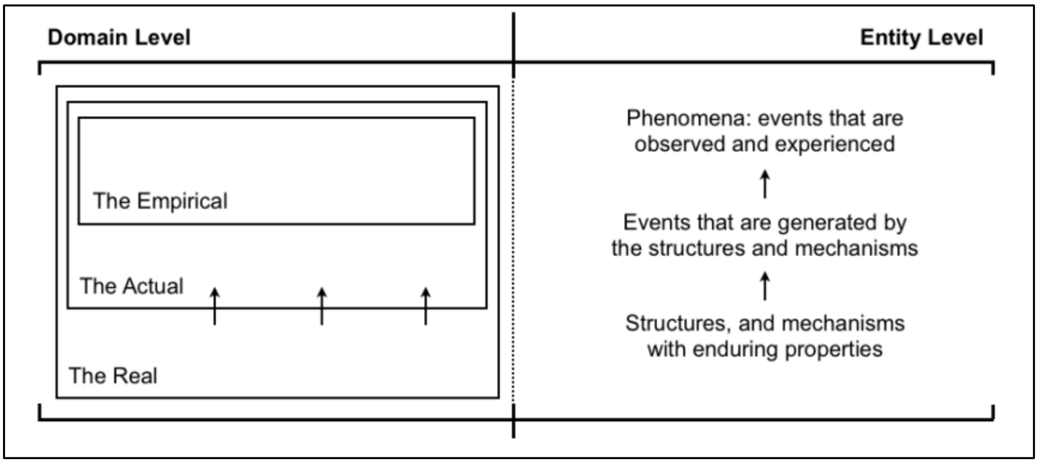


Figure 3-2. The Stratified Ontology of Critical Realism

Source: Zachariadis, Scott and Barrett (2013). Copyright © 2013, MIS Quarterly. Reprinted with permission of the publisher.

The domain of the *real* includes "all physical and social entities (i.e., structures) that independently exist and their inherent causal powers (i.e. *generative mechanisms*) which may be activated in a specific context" (Williams & Karahanna 2013, p. 935), though these mechanisms may not always be empirically observable (Zachariadis, Scott & Barrett 2013). Structures are defined as sets of internally related objects, and mechanisms refer to ways of acting (Sayer 2000). Structures and their associated mechanisms are ontologically decoupled from the events they produce (Smith 2006). The *actual* domain is a subset of real and includes the events generated from both exercised and unexercised mechanisms and events, whether or not they occur or are observed. Finally, the *empirical* domain is a subset of actual and refers only to the subclass of observable events experienced through either direct or indirect observation (Bhaskar 1978, 1989; Tsang 2014; Zachariadis, Scott & Barrett 2013). Positivism and Interpretivism only focus on the empirical domain. The stratified formulation of ontology helps to understand that even though there is one reality, we (as researchers) do not necessarily have immediate access to that reality or cannot observe and realise every aspect of that reality.

CR provides a distinctive conceptualisation of *causality*. The task of the researcher in a CR-led research is to use *perceptions of empirical events* to identify the mechanisms that give rise to those events (Collier 1994). In the critical realist view on *causality,* the structures and mechanisms residing in the real domain generate patterns of events and subsequently lead to the establishment of causal laws. "Contrary to the Humean[2] conception of causality adopted by positivism, realism argues that a constant conjunction of events observed in the empirical domain is neither a sufficient nor a necessary condition for a causal law" (Tsang 2014, p. 176). As Sayer (2000, p. 15) asserted "what causes something to happen has nothing to do with the number of times we have observed it happening". Furthermore, causality is independent of any specific pattern of events. In other words, the relationship among events, e.g. the fact that event A is followed by event B, does not necessitate causality because the underlying causal mechanisms may not lead event A to generate event B under other particular circumstances. "The same relationship may appear but not involve exactly the same mechanisms, or may not appear, but this does not imply that the specific mechanisms were absent because they might have been counterbalanced by the presence of other mechanisms" (Zachariadis, Scott & Barrett 2013, p. 861). Because CR considers structural entities to exist in open systems, and their causal powers may interact with the powers of other entities, causality is not deterministic (Sayer 2000). CR finds some common ground with interpretivism because it acknowledges the need for an interpretive understanding of social phenomena. However, the critical realists' view on causality differs from interpretivists who either reject causality completely or accept multidimensionality or circularity of cause and effect (Smith 2006).

The CR position on causality requires a particular mode of inference to explain events "by postulating (and identifying) mechanisms which are capable of producing

[2] David Hume (1711-1776) was a Scottish philosopher

them" (Sayer 1992, p. 107). Bhaskar (1975) called this logic of inference *retroduction*. Retroduction is essentially the same as abduction, as developed by C. S. Peirce in contrast to induction and deduction. In retroduction "we take some unexplained phenomenon that is of interest to us and propose hypothetical mechanisms that, *if they existed*, would generate or cause that which is to be explained" (Mingers, Mutch & Willcocks 2013, p. 797). In a retroduction inference, the researcher investigates the events (in the empirical domain), then based on the descriptions of empirical events, hypothesises that one or a number of potential causal mechanisms and their interaction could potentially have generated the events. These causal mechanisms may be physical/ observable or nonphysical/ unobservable. The next stage is trying to eliminate some of the hypotheses and support others (Mingers, Mutch & Willcocks 2013). The CR notion of causality takes contingencies into account: "the relationship between causal powers or mechanisms and their effects is therefore not fixed, but contingent" (Sayer 1992, p. 107). The activation of causal powers depends on the presence and configuration of two types of contingent conditions, intrinsic and extrinsic. "Intrinsic conditions refer to the nature of an object enabling consistent mechanism operations. An example of violating an intrinsic condition is that an aeroplane with a broken wing cannot fly properly. Extrinsic conditions are external to the object and yet affect the functioning of mechanisms. An extrinsic condition for an aeroplane to fly is not satisfied if the outside temperature is so low that the gas in its tank is frozen" (Tsang 2014, p. 177).

Critical Realism represents my personal world-view and philosophical position and is justified for this study on several grounds.

First, many scholars have argued that the ontological perspective of critical realism is highly relevant to Business and Management (Fleetwood & Ackroyd 2004) and Information Systems Research (Dobson 2002; Mingers 2004; Mingers, Mutch & Willcocks 2013; Smith 2006). In particular, Critical Realism's recognition of a transitive and intransitive dimension to reality provides a useful basis to bridge the dualism between subjective and objective views of reality and protects this study from a common criticism against IS research that it is an inconsistent approach to research (Dobson 2002). The socio-technical nature of this research that investigates the complex phenomena of academic research production, transfer and adoption make critical realism a favourable approach.

Second, critical realism, unlike direct realism and positivism, recognises multi-level studies and each level's capacity to change the researcher's understanding of the subject of study (Saunders, Lewis & Thornhill 2011). Because factors at different levels (individual, group and organisation) impact ITO decision making and research production, transfer and adoption, critical realism provides the appropriate stance for investigating these phenomena.

Third, this research will benefit from the greater explanatory power of critical realism over other paradigms (Smith 2006) to examine the research problem. The intended stakeholders of this research's output include a vast and diversified population (e.g. ITO practitioners, ITO researchers, research policy makers). Thus, generalisable conclusions that consider the contingencies in different settings are highly desirable for this study.

Fourth, CR is the paradigm that allows for overcoming persistent theory-practice inconsistencies in the information systems research (Smith 2006) and successfully addresses the unresolved problems within the philosophy of science e.g. "the impoverished view of explanatory theory within empiricism; the major critiques of observer- and theory-independence that empiricism assumes; the logical problems of induction and falsificationism; the dislocation between natural and social science; and the radical anti-realist positions adopted by constructivists and postmodernists" (Mingers 2004, p. 100).

Finally, it has been widely argued that the CR approach to research embraces a wide variety of methods where qualitative and quantitative approaches can be integrated in order to hypothesize and identify the generative mechanisms that cause the events we experience (Mingers 2004; Venkatesh, Brown & Bala 2013; Venkatesh, Brown & Sullivan 2016; Zachariadis, Scott & Barrett 2013). In other words, CR is a compatible and well-justified paradigm for the use of the mixed-methods approach adopted in this study, thus provides consistent and vigorous research grounds for the study.

3.3. Methodological approach used in this study

A mixed-methods research approach (Creswell & Clark 2011; Venkatesh, Brown & Bala 2013; Venkatesh, Brown & Sullivan 2016) was selected for this study. In a mixed-methods research "a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Johnson, Onwuegbuzie & Turner 2007, p. 123).

To decide on the appropriateness of a mixed-methods approach to the research study, four properties of the research that make up the foundation of research design decisions were examined. These are 1) research question; 2) research purpose; 3) selection of theoretical perspectives/worldviews or paradigms; and 4) epistemological perspectives (Creswell & Clark 2011; Venkatesh, Brown & Sullivan 2016).

First, the research questions of this study demand using a mixed-methods approach because the questions embed both a qualitative research question and a quantitative research question in one question. For instance, to answer RQ2 (what factors may explain effective knowledge transfer from academic researchers to practitioners?), a qualitative approach is needed to identify the factors and also a quantitative approach for ranking the factors and examining the relations between factors.

Second, this study combines qualitative and quantitative research approaches to pursue multiple purposes of a typical mixed-method research. Venkatesh, Brown and Sullivan (2016, p. 442) argued that mixed-methods research can be adopted to achieve one or a combination of seven purposes: "1) complementarity (i.e., to gain complementary views about the same phenomena or relationships), 2) completeness (i.e., to gain a complete picture of phenomena), 3) developmental (i.e., to ensure the questions from one strand emerge from the inference of a previous one or one strand is used to develop hypotheses the researcher will test in the next one), 4) expansion (i.e., to explain or expand on the understanding obtained in a previous strand of a study), 5) corroboration/confirmation or triangulation (i.e., to assess the credibility of inferences obtained from one approach), 6) compensation (i.e., to eliminate potential design weaknesses of one approach by using the other), and 7) diversity (i.e., to obtain divergent views of the same phenomenon)". This study's purposes of adopting the mixed-method approach were complementary, developmental, corroboration/ confirmation, compensation, and diversity as clarified in Table 3.2.

Table 3.2 Purposes of using mixed-methods research in this thesis

Purposes	Description	Relevance to this study
Complementarity	Mixed methods are used in order to gain complementary views about the same phenomena or relationships.	The qualitative study was used to gain additional insights on the findings from the quantitative study.
Developmental	Questions for one strand emerge from the inferences of a previous one (sequential mixed methods), or one strand provides hypotheses to be tested in the next one	The qualitative study was used to develop constructs and questions to be used in the quantitative study
Corroboration/ Confirmation	Mixed methods are used in order to assess the credibility of inferences obtained from one approach (strand).	The quantitative study used to assess the credibility and generalisability of findings from the qualitative study.
Compensation	Mixed methods enable compensating for the weaknesses of one approach by using the other.	The quantitative analysis compensated for the small sample size in the qualitative study.
Diversity	Mixed methods are used with the hope of obtaining divergent views of the same phenomenon.	Qualitative and quantitative studies were conducted to compare perceptions of the phenomenon of interest by two different types of participants: ITO researchers and ITO practitioners

Source: adapted from Venkatesh, Brown and Bala (2013)

Third, from an epistemological perspective, this study uses a single paradigm (Critical Realism). The Critical Realism paradigm recognises both subjective and objective views of reality (Dobson 2002) and abandons the need for multiple paradigms to accommodate both qualitative and quantitative research.

Fourth, with regard to paradigmatic assumptions, the adopted critical realism paradigm is "an ideal paradigm for mixed-methods research because its philosophical stance is compatible with the methodological characteristics of both quantitative and qualitative research" (Venkatesh, Brown & Sullivan 2016, p. 443). In comparison with positivist and interpretivist research designs, CR-led mixed-methods research was selected because it enables researchers to better address issues of validity and the development of more robust meta-inferences (Zachariadis, Scott & Barrett 2013).

3.4. Research process

The whole process of this study is illustrated in Figure 3-3. The research process is divided into three conceptual phases. These *conceptual* phases should be considered as three interrelated subprojects, not timed phases.

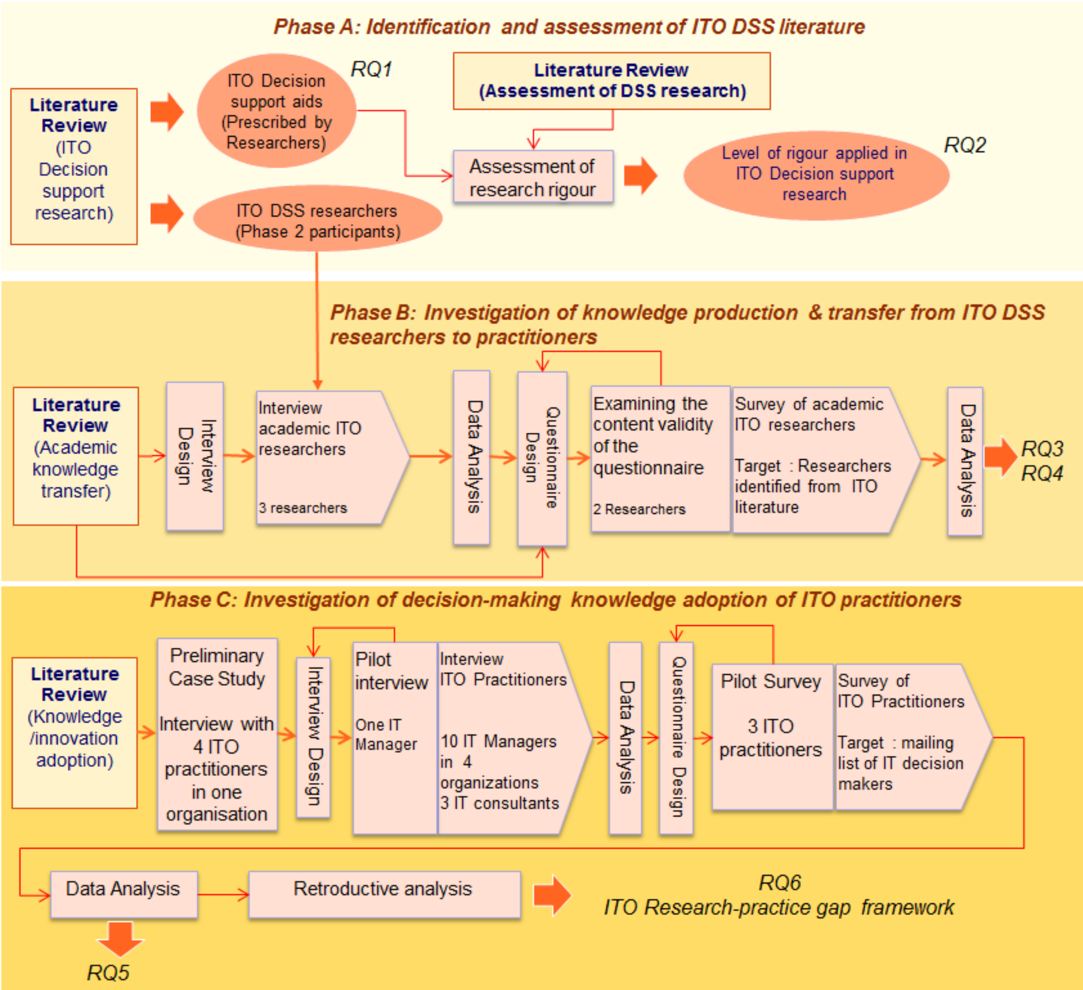


Figure 3-3 Research process

Phase A is focused on the identification and assessment of the extant decision support knowledge generated through academic research. A systematic literature review methodology is employed to identify and critically assess the ITO decision support articles in Phase A. The findings of this Phase reveal the scope, rigour and relevance of the ITO decision support literature.

In Phase B, the academic knowledge production and transfer from the perspective of the researchers is investigated. In addition, viewpoints of researchers on the relevance of their own research and possible ways of improving the practical relevance of research and its adoption by practitioners are examined. Phase B uses a mixed-methods approach comprising interviews and an online survey of ITO researchers.

The focus of Phase C is on the adoption of ITO decision making in practice. The aim of Phase C is to understand the extent to which practitioners' ITO decisions are informed by academic research and the factors that may hinder the adoption of research-generated knowledge by IT practitioners. Phase C employs a mixed-methods approach comprising interviews and an online survey of ITO practitioners. Phase C concludes with a retroductive analysis of the study findings in the context of extant literature, and develops a framework to explain the barriers to adoption of research-generated knowledge by IT practitioners.

The relationships between the research objectives, research questions and research phases are shown in Table 3.3.

Table 3.3 Mapping of research phases to research objectives and questions

Objective	**RQs**	**Phase(s)**
To identify and assess the state of the art DSS research on ITO decisions	RQ1 RQ2	A
To investigate the transfer of ITO DSS research by academics to practitioners	RQ3 RQ4	B
To investigate the adoption of ITO decision-making knowledge by practitioners	RQ5	C
To investigation barriers to adoption of research-generated knowledge by IT practitioners	RQ6	A & B & C

3.5. Data-collection strategies

This section provides the description and justification of data-collection strategies selected for this study. The rationale and justification for data collection choices are presented in §3.5.1. The sampling design strategy used in this study is explained in §3.5.2. The details of data collection plan for each of the three phases of this study are provided in §3.5.3.

3.5.1. Justification of data-collection strategies

This section justifies the four data collection methods planned for this study including *archival research*, *case study*, *interview*, and *survey*. A summary of data collection plan for this research is provided in Table 3.4.

Table 3.4 Summary of data collection plan

Phase	Data description	Data Type
Phase A	ITO DSS research articles	Qualitative
Phase B	Interviews with ITO researchers	Qualitative
	Online survey of ITO researchers	Quantitative
Phase C	Interviews with ITO decision makers for preliminary case study	Qualitative
	Interviews with ITO decision makers for the main case studies	Qualitative
	Interviews with ITO consultants	Qualitative
	Online survey of ITO practitioners (ITO decision-makers & consultants)	Quantitative

Archival research was the only available method to provide required data to answer RQ1 and RQ2 in Phase A. Archival research strategy focuses on the past and recorded information. A systematic literature review approach (Kitchenham 2004; Okoli 2015; vom Brocke et al. 2015) is used for archival research as detailed in §3.5.3.1. The systematic literature review method was justified because “a systematic review is a means of evaluating and interpreting all available research relevant to a particular research question, topic area, or phenomenon of interest” (Kitchenham 2004, p. 1).

For Phase B - A *case study* method was selected to enable empirical investigation of ITO decision-making knowledge adoption in four large Australian organisations. To obtain the multiple sources of evidence required for a case study (Yin 2014), the data collection plan required interviews with multiple informed participants (at least two) as well as using organisational documents to provide contextual information and triangulation. The case study method used a *multiple case* approach to enable theoretical replication (Perry 2013). Regarding the unit of analysis, an *embedded case study* approach was selected. The embedded case study approach enabled simultaneous consideration of two units of analysis: organisation and individuals (i.e. ITO practitioners). Hence the study investigated the adoption of ITO decision-making knowledge both at the organisational level and at the individual level. Also, the level of structure of ITO decision-making at the case organisations was studied at the organisational level.

The *interview* method was selected as the qualitative data collection method for this part of the study. Qualitative interviews are necessary where it is required to understand the reasons for the decisions that research participants have taken, or to understand the reasons for their attitudes and opinions (Saunders, Lewis & Thornhill 2011). In this study, RQ3, RQ4, RQ5, and RQ6 required information about participants' attitudes and opinions about the research issues such as academic research-generated knowledge and research-practice gap. From the three types of interviews (structured, semi-structured, and unstructured) considered, the *semi-structured* interview method was selected for this study.

Structured and unstructured interview methods were not appropriate for this study. Structured interviews use "questionnaires based on a predetermined and 'standardised' or identical set of questions" (Saunders, Lewis & Thornhill 2011, p. 320). The main benefits of the structured interview include: keeps the data concise, need less time in comparison to unstructured and semi-structured interviews, and reduces the researcher bias. However, structured interviews are only useful for obtaining very specific information and do not allow the exploration of new issues that may emerge during the interview. This approach was not suitable for this study because the problem domain was less-explored and required the flexibility to ask non-formulated questions if it was needed. By contrast, in unstructured interviews, there is no predetermined list of questions. Unstructured interviews allow collection of rich and in-depth data and are most suitable when little knowledge exists about a topic (Creswell & Clark 2011). Unstructured interviews were not suitable for this study because the interviews were intended to seek an answer to a set of pre-defined questions guided by the literature and theories underpinned the study. Also, unstructured interviews normally need more time than structured and semi-structured interviews. Consideration of participants' time limitation was essential because the targeted population were mainly in senior managerial positions or academic positions with scarce time. A semi-structured interview approach was selected because it uses a set of pre-defined questions and allows new issues to emerge for exploration during the interview. Furthermore, the semi-structured interview approach gives interviewees the flexibility to elaborate their answers but also enables the researcher to focus on the research problem during the interview.

All interviews were planned to be conducted on a *one-on-one* basis because the study required individual-based answers to interview questions. For instance, for the case studies, more than one participant from each case organisation were required to provide answers to the same set of interview questions independently in order to make a comparison of answers possible in the data analysis stage. Group interviews (i.e. focus group) may have been useful to obtain data for RQ6. However, it was not considered as a feasible choice for this study due to the anticipation of the time limitation of academic researchers and ITO practitioners, and their different geographical locations.

The preferred medium for interviews was *face-to-face* due to their several advantages over other methods (telephone and internet-mediated/online interviews). First, participants in telephone interviews are typically less willing to provide the researcher with as much time to talk to them, and the researcher may encounter difficulties in developing more complex questions in comparison to a face-to-face interview situation. Second, the face-to-face interview can provide more interactive conversation than online interviews (Saunders, Lewis & Thornhill 2011). Telephone and internet-mediated interviews (video-conference, email interview, or chat) were considered whenever a face-to-face interview was not possible.

All interviews were planned to be audio-recorded and subsequently transcribed by a third-party professional transcriber upon the consent of the interviewees.

The *survey* (*questionnaire*) method was considered for the collection of quantitative data from ITO practitioners and researchers. The survey was essential for collection of a high volume of data with less time and resources than required for conducting interviews. The survey data was needed to assure the generalisability of findings. The survey was planned to be conducted online because of the geographical spread of both populations of ITO practitioners and researchers around the world. The online survey was feasible because both targeted populations were inevitably internet users. Conducting pilot surveys among a subset of the population and using expert judgment (Saunders, Lewis & Thornhill 2011) was planned to validate the design of the questionnaires.

The alternative data collection strategies that were considered but not used in this study were: *experiment*, *action research*, and *ethnography*. The experiment method was not relevant to this study considering the research questions. Experiments are used to study causal links among independent variables with a dependent variable. Experiments mainly belong to natural sciences and are infrequently used in Management/Business research. A social science experiment generally requires the establishment of two groups of people (experimental group and control group) randomly drawn from the targeted population (Saunders, Lewis & Thornhill 2011). Also, action research was not relevant to this study because this research did not aim to create an actionable organisational artefact. Action research is concerned with the resolution of organisational issues in iterative cycles of diagnosing, planning, taking action and evaluation. Furthermore, action research emphasises the collaboration between the researcher and practitioners and requires the researcher to be "part of the organisation within which the research and the change process are taking place" (Saunders, Lewis & Thornhill 2011, p. 141). Ethnography research aims "to describe and explain the social world the research subject inhibit in the way in which they would describe and explain it" (Saunders, Lewis & Thornhill 2011, p. 142). Ethnographers collect data "through participant observation and record field notes as they observe from the sidelines and ⁄ or as they join in the activities of those they are studying" (DiCicco-Bloom & Crabtree 2006, p. 315). Ethnography was not relevant to RQ1, RQ2, RQ3 and RQ4. However, ethnography was relevant to RQ5 and RQ6 but the data generated from ethnography research would be limited in scope and not suitable to address the research questions.

3.5.2. Sampling design strategies

This study used purposive sampling that is the intentional selection of participants who have experience with the central phenomenon or the key concept being explored (Creswell & Clark 2011, p. 112). Rather than seeking a statistically representative sample, the sampling was based on participants' relevance (Perry 2013, p. 113) and availability. Hence, this research has targeted an international cohort of ITO researchers and practitioners capable of offering expertise and reflections most directly relevant to this study's objective, and of providing in-depth understandings of the nature, dimensions and potential approaches to the research problem. Using probability (random) sampling was practically impossible for the population of ITO practitioners.

3.5.3. Details of data-collection strategies in each research phase

3.5.3.1 Phase A (systematic literature review) data collection

To identify relevant articles that suggested decision support models/tools for ITO (Phase A) an archival data collection strategy was selected. A systematic literature review protocol was developed comprising the following elements:

1) Data sources: five electronic academic research databases in the areas of information systems and Management/Business research

2) Inclusion/exclusion criteria:

   Subject area: IT outsourcing, IS outsourcing, cloud computing, cloud sourcing, Application Service Provision (ASP), Net-sourcing

   Content: model-based decision support artefact (method/software …)

   Decision-making Level: Organisational/Managerial – Outsourcer (client) perspective

   Exclusion: decision-making at the application level or technical level, e.g. the optimum cloud configuration; decision-making from IT vendor perspective

3) Selection procedures: using keyword search in the electronic databases, short-listing papers based on the assessment of their title and abstract, full-text examination of short-listed papers, performing backward search (screening the reference lists of papers retrieved from the keyword search (vom Brocke et al. 2015)), forward search (searching among the publications that cited the papers retrieved from the keyword search (vom Brocke et al. 2015)).

3.5.3.2 Phase B (researchers) data collection

Three interviews and an on-line survey were planned for Phase B data collection. The targeted population for Phase B were academic researchers who published ITO decision support artefacts (models, frameworks, tools) in scholarly peer-reviewed journals and conferences identified in the systematic literature review (Phase A).

Three semi-structured interviews with academic researchers who published ITO decision support artefacts in top-ranked journals (A or A* based on the ABDC[3] list) were planned to obtain an in-depth understanding of the research problems.

In addition, it was decided to conduct an online survey of the ITO DSS researchers to obtain a larger data set. The entire population of the researchers were targeted as the survey population, therefore, no selection bias was expected. However, participation in the survey was inevitably voluntarily and consequently involved sampling bias. The population size was estimated at almost 200 researchers. A response rate of between 30 percent and 50 percent was expected to provide a confidence level of 95 percent with 7 to 11 percent margin of error (Saunders, Lewis & Thornhill 2011). This response rate was considered achievable according to the study of Tucker and Parker (2014) who reported a 51 percent response rate in a survey of senior academics in a study of the research-practice gap in Management Accounting.

3.5.3.3 Phase C (practitioners') data collection

The data for Phase C was planned using four interview-based case studies, interviews with three IT consultants and an online survey of practitioners. The intended population in Phase C were ITO practitioners comprised individuals involved in ITO decision-making either as an organisational decision maker (e.g. CIOs, ICT Directors, IT managers, etc.) or as an IT consultant. The study intended to engage four *medium/large* Australian organisations across different sectors as the case organisations. One of the four organisations was expected to participate in a preliminary (pilot) case study prior to the multiple case study. Considering the time and resource limitations of a PhD study, the search for case organisations was limited to organisations in Queensland to ensure accessibility for face-to-face interviews. The operational definition of *medium/large* organisation in this study is based on the Australian Bureau of Statistics' (ABS) definition. ABS (2002) defines a medium business as one that employs between 20 and 200 people and a large business as one that employs more than 200 people. Small organisations were excluded from this study

[3] Australian Business Deans Council list, accessed from www.abdc.edu.au.

because they usually have informal decision-making structures (Perren, Berry & Partridge 1998).

The relevance criteria here was that the participant must have at least five years of ITO experience in ITO decision-making to ensure that they have sufficient and relevant information to respond to the research questions. For each case study, face-to-face interviews were planned to be conducted with at least two ITO decision makers in the participating organisation. Interview questions used for the four case studies are provided in Appendix B.2. The interviews aimed to provide data about the types and attributes of the decision-making processes and the (possible) decision aids (e.g. frameworks, models) that practitioners use for ITO, practitioners' sources of obtaining ITO decision-making knowledge, and their attitude toward academic-generated knowledge.

The targeted population for practitioners' online survey was members of a LinkedIn online group namely the International Association of Outsourcing Professionals (IAOP). This on-line community was chosen because of its subject-domain relevance and having more than 9,500 members at the time of planning the study (July 2014). A response rate of about five percent was expected to provide the confidence level of 95 percent with five percent error margin (Saunders, Lewis & Thornhill 2011). It was recognised that constructing the sample in this way inevitably would introduce the possibility of potential selection bias as all ITO decision makers in the world would not get a chance of inclusion in the study. However, unbiased sampling was not practically possible. Thus, this research targeted a comprehensive international cohort of practitioners capable of offering expertise and reflections most directly relevant to this study's objective, and of providing in-depth understandings of the nature, dimensions and potential approaches to the ITO decision-making knowledge adoption.

3.5.3.4 Instrument design for data collection in Phase B and Phase C

Two interview guide questionnaires and two survey questionnaires were planned to be employed for data collection in Phase B and Phase C.

For development of each of these four questionnaires, the following steps were planned:

1. Designing questions that measure some aspect of the research questions (Czaja & Blair 2005) with adaption of existing questionnaires identified through literature review. Using existing questions from previous surveys has several advantages. First, those questions would have been piloted/tested at the time of their first use and some data regarding their validity will already be available. Second, comparisons with other research are possible (Bryman & Bell 2011). In addition, with use of existing questions researchers can avoid re-invention of the wheel, and save time and financial resources (Hyman, Lamb & Bulmer 2006). Disadvantages of borrowing the existing questions adopted from the extant literature include the risk of adopting poorly validated questions, and possible perception about limited originality of the undertaken research.

2. Refining the questions the questions to fit with the research questions and context of the study.

3. Piloting the instruments with at least two informed participant (i.e. experts) and seeking their feedback.

4. Revising the questions based on the feedback obtained in the pilot stage.

5. Developing a standardised questionnaires to support internal validity, manageability of data and cross-case comparison (Miles & Huberman 1994).

3.6. Data-analysis strategies

Document analysis was used to examine the rigour and relevance of the research articles identified through the systematic literature process in Phase A. The Information System (IS) Research Framework (Hevner et al. 2004) (Figure 3-4) was adapted to develop the coding protocol (detailed in Appendix D) for content analysis of the surveyed articles. Content analysis of the selected articles was conducted using NVivo software.

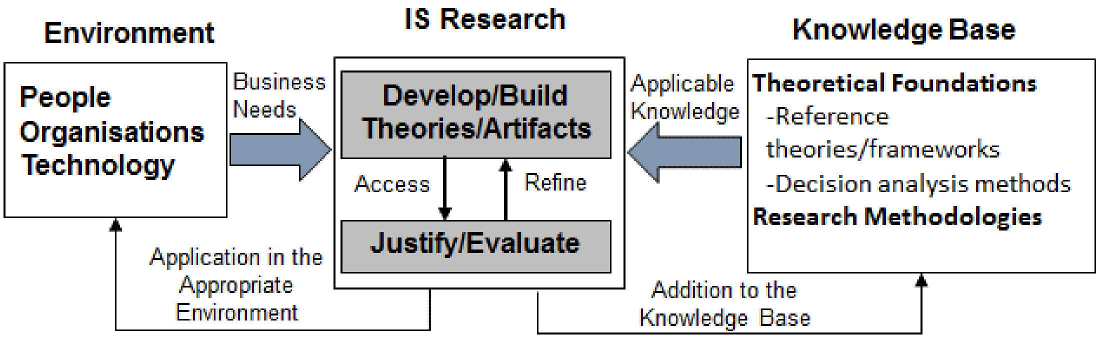


Figure 3-4. Information System Research Framework

Source: adapted from Hevner et al. (2004)

The selection of the Information System Research Framework is justified for several reasons. First, it does not have the limitations of classic IS evaluation frameworks. Classic evaluation frameworks and models (e.g. Keen 1981; Santhanam & Guimaraes 1995; Sun & Kantor 2006) do not provide a comprehensive view that jointly considers the organisational, user, designer and builder criteria (Phillips-Wren et al. 2009). Second, this framework has been used in similar studies for review and assessment of DSS literature by several scholars (e.g. Arnott & Pervan 2005, 2008b, 2008a; Purao & Storey 2008) and found to be a superior strategy for DSS evaluation since it takes the entire range of development activities into consideration (Miah, Debuse & Kerr 2012).

The evaluation was limited to the factors that allow an objective assessment and avoid possible bias and subjectivity. For the assessment of research rigour, adoption of theoretical foundations (reference theories/frameworks and decision analysis methods), research methodologies and evaluation methods were analysed. To assess the extent of relevance regarded in the research, the consideration of business needs (people, organisation and technology requirements) in the articles were reviewed.

To analyse the qualitative data gathered through interviews, the audio-recorded interviews were transcribed. Thematic analysis was used to analyse the qualitative data generated from the interviews. The qualitative data analysis process includes coding the data, assigning labels to codes, and grouping codes into themes, interrelating themes or abstracting to a smaller set of themes (Creswell & Clark 2011). NVivo, a qualitative data analysis software tool, was used to organise and analyse the data obtained (Bazeley & Jackson 2013). The aim of this process was to provide structure to the material for further analysis.

Quantitative data obtained from online surveys include demographic variables and respondents' levels of agreement with the survey propositions. The survey data were analysed using descriptive statistics methods, and two non-parametric statistical tests: Chi-Square Test and Binomial Test. Nonparametric tests are chosen because they do not require assumptions about the shape of the underlying distribution. IBM SPSS Statistics (Version 23) was used for the statistical analysis. The Chi-Square test is a nonparametric test of the statistical significance of a relation between two nominal or ordinal variables. The chi-square test can report only whether groups in a sample are significantly different in some measured attribute or behaviour; it does not allow one to generalise from the sample to the population from which it was drawn (Connor-Linton 2012). The Binomial Test is used to compare the observed frequencies of the two categories of a dichotomous variable to the frequencies that are expected under a binomial distribution with a specified probability parameter (Gravetter 2013).

3.7. Validity (Inference quality)

Validity was considered in the study because it indicates the level of quality and rigour of research and can have a substantial impact on the quality of inferences that are generated from a study (Venkatesh, Brown & Sullivan 2016). Teddlie and Tashakkori (2003) proposed the term *inference quality* to refer to validity in the context of mixed-methods research to differentiate mixed-methods validation from quantitative and qualitative validation. In this study, I use the terms validity and inference quality interchangeably.

Three distinctive categories for validity are commonly used and were considered: design validity, measurement (or analytical) validity, and inferential validity (Teddlie & Tashakkori 2003; Venkatesh, Brown & Bala 2013). The definitions of these validity categories may vary depending on the research approach. Figure 3-5 shows how these three validity types differ between the conventional view (dashed lines) and the CR view (continuous lines) and an explanation follows.

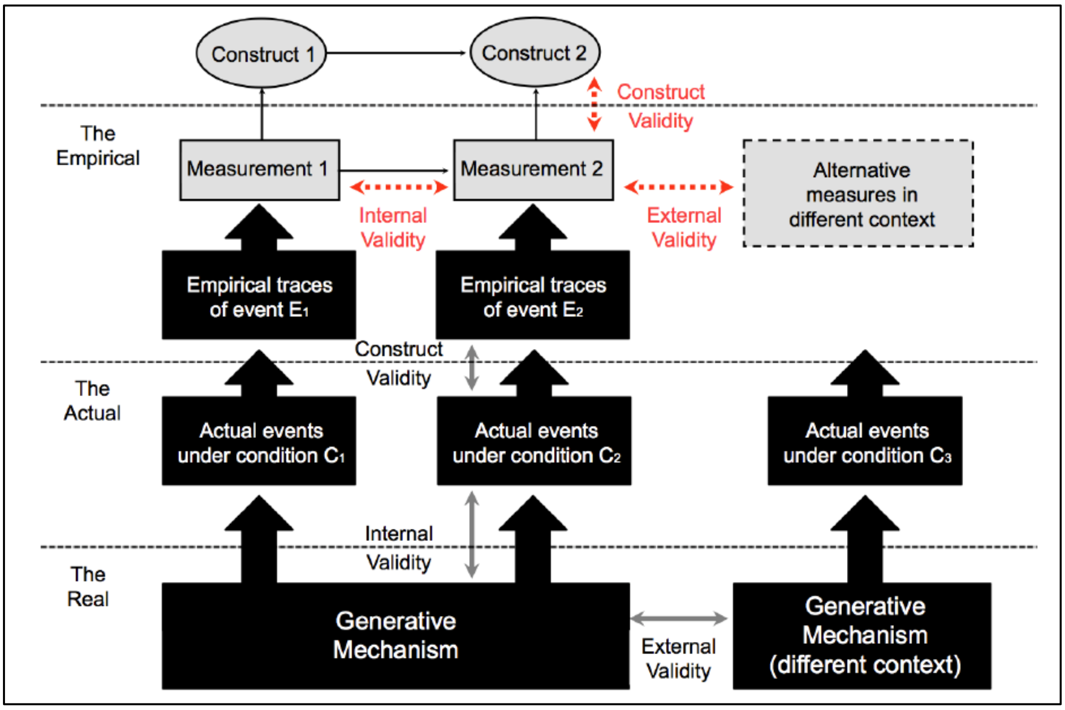


Figure 3-5. Validity based on a Critical Realist Approach

Source: Zachariadis, Scott and Barrett (2013, p. 861). Copyright © 2013, MIS Quarterly. Reprinted with permission of the publisher.

This study applies a CR-based assessment of inference quality following the guidelines provided by Zachariadis, Scott and Barrett (2013) and Smith and Johnston (2014).

Design validity includes *internal validity* and *external validity*. From a critical realist view, internal validity refers to establishing whether the generative mechanism hypothesised or uncovered is involved in the observed events. Similarly, external validity refers to the generalisability of the knowledge claims about the causal mechanisms identified in a specific research setting to other domains. However, in traditional quantitative research, internal validity is concerned with showing that the correlation observed is causation, and external validity refers to generalisability of results outside the research setting. In qualitative research, design validity refers to the quality of design and execution of the study (Smith & Johnston 2014; Zachariadis, Scott & Barrett 2013).

Analytical validity or *measurement validity* refers to "how well a measure gives information about the thing it is designed to measure" (Smith & Johnston 2014, p. 17). Empiricist measurement validity is focused on statistical characteristics of data (observation about the construct) and the connection between a theoretical concept and a measure. However, the empiricist measurement validity is problematic in IS and Management research because many phenomena or behaviours the researcher measures (e.g. usefulness, research relevance) have socially constructed or experiential aspects and assessment of the correspondence between a measure and behaviour is not directly possible (Smith & Johnston 2014). For a critical realist, measurement validity involves establishing a chain of evidence about the quality of information the measure provides for the event. As shown in Figure 3-5, CR-based construct validity refers to "the correspondence between empirical traces of events (E1 and E2) and the information they give us about the actual events in the field we are studying (C1 and C2), which in turn are manifestations of the mechanisms we seek to uncover" (Zachariadis, Scott & Barrett 2013). In contrast, in conventional quantitative research, construct validity describes the degree to which the variables used in the model capture what they intend to measure. In other words, the focus is on the relationship between the theoretical concepts (construct 1 or 2) and their operational definitions existing in the empirical domain (measurement 1 or 2).

Finally, inferential validity focuses on how statistical results can provide information about the relationships of events observed in the empirical domain (not causal assumptions) and how qualitative findings can provide information about the generative mechanisms that cause the events at the empirical level. In traditional research, inferential validity denotes the validity of the statistical conclusions and whether they are sufficient to make inferences for a quantitative study or the overall quality of interpretation and inferences made in a qualitative study (Zachariadis, Scott & Barrett 2013). Table 3.5 provides a detailed description of validity components from a Critical Realist view.

Table 3.5 Validity in CR-Based Research

Validity Type	Description in CR-Based Qualitative Research	Description in CR-Based Quantitative Research
Design Validity	**Descriptive validity and Credibility**: explanations of mechanisms in action and the conditions with which they are interacting; appreciation of the field by identifying, prioritising, and scoping boundaries of the study.	**Internal validity**: Actual events are manifestations of the particular generative mechanism in the context of the field.
	Transferability: the idea that similar or related events that occur (or might occur) in other settings are caused by the generative mechanism that caused the actual events in the field.	**External validity**: The likelihood that similar or related events that occur (or might occur) in other settings are caused by the generative mechanism that caused the actual events in the field.
Measurement Validity	**Theoretical validity**: theory is used to help hypothesise about the mechanisms and provide explanations for the events that have occurred. **Dependability**: this is an essential part of the retroductive process and identification of contingent factors.	**Reliability**: The measurements used in the extensive methods do not have measurement error.
	Consistency: Challenge and inform the terms of (quasi-)closure and process of ongoing inquiry in the retroductive analysis. **Plausibility**: Whether data that is empirically available gives valid knowledge about the actual manifestation of the alleged generative mechanism in the field.	**Construct validity**: Whether data that is empirically available gives valid knowledge about the actual manifestation of the alleged generative mechanism in the field.
Inferential Validity	Findings from qualitative research can provide information about the mechanisms that cause the events at the empirical level.	Findings from statistics can provide information about the relationships of events observed in the empirical domain (not causal assumptions).

Source: Adapted from Zachariadis, Scott and Barrett (2013)

3.8. Ethical considerations

Approval from the University of Southern Queensland Ethics Committee for research with human subjects was obtained at two stages. First, to conduct the preliminary case study, Ethics Approval number H14REA103 (Appendix A.1) was obtained on 23 May 2014. Later, Ethics Approval number H15REA144 (Appendix A.2) was granted on 22 July 2015 for the remainder of the study, confirming the compliance of the research with *Australia National Statement on Ethical Conduct in Human Research*.

All participants acknowledged that they had reviewed the Participant Information Form (Appendix A.3) before their participation. As outlined in the participant information form, interviews were entirely voluntary and to protect privacy and ensure confidentiality, interview audio and transcriptions will not be made available to others at any time. Interviewees signed the Informed Consent Form (Appendix A.4) for online interviews and returned the signed consent form via email. All interviewees, except one, accepted recording of the interviews and subsequent transcription by a third party. To protect their privacy, interviewees' names are not reported in this document. In the online surveys, participants confirmed their consent by submitting the 'Agree' button on the online consent form. The online survey data was anonymous.

3.9. Chapter summary and conclusion

This chapter described the research paradigm and methodology used in this research and the justification for the appropriateness of the selected research approach for this particular research. A mixed-methods research approach under the Critical Realism paradigm was justified for this study. This chapter also presented the details of the mixed-method research employed in this study including research processes, data collection and analysis techniques, validity criteria and the ethical considerations.

Chapter 4. A systematic literature review and assessment of ITO decision support literature

4.1. Introduction

This chapter presents the results of Phase A comprising a systematic literature review and critical assessment of 133 model-driven decision support research articles for IT outsourcing (including cloud sourcing, application service provision and net-sourcing). These articles were identified through a systematic literature review (Okoli 2015; vom Brocke et al. 2015) as outlined in §3.5 and assessed based on Hevner et al.'s (2004) Information System Research Framework described in §3.6 (Chapter 3) and other theoretical frameworks explained in this chapter.

As shown in Figure 4-1, this chapter is organised into four sections. Section 4.2 describes the systematic literature review process performed to collect the ITO DSS papers. Section 4.3 presents the findings of the systematic literature review and assessment of the identified papers. Section 4.4 provides a summary of this chapter.

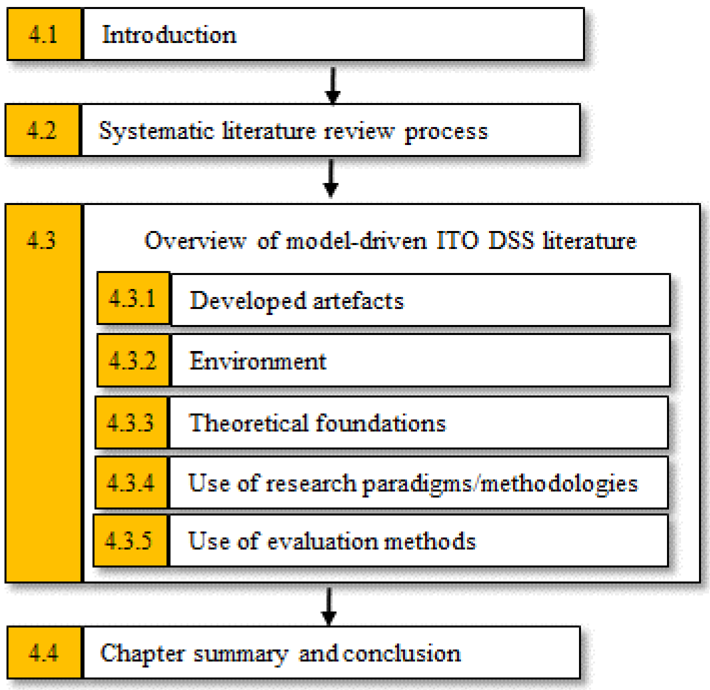


Figure 4-1. Structure of chapter 4

4.2. Systematic literature review process

In Phase A, to identify relevant articles that suggested a decision support model/tool for ITO a systematic literature review was conducted. As shown in Figure 4-2, six academic publication indexing databases were queried: EBSCOhost Business Source Complete, Science Direct, Scopus, Emerald Insight, AIS Electronic Library (AISeL) and IEEE Xplorer. The choice of the six databases can be considered reasonable and sufficient. AISeL is a dedicated repository for information systems' research papers. IEEE Xplorer is one of the world's largest collections of technical literature in engineering, computer science and related technologies with more than four million documents (IEEE 2016). The other four databases are considered among the most prominent in academic institutions and are frequently used by other researchers. The following search terms were applied: 'Outsourcing AND (Decision OR Select* OR Framework)', 'Cloud AND (Decision OR Select* OR Framework OR Adoption)', '("Application Service" OR ASP OR Net-sourcing) AND (Decision OR Select* OR Framework)'.

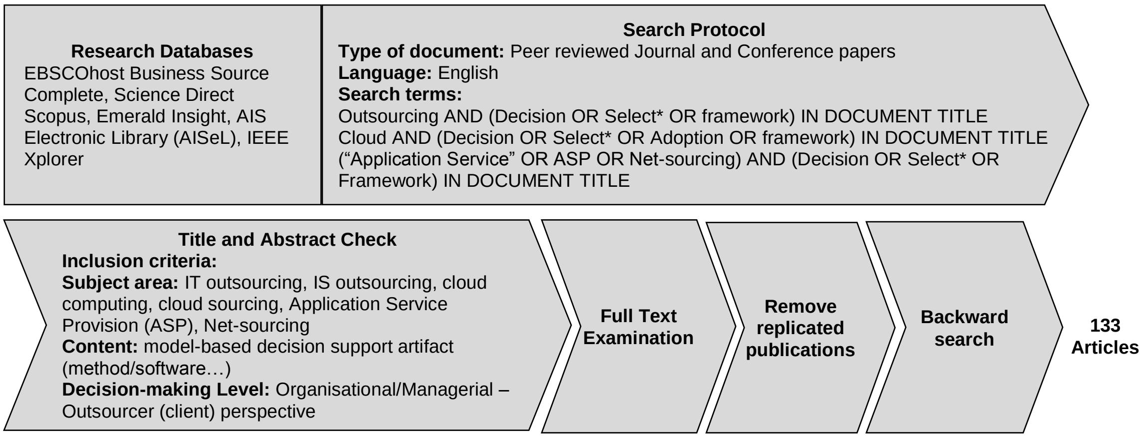


Figure 4-2. Systematic literature review process

Potentially relevant articles were shortlisted for further analysis based on the examination of the title and abstract of the article. Relevant articles were identified through the careful examination of the full-text of the shortlisted articles. In addition, a backwards search (vom Brocke et al. 2015) within the reference lists of the identified articles was performed to identify further relevant articles. Due to time limitations of this study, the forward search was not performed. Initial screening revealed that nine studies were published twice, thus only the most recent versions of these nine articles were included to avoid duplication of the reported quantities. The final number of articles analysed was 133[4].

The inclusion criteria were (1) Subject area: IT outsourcing, IS outsourcing, cloud computing, cloud sourcing; (2) Content: model-based decision support artefact (method/software …); (3) Decision-making Level: Organisational/Managerial; and (4) Decision-making method: model-based/quantitative. The review was aimed at organisational decision making, thus did not cover decision-making at the application level or technical level, e.g. the optimum cloud configuration.

4.3. Overview of model-driven ITO DSS literature

This section reports the findings of the systematic literature review of model-driven ITO decision support literature.

4.3.1. Developed artefacts

As described in §3.5.2, 133 research papers (listed in Appendix E) were selected for analysis. All of the articles developed a kind of decision support *method.* In addition to the suggested method, 16 articles reported development of an *instantiation* in the form of a software tool, either as their final product or as a prototype (Andresen et al. 2010; Andrikopoulos, Song & Leymann 2013; Cayirci et al. 2014; Chen, Chou & Lin 2007; Ding et al. 2014; Ghosh, Ghosh & Das 2015; Hodosi & Rusu 2007; Juan-Verdejo & Baars 2013; Khajeh-Hosseini et al. 2012; Martens & Teuteberg 2012; Menzel, Schönherr & Tai 2013; Naseer, Jabbar & Zafar 2014; Razumnikov & Kremneva 2015; Rehman, Hussain & Hussain 2015). In Table 4.1 the 133 articles have been categorised by the major sourcing decision and reference type. The ITO adoption decision, which was the subject of 21 percent of studies, includes identification of the determinants of outsourcing (i.e. decision variables) and evaluation of advantages and disadvantages of outsourcing versus insourcing (i.e. risk-benefit analysis/assessment) and focusses on the question *whether to outsource or*

[4] The search was conducted in two stages. The first stage was conducted in September 2015. The authors of identified articles at this stage were targeted as the population for research Phase B. The second round of searches was conducted in August 2016 to include the most recent ITO DSS articles. In this chapter the result of the second stage of searches is presented.

not? Deciding the level of ITO or *sourcing model* was studied in seven percent of articles. Almost 11 percent of articles covered the decision of *what to outsource?* This decision considers each of the IT infrastructure components (e.g. data centre, communication network, etc.) and services (e.g. hardware maintenance, software development, etc.) as an alternative for the organisation to outsource. *Outsourcing location* and *IT vendor/supplier selection* were the other decisions studied and were present in four and 20 percent of articles respectively. In the articles focused on cloud sourcing, net-sourcing or ASP, the most frequent topic was *service provider selection* (24% of articles) followed by cloud adoption (15% of articles) and *cloud deployment model selection* (one article).

Table 4.1 Summary of ITO decision support articles by sourcing context and type of sourcing decision

Sourcing context	Sourcing decision	Count	Reference
IT outsourcing	ITO adoption (To outsource or Not / outsourcing risk assessment)	28	(Lokachari & Mohanarangan 2002); (Davis 2005); (Zhang et al. 2006); (Hodosi & Rusu 2007); (Xiu-Wu, Tao & Yuan 2008); (Xinyi & Jingjing 2009); (Andresen et al. 2010); (Udo 2000); (Yang & Huang 2000); (Mathew 2006); (Cong et al. 2008); (Tajdini & Nazari 2012); (Buhl, Fridgen & König 2013); (Samantra, Datta & Mahapatra 2014); (Atkinson, Bayazit & Karpak 2015); (Olson 2007); (Cong & Chen 2015); (Cheng, Balakrishnan & Wong 2006); (Corbitt & Tho 2005); (Dasgupta & Mohanty 2009); (Fan, Suo & Feng 2012); (Olson & WU 2011); (Paisittanand & Olson 2006); (Hsu, Chiu & Hsu 2004); (Benaroch 2002);(Tang, Liang & Wu 2008); (Xie, Zhang & Lai 2005); (Roehling et al. 2000); (Chen, Chou & Lin 2007)
	Deciding the level of ITO - sourcing model	10	(Davis 2005); (Bezerra, Moura & Lima 2014); (Ngwenyama & Bryson 1999); (Udo 2000); (Faisal & Banwet 2009); (Tsai et al. 2010); (Gulla & Gupta 2011); (Tjader et al. 2014); (Pandey & Bansal 2004);(Roehling et al. 2000)
	What to outsource	15	(Davis 2005); (Xiang & Zhong-liang 2006); (Büyüközkan & Feyzioğlu 2006); (Hatami-Shirkouhi et al. 2010); (Yang & Huang 2000); (Wang & Yang 2007); (Wang et al. 2007); (Wang, Lin & Zhang 2008); (Tsai et al. 2010); (Nazari-Shirkouhi et al. 2011); (Morais, Costa & de Almeida 2014); (Zandi 2014); (Pandey & Bansal 2004); (Li, Wang & Yang 2006)
	(Offshore) outsourcing location selection	5	(Li, Wang & Yang 2006); (Nduwimfura & Zheng 2015); (Jiang et al. 2010); (Liu et al. 2008); (Kramer & Eschweiler 2013)
	IT Vendor/Supplier-selection, vendor portfolio management	27	(Davis 2005); (Wang, Chen & Chen 2008); (Ping, Fu-ji & Jian 2009); (Chen & Han 2011); (Xie & Mei 2011); (Fridgen & Müller 2011); (Chatterjee, Kar & Kar 2013); (Liu & Li 2013); (Akomode, Lees & Irgens 1998); (Hsu & Hsu 2008); (Chen & Wang 2009); (Kahraman et al. 2009); (Kahraman, Beskese & Kaya 2010); (Chen, Wang & Wu 2011); (Chang et al. 2012); (Cao, Cao & Wang 2012); (Li & Wan 2014); (Oztaysi 2014); (Watjatrakul 2014); (Qiang & Li 2015); (Karami & Guo 2012); (Chaudhury, Nam & Rao 1995) ; (Chen & Cao 2009); (Faisal & Asif 2016); (Fekete & Hancu 2010); (Chen & Cao 2009); (Osei-Bryson & Ngwenyama 2006)
Cloud sourcing, Net-sourcing, ASP	Adoption (to adopt or not and/or risk assessment)	20	(Khajeh-Hosseini et al. 2011); (Saripalli & Pingali 2011); (Mastroeni & Naldi 2011); (Yam et al. 2011); (Johnson & Qu 2012); (Andrikopoulos, Song & Leymann 2013); (Muir 2013); (Juan-Verdejo & Baars 2013); (Hanus & Windsor 2013); (Cayirci et al. 2014); (Juan-Verdejo et al. 2014); (Christoforou & Andreou 2015); (Razumnikov & Kremneva 2015); (Lilienthal 2013); (Ramachandran et al. 2014); (Tang-Nguyen & Lee 2015); (Ribas et al. 2015); (Walker, Brisken & Romney

			2010); (Furuncu & Sogukpinar 2015); (Singh et al. 2004); (Loebbecke & Huyskens 2009); (Roedder, Karaenke & Knapper 2013); (Yiming & Yiwei 2011)
	Cloud deployment model selection	1	(Keung & Kwok 2012)
	Service provider selection, vendor portfolio management	32	(Godse & Mulik 2009); (Chen & Lin 2010); (Rehman, Hussain & Hussain 2011); (Chang, Liu & Wu 2012); (Yuen 2012); (Shivakumar, Ravi & Gangadharan 2013); (Sun et al. 2013); (Le et al. 2014a); (Le et al. 2014b); (Baranwal & Vidyarthi 2014); (Moyano, Beckers & Fernandez-Gago 2014); (Naseer, Jabbar & Zafar 2014); (Zheng & Xu 2014); (Ghosh, Ghosh & Das 2015); (Grandhi & Wibowo 2015); (Nie, She & Chen 2011); (Khajeh-Hosseini et al. 2012); (Martens & Teuteberg 2012); (Silas, Rajsingh & Ezra 2012); (Menzel, Schönherr & Tai 2013); (Garg, Versteeg & Buyya 2013); (Kwon & Seo 2014); (Repschlaeger, Proehl & Zarnekow 2014); (Fan, Yang & Pei 2014); (Ding et al. 2014); (Walterbusch, Martens & Teuteberg 2015); (Yu 2015); (Do Chung & Kwang-Kyu 2015); (Singh & Randhawa 2015); (Rehman, Hussain & Hussain 2015); (König, Mette & Müller 2013); (Qu, Wang & Orgun 2013); (Lin 2016); (Low & Hsueh Chen 2012)

4.3.2. Environment (technology, organisation, people)

Traditional ITO decisions were the focus of 57 percent of articles while the remaining articles focused on cloud sourcing, ASP or net-sourcing. Figure 4-3 shows there is an upward trend in the number of selected articles published each year between 1995 and 2014. The number of published ITO decision support articles decreased from 2014 to 2015 to the 2013 level. It should be noted that the literature search does not include publications after August 2016. Hence, Figure 4-3 does not shows the total number of the articles published in 2016. The emergence of cloud computing in recent years has attracted the attention of researchers and has significantly contributed to the rise in the number of publications.

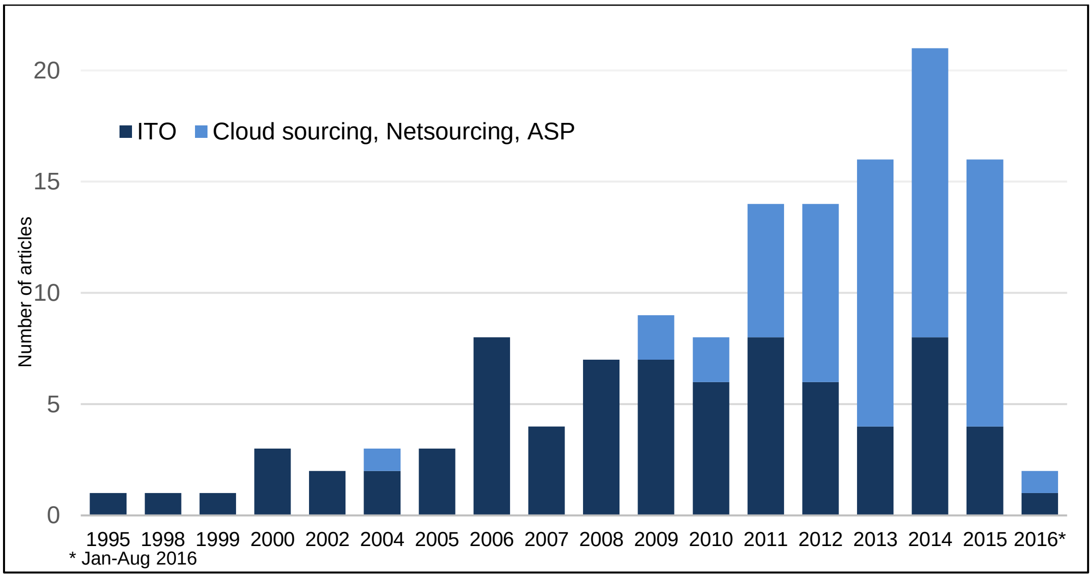


Figure 4-3. Frequency of ITO decision support model articles by type and year

In eight articles the designed artefacts were developed for specific sectors/industries: government agency (Bezerra, Moura & Lima 2014); banking/finance (Gulla & Gupta 2011; Paisittanand & Olson 2006); health (Hsu & Hsu 2008; Low & Hsueh Chen 2012); tourism (Lin 2016); and higher education (Faisal & Asif 2016; Ramachandran et al. 2014). Thirteen articles explicated the size of the targeted organisation (outsourcer) as *small or medium enterprise (SME)* (Chang et al. 2012; Keung & Kwok 2012; Kramer & Eschweiler 2013; Lin 2016; Martens & Teuteberg 2012; Muir 2013; Saripalli & Pingali 2011; Walker, Brisken & Romney 2010; Yam et al. 2011), or *large* (Andresen et al. 2010; Chang, Liu & Wu 2012; Henderson, MacKay & Peterson-Badali 2006; Walker, Brisken & Romney 2010). A quarter of all articles (listed in Table 4.2) indicated that the suggested decision support artefact supports group decision making.

Table 4.2 ITO decision support articles that considered ITO as a group decision

Reference
(Chen, Chou & Lin 2007); (Zhang et al. 2006); (Xiu-Wu, Tao & Yuan 2008); (Udo 2000); (Cong et al. 2008); (Samantra, Datta & Mahapatra 2014); (Fan, Suo & Feng 2012); (Hsu, Chiu & Hsu 2004); (Xie, Zhang & Lai 2005); (Tsai et al. 2010); (Tjader et al. 2014); (Hatami-Shirkouhi et al. 2010); (Nazari-Shirkouhi et al. 2011); (Morais, Costa & de Almeida 2014); (Zandi 2014); (Miri-Nargesi et al. 2011); (Chatterjee, Kar & Kar 2013);(Akomode, Lees & Irgens 1998); (Hsu & Hsu 2008); (Chen & Wang 2009); (Kahraman et al. 2009); (Kahraman, Beskese & Kaya 2010); (Chen, Wang & Wu 2011); (Watjatrakul 2014); (Faisal & Asif 2016); (Saripalli & Pingali 2011); (Christoforou & Andreou 2015); (Lilienthal 2013); (Sun et al. 2013); (Grandhi & Wibowo 2015); (Fan, Yang & Pei 2014); (Singh & Randhawa 2015); (Qu, Wang & Orgun 2013); (Lin 2016); (Low & Hsueh Chen 2012)

4.3.3. Theoretical foundations

The majority of surveyed articles include references to previous related works, although the extent of the literature review reported in each article varied significantly. The assessment of theoretical foundations as presented in this section focused on the analysis of *reference theories/ frameworks* and decision analysis *methods* adopted by the authors of the surveyed articles.

4.3.3.1 Reference theories/frameworks

The majority of articles (70%) did not mention any specific theory or framework as the theoretical foundation for their study. As shown in Table 4.3, the most frequently cited type of ITO reference theory was Economic Theories. Strategic theories and Social/ Organisational Theories were cited in 16 and six percent of articles respectively.

Table 4.3 Analysis of theoretical foundation referenced in each of the surveyed articles

Category	Theory/Framework	Count	Reference
Economic Theories	Transaction Cost Theory	22	(Martens & Teuteberg 2012); (Repschlaeger, Proehl & Zarnekow 2014); (Walterbusch, Martens & Teuteberg 2015); (Xinyi & Jingjing 2009); (Chen & Wang 2009); (Cong & Chen 2015); (Fridgen & Müller 2011); (Hodosi & Rusu 2007); (Kahraman, Beskese & Kaya 2010); (Kahraman et al. 2009); (Nazari-Shirkouhi et al. 2011); (Ngwenyama & Bryson 1999); (Tjader et al. 2014); (Yang & Huang 2000); (Chen & Cao 2009); (Cheng, Balakrishnan & Wong 2006); (Chen & Cao 2009); (König, Mette & Müller 2013); (Loebbecke & Huyskens 2009); (Fan, Suo & Feng 2012); (Hsu, Chiu & Hsu 2004); (Liu et al. 2008)
	Production Cost Theory	2	(Martens & Teuteberg 2012); (Walterbusch, Martens & Teuteberg 2015)
	Agency Theory	11	(Martens & Teuteberg 2012); (Repschlaeger, Proehl & Zarnekow 2014); (Walterbusch, Martens & Teuteberg 2015); (Xinyi & Jingjing 2009); (Tjader et al. 2014); (Cheng, Balakrishnan & Wong 2006); (König, Mette & Müller 2013); (Fan, Suo & Feng 2012); (Cong & Chen 2015); (Loebbecke & Huyskens 2009); (Xiu-Wu, Tao & Yuan 2008)
	Property Rights Theory	1	(Tjader et al. 2014)
	Portfolio Theory	3	(Fridgen & Müller 2011); (König, Mette & Müller 2013); (Martens & Teuteberg 2012)
Strategic Theories	Resource Based Theory	12	(Martens & Teuteberg 2012); (Repschlaeger, Proehl & Zarnekow 2014); (Walterbusch, Martens & Teuteberg 2015); (Chen & Wang 2009); (Cong & Chen 2015); (Nazari-Shirkouhi et al. 2011); (Tjader et al. 2014); (Cheng, Balakrishnan & Wong 2006); (Lin 2016); (Mathew 2006); (Muir 2013); (Kramer & Eschweiler 2013)
	Competitive Advantage Theory	14	(Nazari-Shirkouhi et al. 2011); (Lin 2016); (Tsai et al. 2010); (Chen & Wang 2009); (Ngwenyama & Bryson 1999); (Oztaysi 2014); (Akomode, Lees & Irgens 1998); (Mathew 2006); (Cao, Cao & Wang 2012); (Paisittanand & Olson 2006); (Low & Hsueh Chen 2012); (Xinyi & Jingjing 2009); (Hatami-Shirkouhi et al. 2010); (Kramer & Eschweiler 2013)
	Power Theory	1	(Tjader et al. 2014)
Social/ Organisational Theories	Institutional Theory	1	(Walterbusch, Martens & Teuteberg 2015)
	Relationship Theory	3	(Martens & Teuteberg 2012); (Repschlaeger, Proehl & Zarnekow 2014); (Walterbusch, Martens & Teuteberg 2015)
	Socio-Technical Theory	1	(Khajeh-Hosseini et al. 2012)
	Risk Theory	1	(Ghosh, Ghosh & Das 2015)
	Theory Of Risk Aversion	2	(Buhl, Fridgen & König 2013); (Fridgen & Müller 2011)
	Social Exchange Theory	1	(König, Mette & Müller 2013)
	Learning Theory	1	(Martens & Teuteberg 2012)
Other theories	Knowledge Base Theory	2	(Tjader et al. 2014); (Atkinson, Bayazit & Karpak 2015)
Frameworks	Gap Evaluation Model	1	(Fan, Yang & Pei 2014)
	Cloud Trust Models	1	(Ghosh, Ghosh & Das 2015)
	Cloud Adoption Framework	1	(Muir 2013)
	Technology, Organisation, and Environment Framework	1	(Lin 2016)
	Balanced Scorecard (BSC)	2	(Ribas et al. 2015); (Tjader et al. 2014)

4.3.3.2 Decision analysis methods

The decision analysis methods applied to IT outsourcing in the surveyed literature are summarised in Table 4.4. The most frequent MCDM method adopted in the surveyed literature was AHP which was used individually or in combination with other methods in 24 percent of studies. A fuzzy version of AHP (Fuzzy AHP) was used in nine percent of studies individually or in combination with other methods. Two-thirds of the articles (70%) assumed IT outsourcing decisions as deterministic decision-making problems while the remainder used fuzzy decision-making theory. From a historical perspective, optimisation using mixed-integer programming was the first decision analysis method to appear in the ITO literature (Chaudhury, Nam & Rao 1995). Then AHP was applied to ITO decision support literature by Akomode, Lees and Irgens (1998) and remained a popular method for researchers, sometimes complemented by other decision analysis techniques. While this diversity expresses the creative endeavour of IT outsourcing decision support researchers, it also reveals that the convergence of research approaches has not happened to date.

Table 4.4 Summary of MCDM methods in ITO literature

Decision-making approach	Method	Count	References
MCDM	AHP	20	(Lokachari & Mohanarangan 2002); (Xinyi & Jingjing 2009); (Godse & Mulik 2009); (Andrikopoulos, Song & Leymann 2013); (Razumnikov & Kremneva 2015); (Akomode, Lees & Irgens 1998); (Yang & Huang 2000); (Udo 2000); (Gulla & Gupta 2011); (Chang et al. 2012); (Tajdini & Nazari 2012); (Garg, Versteeg & Buyya 2013); (Sun et al. 2013); (Ramachandran et al. 2014); (Repschlaeger, Proehl & Zarnekow 2014); (Atkinson, Bayazit & Karpak 2015); (Yiming & Yiwei 2011); (Pandey & Bansal 2004); (Liu et al. 2008); (Chen, Chou & Lin 2007)
	AHP + PROMETHEE	2	(Wang & Yang 2007); (Li, Wang & Yang 2006)
	AHP + ELECTRE	1	(Wang, Lin & Zhang 2008)
	AHP+ Optimization	8	(Ngwenyama & Bryson 1999); (Osei-Bryson & Ngwenyama 2006); (Juan-Verdejo & Baars 2013); (Juan-Verdejo et al. 2014); (Ribas et al. 2015); (Martens & Teuteberg 2012); (Walterbusch, Martens & Teuteberg 2015); (Yuen 2012)
	ANP	5	(Faisal & Banwet 2009); (Tjader et al. 2014); (Tang-Nguyen & Lee 2015); (Menzel, Schönherr & Tai 2013); (Do Chung & Kwang-Kyu 2015)
	ANP + Optimization	2	(Tsai et al. 2010); (Cao, Cao & Wang 2012; Tsai et al. 2010)
	ELECTRE	2	(Silas, Rajsingh & Ezra 2012); (Rehman, Hussain & Hussain 2015; Silas, Rajsingh & Ezra 2012)
	TOPSIS	2	(Hsu & Hsu 2008); (Hsu & Hsu 2008; Rehman, Hussain & Hussain 2015)
	Simple Additive Weighting (SAW)	12	(Andresen et al. 2010); (Saripalli & Pingali 2011); (Keung & Kwok 2012); (Muir 2013); (Liu & Li 2013); (Naseer, Jabbar & Zafar 2014); (Hodosi & Rusu 2007); (Olson 2007); (Corbitt & Tho 2005); (Dasgupta & Mohanty 2009); (Fekete & Hancu 2010); (Olson & WU 2011)
	Extended Ordered Weighted Averaging + Optimization	1	(Watjatrakul 2014)
	PROMETHEE	2	(Morais, Costa & de Almeida 2014); (Morais, Costa & de Almeida 2014; Nduwimfura & Zheng 2015)
	PROMETHEE + ELECTRE	1	(Wang et al. 2007)
Fuzzy MCDM	Fuzzy AHP	8	(Hatami-Shirkouhi et al. 2010); (Nazari-Shirkouhi et al. 2011); (Miri-Nargesi et al. 2011) (Kahraman, Beskese & Kaya 2010); (Chen & Lin 2010); (Nie, She & Chen 2011); (Kwon & Seo 2014); (Low & Hsueh Chen 2012)
	Fuzzy DEA+AHP	1	(Karami & Guo 2012)
	Fuzzy AHP + Grey-TOPSIS	1	(Oztaysi 2014)
	Fuzzy ANP	1	(Le et al. 2014a)
	Fuzzy ANP + Fuzzy AHP + Fuzzy TOPSIS	1	(Le et al. 2014b)
	Fuzzy AHP + Fuzzy TOPSIS	1	(Singh & Randhawa 2015)
	Fuzzy TOPSIS	5	(Hatami-Shirkouhi et al. 2010); (Xie & Mei 2011); (Nie, She & Chen 2011); (Kahraman et al. 2009); (Hatami-Shirkouhi et al. 2010; Karami & Guo 2012)
	Fuzzy TOPSIS + Optimization	2	(Li & Wan 2014); (Qiang & Li 2015)

	Fuzzy PROMETHEE	2	(Wang, Chen & Chen 2008); (Chen, Wang & Wu 2011; Wang, Chen & Chen 2008)
	Fuzzy Simple Additive Weighting	1	(Qu, Wang & Orgun 2013)
	Fuzzy VIKOR	2	(Chatterjee, Kar & Kar 2013); (Chen & Wang 2009)
	Fuzzy VIKOR + Fuzzy AHP	1	(Chatterjee, Kar & Kar 2013; Lin 2016)
	Fuzzy LINMAP	1	(Zandi 2014)
	Other Fuzzy methods	15	(Büyüközkan & Feyzioğlu 2006); (Xiang & Zhong-liang 2006); (Zhang et al. 2006); (Chen & Han 2011); (Shivakumar, Ravi & Gangadharan 2013); (Zheng & Xu 2014); (Christoforou & Andreou 2015); (Grandhi & Wibowo 2015); (Mathew 2006); (Cong et al. 2008); (Zhang, Jiang & Huang 2012); (Fan, Yang & Pei 2014); (Samantra, Datta & Mahapatra 2014); (Faisal & Asif 2016); (Fan, Suo & Feng 2012); (Low & Hsueh Chen 2012)
Optimization	Integer Programming	3	(Cheng, Balakrishnan & Wong 2006); (Chaudhury, Nam & Rao 1995); (Chen & Cao 2009)
	Fuzzy Linear Programming	1	(Zandi 2014)
	Dynamic programming	2	(Chang, Liu & Wu 2012); (Walterbusch, Martens & Teuteberg 2015)
	Genetic Algorithm (GA)	2	(Hsu, Chiu & Hsu 2004); (Jiang et al. 2010)
	Zero-One Goal Programing	2	(Cao, Cao & Wang 2012); (Hanus & Windsor 2013)
	Other optimization methods	8	(Olson & WU 2011); (Kramer & Eschweiler 2013); (Fridgen & Müller 2011); (Lilienthal 2013); (Singh et al. 2004); (Roedder, Karaenke & Knapper 2013); (Baranwal & Vidyarthi 2014); (König, Mette & Müller 2013)
Other Methods	Real Options	3	(Davis 2005); (Yam et al. 2011); (Benaroch 2002; Davis 2005)
	System Dynamics	2	(Bezerra, Moura & Lima 2014); (Roehling et al. 2000)
	Game theory	2	(Furuncu & Sogukpinar 2015); (Tang, Liang & Wu 2008)
	Logistic regression	1	(Loebbecke & Huyskens 2009)
	Cost Modelling using Net Present Value	8	(Khajeh-Hosseini et al. 2012); (Olson 2007); (Paisittanand & Olson 2006); (Benaroch 2002); (Mastroeni & Naldi 2011); (Yam et al. 2011); (Walker, Brisken & Romney 2010); (Singh et al. 2004)
	Other mathematical methods	7	(Xiu-Wu, Tao & Yuan 2008); (Buhl, Fridgen & König 2013); (Cong & Chen 2015); (Xie, Zhang & Lai 2005); (Walker, Brisken & Romney 2010); (Ding et al. 2014); (Rehman, Hussain & Hussain 2011); (Ghosh, Ghosh & Das 2015)

4.3.4. Use of research paradigms/methodologies

Three studies (König, Mette & Müller 2013; Kramer & Eschweiler 2013; Walterbusch, Martens & Teuteberg 2015) adopted the *Design Science Research* paradigm, although these did not fully follow the design science methodology. For instance, no design principles were identified and implemented in these three articles. One study (Akomode, Lees & Irgens 1998) reported the use of *Action Research* in addition to quantitative modelling, but no detail about the implementation of the action research process is given in the article. *Case Study* research methodology was adopted in one study (Ramachandran et al. 2014).

The other 96 percent of studies can be classified under the *axiomatic* research paradigm (Meredith et al. 1989) and used a quantitative modelling methodology. In *axiomatic* research, as opposed to *empirical* research, “a high degree of knowledge is assumed a priori about the goals and the socio-technical structure of the organisation" (Meredith et al. 1989, p.305). In other words, this type of research is based on the underlying assumption that the building of objective models that can capture the organisational decision-making problems is possible (Bertrand & Fransoo 2002). Although within those models all claims can be unambiguous and verifiable, for the real-world outside the model such unambiguity and verification is very hard to achieve (Bertrand & Fransoo 2002).

4.3.5. Use of evaluation methods

Evaluation of a DSS is defined as an assessment of its overall value (O'Keefe, Balci & Smith 1986). The evaluation includes *validation, verification* and *substantiation* (Borenstein 1998, p.228). *Validation* is the process of testing the agreement between the behaviour of the model/DSS and that of the real world system being modelled (Finlay 1989). *Verification* is defined as the "process of testing the extent to which a model has been faithful to its conception, whether or not it and its conception are valid" (Miser & Quade 1988, p.530). *Substantiation* is defined as "the demonstration that a computer model [DSS], within its domain of applicability, possesses a satisfactory range of accuracy consistent with the intended application of the model" (Schlesinger et al. 1979, p.104).

To assess the presence of *evaluation* in general and *validation* in particular in the surveyed articles, the methods used by the researchers to evaluate the design of the artefact were examined and categorised according to available taxonomies of *evaluation* methods. Evaluation methods can also be used to assess the design process (Venable, Pries-Heje & Baskerville 2012), but no such use was found in the surveyed articles. Due to a lack of consensus on terminologies, different authors used one term with various meanings. For instance, authors applied the term *case study* to illustrative examples, experiments and simulations. Thus, the analysis was based on the Hevner et al. (2004) definitions and I concede that the evaluation approach may have been labelled differently in the respective articles.

The results of this analysis are provided in Table 4.5. In 89 percent of the articles at least one evaluation method was found. *Simulation,* the execution of the decision model with artificial data, was the most frequent evaluation method and was used in

48 percent of the studies. The second most frequent evaluation method (31%) was *controlled experiment*, execution of the decision model with real-world data. *Scenarios* and *sensitivity analysis* were used in 22 percent of the articles. The other less frequent evaluation methods were: *case study* (11%), *informed argument* (7%), *optimisation* (5%) and *static analysis* (1.5%). Whenever the artefact was evaluated using an empirical method such as questionnaire, interview or focus group with practitioners or through implementation in a case organisation, the evaluation method was classified as a case study.

Table 4.5 Summary of analysis of evaluation methods used in ITO decision support literature

Evaluation category	Evaluation method	Definition	Count	Reference
Observational	Case study	Execute artefact with real-world data and study the artefact in business environment	15	(Khajeh-Hosseini et al. 2012); (Lilienthal 2013); (Menzel, Schönherr & Tai 2013);(Ramachandran et al. 2014); (Repschlaeger, Proehl & Zarnekow 2014); (Gulla & Gupta 2011); (Hsu & Hsu 2008); (Samantra, Datta & Mahapatra 2014); (Andresen et al. 2010); (Karami & Guo 2012); (Dasgupta & Mohanty 2009); (Paisittanand & Olson 2006); (Hsu, Chiu & Hsu 2004); (Pandey & Bansal 2004); (Liu et al. 2008)
Analytical	Static Analysis	Examine structure of artefact for static qualities (e.g. complexity)	2	(Garg, Versteeg & Buyya 2013);(Garg, Versteeg & Buyya 2013; Osei-Bryson & Ngwenyama 2006)
	Optimisation	Demonstrate optimality bounds on artefact behaviour	7	(Baranwal & Vidyarthi 2014); (Zandi 2014); (Buhl, Fridgen & König 2013); (König, Mette & Müller 2013); (Osei-Bryson & Ngwenyama 2006); (Hsu, Chiu & Hsu 2004); (Roedder, Karaenke & Knapper 2013)
Experimental	Controlled experiment	Controlled experiment: Execute artefact with real-world data	41	(Andrikopoulos, Song & Leymann 2013); (Christoforou & Andreou 2015); (Fan, Yang & Pei 2014); (Garg, Versteeg & Buyya 2013); (Johnson & Qu 2012); (Keung & Kwok 2012); (Le et al. 2014a); (Martens & Teuteberg 2012); (Muir 2013); (Naseer, Jabbar & Zafar 2014); (Silas, Rajsingh & Ezra 2012); (Atkinson, Bayazit & Karpak 2015);(Büyüközkan & Feyzioğlu 2006); (Chang et al. 2012); (Chen & Han 2011); (Chen, Wang & Wu 2011); (Cong & Chen 2015);(Cong et al. 2008); (Hatami-Shirkouhi et al. 2010);(Cao, Cao & Wang 2012); (Kahraman, Beskese & Kaya 2010); (Kahraman et al. 2009); (Li & Wan 2014);(Xiu-Wu, Tao & Yuan 2008); (Lokachari & Mohanarangan 2002); (Mathew 2006); (Morais, Costa & de Almeida 2014); (Nazari-Shirkouhi et al. 2011); (Olson 2007); (Oztaysi 2014); (Qiang & Li 2015); (Wang, Chen & Chen 2008); (Tjader et al. 2014); (Karami & Guo 2012); (Corbitt & Tho 2005); (Faisal & Asif 2016); (Fan, Suo & Feng 2012); (Olson & WU 2011); (Loebbecke & Huyskens 2009); (Miri-Nargesi et al. 2011); (Lin 2016)
	Simulation	Execute artefact with artificial data	64	(Cayirci et al. 2014); (Chang, Liu & Wu 2012); (Christoforou & Andreou 2015); (Ding et al. 2014); (Do Chung & Kwang-Kyu 2015); (Garg, Versteeg & Buyya 2013); (Ghosh, Ghosh & Das 2015); (Godse & Mulik 2009); (Grandhi & Wibowo 2015); (Le et al. 2014b); (Martens & Teuteberg 2012);(Mastroeni & Naldi 2011); (Sun et al. 2013); (Moyano, Beckers & Fernandez-Gago 2014); (Razumnikov & Kremneva 2015); (Ribas et al. 2015); (Shivakumar, Ravi &

				Gangadharan 2013); (Singh & Randhawa 2015);(Walterbusch, Martens & Teuteberg 2015);(Yu 2015); (Zandi 2014); (Akomode, Lees & Irgens 1998); (Bezerra, Moura & Lima 2014; Chatterjee, Kar & Kar 2013);(Buhl, Fridgen & König 2013); (Chen & Wang 2009); (Fridgen & Müller 2011); (Udo 2000); (Jiang et al. 2010); (Wang et al. 2007);(Wang, Lin & Zhang 2008); (Li, Wang & Yang 2006); (Liu & Li 2013); (Mathew 2006); (Nduwimfura & Zheng 2015); (Ngwenyama & Bryson 1999); (Ping, Fu-ji & Jian 2009); (Tajdini & Nazari 2012); (Tsai et al. 2010); (Wang & Yang 2007) ; (Xinyi & Jingjing 2009); (Watjatrakul 2014); (Xie & Mei 2011); (Xiang & Zhong-liang 2006); (Yang & Huang 2000); (Zhang et al. 2006); (Zhang, Jiang & Huang 2012); (Yiming & Yiwei 2011); (Chaudhury, Nam & Rao 1995); (Chen & Cao 2009); (Cheng, Balakrishnan & Wong 2006); (Fekete & Hancu 2010); (Yuen 2012); (Chen & Cao 2009); (Walker, Brisken & Romney 2010); (Furuncu & Sogukpinar 2015); (Singh et al. 2004); (König, Mette & Müller 2013); (Paisittanand & Olson 2006); (Benaroch 2002); (Xie, Zhang & Lai 2005); (Qu, Wang & Orgun 2013); (Roehling et al. 2000); (Chen, Chou & Lin 2007)
Descriptive	Informed argument	Use information from the knowledge base (e.g., relevant research) to build a convincing argument for the artefact's utility	9	(Hanus & Windsor 2013); (Keung & Kwok 2012); (Martens & Teuteberg 2012); (Rehman, Hussain & Hussain 2015); (Benaroch 2002); (Tang, Liang & Wu 2008); (Xie, Zhang & Lai 2005); (Loebbecke & Huyskens 2009); (Hanus & Windsor 2013; Singh & Randhawa 2015)
	Scenarios	Construct detailed scenarios around the artefact to demonstrate its utility	30	(Chang, Liu & Wu 2012); (Christoforou & Andreou 2015); (Ding et al. 2014); (Ghosh, Ghosh & Das 2015);(Juan-Verdejo & Baars 2013);(Le et al. 2014a); (Le et al. 2014b);(Lilienthal 2013); (Martens & Teuteberg 2012);(Mastroeni & Naldi 2011);(Sun et al. 2013);(Ribas et al. 2015); (Walterbusch, Martens & Teuteberg 2015);(Yu 2015); (Atkinson, Bayazit & Karpak 2015);(Bezerra, Moura & Lima 2014); (Chatterjee, Kar & Kar 2013); (Cong & Chen 2015);(Cao, Cao & Wang 2012); (Nazari-Shirkouhi et al. 2011); (Ngwenyama & Bryson 1999); (Oztaysi 2014) ; (Tajdini & Nazari 2012); (Tjader et al. 2014); (Wang & Yang 2007); (Watjatrakul 2014); (Chaudhury, Nam & Rao 1995); (Singh et al. 2004); (König, Mette & Müller 2013); (Roehling et al. 2000)

The DSR Evaluation Method Selection Framework (Venable, Pries-Heje & Baskerville 2012) provides another perspective for the analysis of the evaluation methods. The framework provides a classification of evaluation methods on two dimensions. The first dimension is the evaluation timing which is categorised as *ex-ante* (before artefact construction) versus *ex-post* evaluation (after artefact construction). The second dimension is the nature of the evaluation method that comprises naturalistic (e.g., field setting) versus artificial evaluation (e.g., laboratory setting). As shown in Table 4.6, the evaluation methods reported were analysed according to the four quadrants. The majority of the surveyed articles applied artificial *ex-post* evaluation methods. The use of naturalistic evaluation was limited to about 11 percent of the articles.

Table 4.6 DSR Evaluation Method Selection Framework

Evaluation	Ex Ante	Ex Post
Naturalistic **Percentage of Articles: 11%**	**Action Research** (Akomode, Lees & Irgens 1998) **Focus group** (Samantra, Datta & Mahapatra 2014) **Percentage of Articles: 1.5%**	**Action Research** (Akomode, Lees & Irgens 1998) **Case study** (Khajeh-Hosseini et al. 2012); (Lilienthal 2013); (Menzel, Schönherr & Tai 2013);(Ramachandran et al. 2014); (Repschlaeger, Proehl & Zarnekow 2014); (Gulla & Gupta 2011); (Hsu & Hsu 2008); (Samantra, Datta & Mahapatra 2014); (Andresen et al. 2010); (Karami & Guo 2012); (Dasgupta & Mohanty 2009); (Paisittanand & Olson 2006); (Hsu, Chiu & Hsu 2004); (Pandey & Bansal 2004); (Liu et al. 2008) **Percentage of Articles: 11%**
Artificial **Percentage of Articles: 78%**	**Mathematical or logical proof** (Buhl, Fridgen & König 2013); (Cong & Chen 2015); (Ding et al. 2014); (Hodosi & Rusu 2007); (Martens & Teuteberg 2012); (Ribas et al. 2015);(Walterbusch, Martens & Teuteberg 2015); (Garg, Versteeg & Buyya 2013); (Hanus & Windsor 2013); (Keung & Kwok 2012); (Rehman, Hussain & Hussain 2015); (Benaroch 2002) **Percentage of Articles: 9%**	**Experiment and scenario building, computer simulation** (list of articles is provided in Table 4.5) **Percentage of Articles: 75%**

Source: adapted from Venable, Pries-Heje and Baskerville (2012)

Peffers et al. (2007) considered simulation and experiment as a demonstration and distinguished them from evaluation. While both artificial and naturalistic evaluation methods have their strengths and weaknesses, evaluation in a naturalistic setting is “the real *proof of the pudding*” (Venable 2006, p. 5). Particularly for sociotechnical artefacts, the ITO DSS in this case, it seems that naturalistic evaluation is expected (Venable, Pries-Heje & Baskerville 2012).

Only seven percent of articles (Cayirci et al. 2014; Christoforou & Andreou 2015; Ding et al. 2014; Fan, Yang & Pei 2014; Ghosh, Ghosh & Das 2015; Gulla & Gupta 2011; Keung & Kwok 2012; Loebbecke & Huyskens 2009; Menzel, Schönherr & Tai 2013) *validated* their suggested decision model by comparing the results of the proposed decision model with the decision made by experts, historical data, or the result of other available decision tools.

4.4. Chapter summary and conclusion

This chapter provided a critical assessment of model-driven decision support for IT outsourcing and cloud sourcing in academic research through a systematic review and document analysis of a total of 133 peer-reviewed articles published between 1995 and 2016.

The systematic literature review of model-driven decision support for IT outsourcing provided two main outputs that were essential for this study. First, members of one of the targeted populations in this study, namely academic ITO DSS researchers were identified. Two samples from this population participated in the qualitative (i.e. interviews) and quantitative (i.e. survey) phases of this study (Chapter 5 and Chapter 6). Second, the scope and attributes of model-driven decision support for IT outsourcing were identified and analysed. Later, in § 7.2 the findings from this systematic literature review are discussed to answer RQ1, RQ2.

Chapter 5. Knowledge transfer activities of ITO decision-support researchers and their reflection on research relevance

5.1. Introduction

This chapter presents the results of Phase B of this study. In Phase B, the study population comprises researchers who proposed a model-driven decision support artefact (e.g. model, framework, software) for IT outsourcing in their publications. The aim of phase B was to examine the knowledge transfer activities of the targeted academic researchers and their reflection on the relevance of their research.

As shown in Figure 5-1, this chapter is organised into four sections. Section 5.1 provides the background to the chapter. Section 5.2 describes the data collection process and the results of analysis of the qualitative part of Phase B (interviews with academic researchers). In §5.3 the findings from a survey of ITO decision support researchers are provided. Section 5.4 presents the summary of Phase B findings.

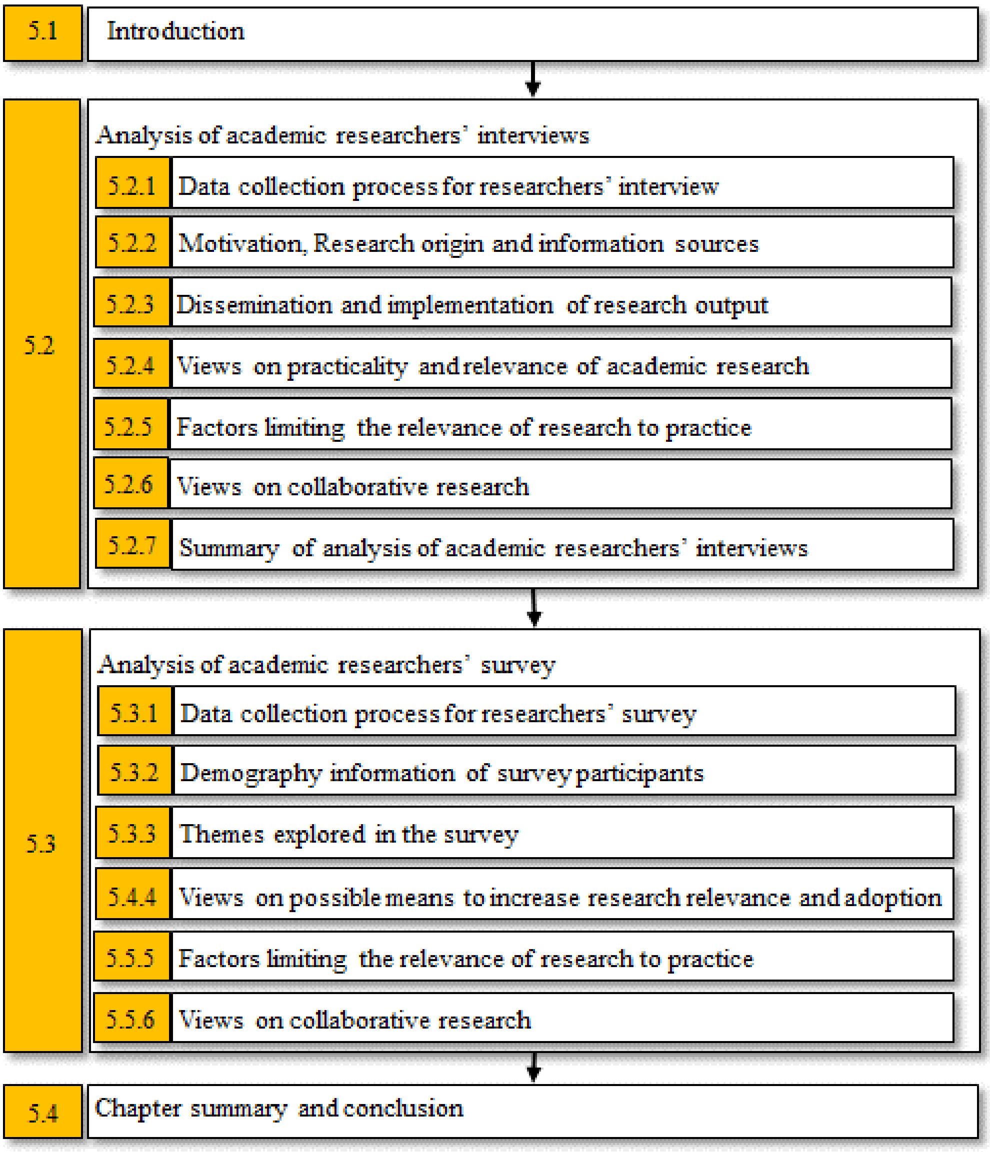


Figure 5-1 Structure of chapter 5

5.2. Analysis of academic researchers' interviews

This section provides the results of the analysis of interviews with three academic researchers who suggested decision models for ITO in their published papers in high ranked journals. Three academic researchers were selected and interviewed to provide a perspective to the study from the knowledge production side.

After a description of the data collection process in §5.2.1, the five main themes explored in the interviews are presented in §5.2.2 to §5.2.6. In the last section (§5.2.7) the findings from the three interviews with academic researchers are summarised.

5.2.1. Data collection process for researchers' interview

Data collection in Phase B comprised semi-structured interviews with three academic researchers and an online survey of researchers. To recruit academic researchers as participants for the interviews, from the articles identified in Phase A, the articles in top-ranked journals (A or A* based on the ABDC[5] list) were shortlisted (11 papers), and the first authors of the shortlisted papers were invited via email to participate in a semi-structured research interview. Three academic researchers who were all first authors of A-ranked journal papers agreed to participate. Interviewee #1 was a Professor from the United States, Interviewee #2 and Interviewee #3 were both Associate Professors based in China. The first interview was conducted by exchanging a series of emails (due to communication problems with the video conference system) and took approximately 135 minutes. The email interview did not require transcription. The second interview was conducted and recorded via Skype (approximately 50 minutes) and transcribed. The third participant returned written responses to the interview questions due to his limited time availability for an online interview.

Next, the key themes explored in the interviews in relation to the research questions are reported. To maintain anonymity, the researchers' names are not identified. Comments from the three interviewees are attributed to Interviewee #1 to #3.

5.2.2. Motivation, Research origin and information sources

Two of the interviewed researchers stated that their motivation to conduct research on ITO was to publish papers as part of their academic work to obtain the common rewards of the academic system e.g. promotion. The third participant specified helping practitioners with their decision making was his main motivational factor. The origin of the ITO research topic was 'teaching an enterprise system course' for Interviewee #1, 'reading previous research papers' for Interviewee #2 ("I don't know how industry sees this problem. I just read some references and found the question") and concern for "lack of risk consciousness" among ITO practitioners for Interviewee #3.

[5] Australian Business Deans Council list, accessed from www.abdc.edu.au.

The main sources to obtain information about ITO in practice were personal industry work experience, personal contact with practitioners and secondary sources (e.g. online media and industry surveys) for Interviewee #1, personal contact with practitioners and online media for Interviewee #2, and survey and personal contact with practitioners for Interviewee #3.

5.2.3. Dissemination and implementation of research output

Interviewee #3 implemented the decision model suggested in his research paper in several companies:

> *"I have tried to utilise the model in several companies. Though the model itself is complicated, but it is easy for the managers because they just need to fill in their description [based] upon risks based on their own experience" (Interviewee #3).*

Conversely, the other two academics were not aware of the implementation of their research in the practice, nor did they attempt to disseminate their research result to practice:

> *"I would view the responsibility [of academics] as publishing sound research – there is value on the 'pure' research side of massive 'rigour', but also in disseminating results to practice. But no one researcher is responsible for doing all of these – each is responsible for developing a viable research program" (Interviewee #1, emphasis from the correspondence).*

5.2.4. Views on practicality and relevance of academic research

The main audience for published papers was perceived to be "other academic researchers" for two participants (Interviewee #1 and Interviewee #2) and "practitioners" for Interviewee #3. Interviewee #1 and Interviewee #2 held the view that the potential ability of research to impact practice was limited. Interviewee #1 considered his published decision model "potentially useful to decision-makers" and not as a "prescription":

> *"The method I published could certainly work, but decision-makers have to use what they are comfortable with. The effectiveness would depend on more upon the accuracy of the data (and the trust of the decision maker in the model) than on the model itself … In short - my model could be used effectively … In business, research tends to follow the practice, not the other way around … I do hesitate to try to tell practitioners what to do" (Interviewee #1).*

However, Interviewee #3 was more inclined towards the potential ability of academic research to influence practice:

> *"At least in Management research, we have to try our best to make it happen" (Interviewee #3).*

5.2.5. Factors limiting the relevance of research to practice

Content analysis of the interview transcripts revealed five distinct factors that limit the relevance of research as perceived by the participants.

First, the 'academic promotion system' did not encourage (even discouraged) academic researchers to conduct practitioner-oriented research in the view of the three participants:

> *"Promotion in top research schools requires publication in academic 'rigorous' journals. They don't care a whit about practitioner publications (and may even look upon it negatively)" (Interviewee #1).*

> *"For academic researchers, the first important thing is to publish a good paper. The theory is important … if I can publish in the top journals, then I can go from associate professor to full professor" (Interviewee #2).*

> *"[Academic promotion system] not only discourages but also stops us from doing so" (Interviewee #3).*

Furthermore, publishing in practitioner-oriented journals, even highly regarded journals such as Harvard Business Review (HBR) and Sloan Management Review, was disregarded by the academic promotion panels in some universities:

> *"[HBR and Sloan Management Review] neither would get an assistant professor tenure at a top U.S. research school. At Texas A&M I served with promotion & tenure committee members who would vote 'no' on any candidate with such a practitioner publication – the argument was that they weren't placing their energies in the 'correct' places" (Interviewee #1, emphasis from the correspondent).*

The second identified factor was the differences between decision making in practice and theory. Decision making in practice was considered experience-based and group-based. Moreover, the confidence of decision-makers in the decision-making method was perceived to be more important than its rigour:

> *"It is very rare that their past included what you (and maybe even I) would consider 'rigorous' methodology – so they [practitioners] continue to base their decisions the same way they always did (which after all worked enough to get them where they are). We come in with our ideas of how they 'should' make decisions and we often*

fail to understand that they come from their own specific path of experience. [Furthermore,] practitioners are responsible for their decisions (far more than academics [who published and suggested the decision model])" (Interviewee #1).

The third factor that appeared was a trade-off between rigour and relevance. One of the interview participants believed that rigorous research loses relevance because of its inherent characteristics such as the need for abstraction to generalise research results and the more complex nature of academic research-generated decision support models and tools in comparison to practical models and tools:

"Practitioners have to live with their decisions and need to understand many complex realities that academics need to eliminate from their models because they are case specific ... Models require assumptions – and reality is nonlinear ... the assumptions needed for such 'rigour' make them impractical ('irrelevant'). As to relevant, simpler is usually better because decision makers in my view need to understand the models they are applying" (Interviewee #1, emphasis from the correspondent).

The fourth factor that emerged was the slow pace of research production in comparison with the high speed of change in practice:

"It is a dynamic environment with constant change and academics are slower than molasses" (Interviewee #1).

The fifth factor that became apparent was the unavailability of industry decision-making data to feed into the decision model in the implementation stage:

"They need to be comfortable with the model and more importantly, have good data" (Interviewee #1).

5.2.6. Views on collaborative research

The three academic interview participants believed in the potential benefit of collaborative research with practitioners to improve the practical relevance of academic research, although to varying degrees. Two of the interview participants were sceptical about the ability of collaborative research to reduce the gap between research and practice because of the different goals of academic researchers and practitioners:

"Academics have the goal of publishing papers (in 'rigorous' journals if possible). Practitioners have the goal of reaching clients ... When you ask if collaborative research could be a solution, I am dubious. However, I do think it should be encouraged (and agree that it would lead to more realism and practicality)" (Interviewee #1).

"Professors do the research to publish papers, but in practice, they want a good job" (Interviewee #2).

A challenge to collaborative research was practitioners' reluctance to spend sufficient time on cooperation (Interviewee #3), and the suggested solution to tackle this problem was involvement in the whole process of research and sharing the benefits of research: "let them take part in the whole process [of research], and share the benefit of research" (Interviewee #3).

5.2.7. Summary of analysis of academic researchers' interviews

A summary of findings from the analysis of the data obtained from interviews with three academic researchers who suggested ITO decision-making models in their published papers is provided in Table 5.1.

Table 5.1 Summary of key findings from academic researcher interviews

Interview topics	Interviewee #1	Interviewee #2	Interviewee #3
Motivation to do research	Publishing paper as a part of academic work and to gain reward/promotion.	Publishing papers.	Help practitioners.
Aware of implementation in practice?	No.	No.	Personally tried to utilise the model in several companies.
Source of information about ITO in practice	Previous industry work experience. Industry surveys (secondary data). Contact with practitioners/consultants.	Online media. Contact with practitioners.	Own survey. Contact with practitioners.
Intended audience	Academic researchers	Academic researchers	Practitioners
Factors contributing to the gap	Academic promotion system. Differences between decision making in practice and theory. The trade-off between rigour and relevance. The lower pace of research in comparison with practice. Unavailability of decision-making data to implement decision model.	Academic promotion system.	Academic promotion system.
Views on collaborative research	Will not solve the problem, however, should be encouraged.	Can result in more practical research.	Promising solution Practitioners should be involved in the whole process.

The interviews with the three academic researchers revealed opposing views on the practical relevance of their own suggested models (output of their research). One of the interview participants perceived his published model as a *suggestion* that practitioners *could* use but was reluctant to take a prescriptive approach to give advice to practitioners in their decision making. The second interviewee also believed that practitioners *could* benefit from his suggested model, but he considered dissemination of research to practice and implementation of the suggested model to be outside of the scope of the duties of an academic researcher. In contrast, the third interviewee believed that Information Systems and Management researchers *should* try their best to produce relevant and practical outputs in their research, and he had personally implemented his suggested model in a few organisations. Three academic interview participants believed that the academic promotion system did not encourage and even discouraged practical research. Moreover, decision making in practice was perceived to have case-specific characteristics or was inherently too complex, and these features could not be incorporated in academic research papers. In other words, it was perceived that academic researchers have to sacrifice industry relevance in order to publish research that is more generalisable. The interviewees were in favour of collaborative research with practitioners as a possible way to increase practical relevance of research.

5.3. Analysis of academic researchers' survey

In this section, the results from an analysis of responses to the survey of academic researchers are summarised.

5.3.1. Data collection process for researchers' survey

Academic researchers identified in Phase A (systematic literature review) comprised the sample of academic researchers surveyed in Phase B. The articles identified in Phase A were authored by 277 researchers. Twenty-five of these researchers affiliated with non-academic institutions were excluded from the sample because the survey was focused on *academic* researchers per se. Personal information of the researchers (full name, country, university, department, email address) were extracted from the first page of the article and recorded in an Excel worksheet. Web searches were performed to update the email address of the researchers. A further 28 researchers were excluded from the sample because current email addresses could not be found for them.

Next, a questionnaire was developed based on the relevant literature together with themes that emerged from the analysis of the ITO researchers' interview data. Some of the questions were adapted from Tucker and Parker's (2014) questionnaire. The questionnaire used for the survey is provided in Appendix C.2. The questions focused on five themes: researcher's motivation to conduct research; initiators of the research process; sources to obtain information about IT outsourcing in practice; extent and types of communication with practitioners; and knowledge-transfer activities undertaken by the participant researchers. In addition, two questions were asked about potential initiatives to increase the practicality (relevance) of research and adoption of research by industry practitioners. Content validity of the questionnaire was ensured by means of careful definition of the research constructs guided by the literature review as well as using expert judgment. The questionnaire was reviewed by two Professors who had extensive research experience in IT outsourcing and had conducted research on the research-practice gap in the Information Systems field. Their feedback was incorporated into the questionnaire instrument.

An invitation letter (Appendix C.3) was sent to the remaining 224 researchers on 3/3/2016 via email including a link to the online survey. In the two weeks specified response period, only 19 responses were returned. After sending a reminder and extension of one week, a total of 39 usable responses were received from researchers who participated in the survey. The response rate was 17.4 percent

5.3.2. Demographic information of survey participants

As shown in Figure 5-2, the 39 participants were from a diverse range of academic ranks, from research student to professor. Six participants were academic researchers (e.g. PhD students) at the time of research publication but were not working in academia at the time of the survey.

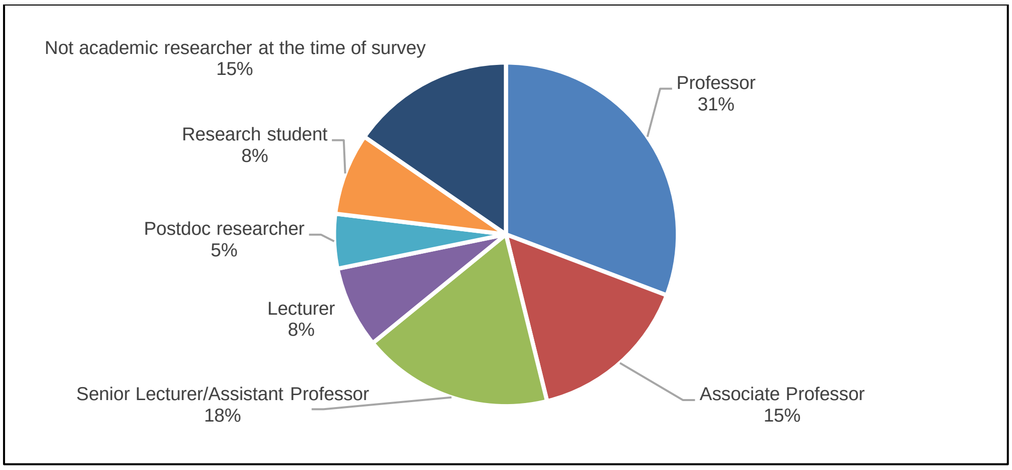


Figure 5-2 Academic rank of participants

Researchers from 17 countries participated in the survey as shown in Figure 5-3. The most frequent countries of residence were the United States and Brazil, six researchers from each participated in the survey. One participant did not state the country of residence.

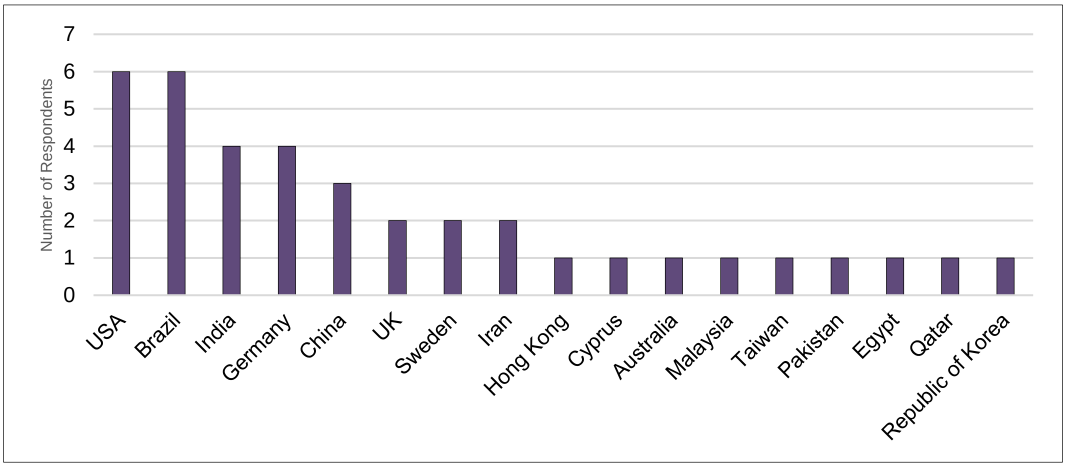


Figure 5-3 Participant's country of residence

The majority of participants (64%) had more than ten years academic work experience, 18 percent had five to ten years and 18 percent less than five years (Figure 5-4).

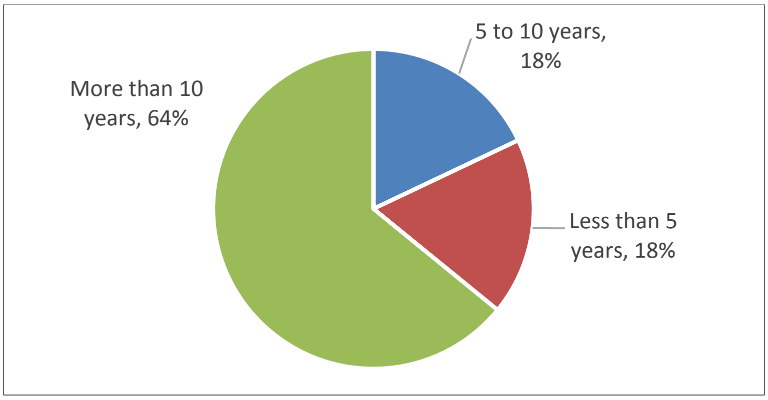


Figure 5-4 Participants' academic work experience

5.3.3. Themes explored in the survey

In this section, first, the descriptive statistics for the five themes investigated in the study and researchers' views about possible initiatives to increase research relevance and adoption are provided. In §5.3.6, the associations between variables related to these themes and *effective academic knowledge transfer* are examined.

Theme 1: Motivation to conduct research on IT outsourcing. Two-thirds of the participants indicated 'to achieve research publications' as their main motivation to conduct ITO research. Almost as many were motivated 'to support practitioners'. Sixty-three percent of the participants selected both motives. Fifteen percent of the participants indicated other motivations such as 'To contribute towards research community' or 'own interest' as their motivators.

Theme 2: Initiators of the research process. Figure 5-5 shows the various initiators of the research process. The most frequent initiator of the research process was 'personal feeling for the need to research' followed by 'finding a research idea while reading research papers'.

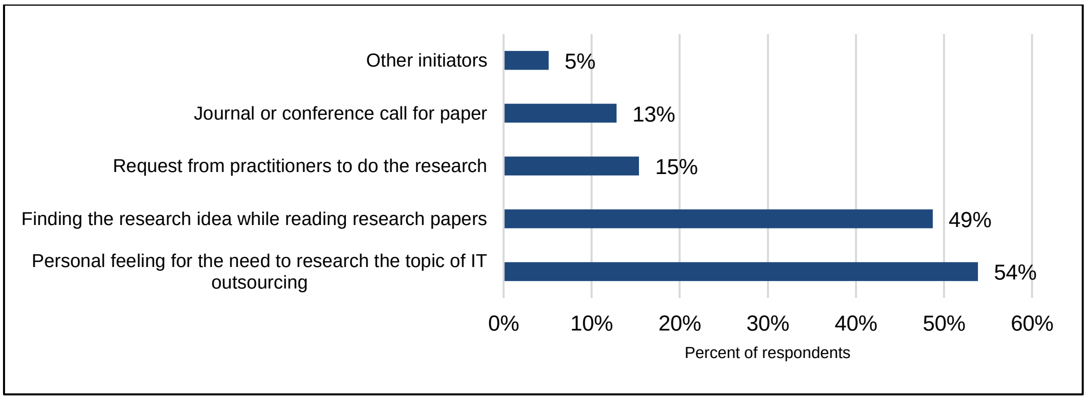


Figure 5-5 Initiators of the research process

Theme 3: Sources to obtain information about IT outsourcing in practice. Secondary data sources such as industry surveys were used by the majority of participants (69%) (Figure 5-6) to obtain information about ITO in practice. Primary data sources such as interviews, surveys, etc. were used by 40 to 50 percent of the respondents.

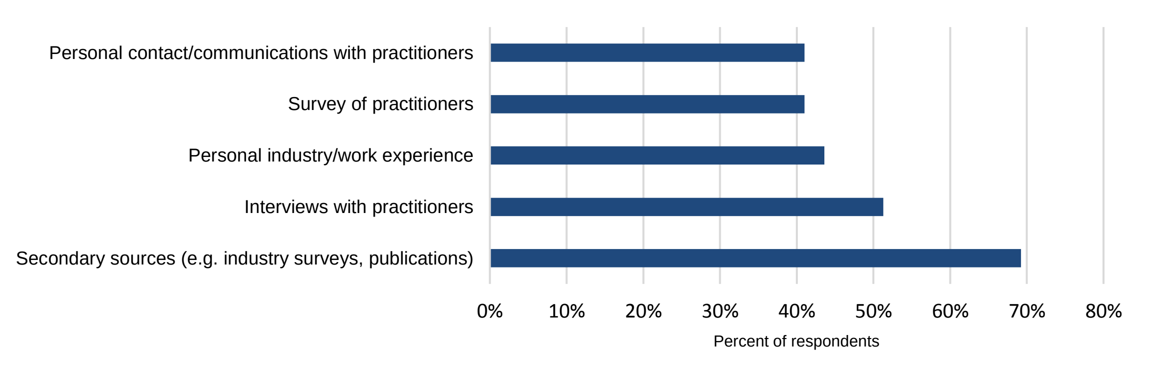
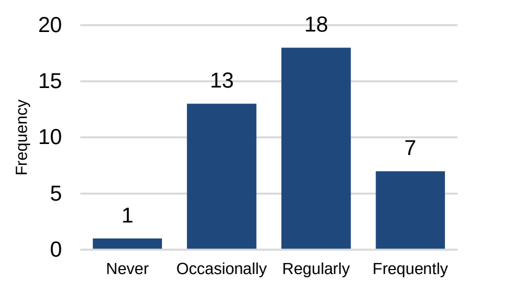
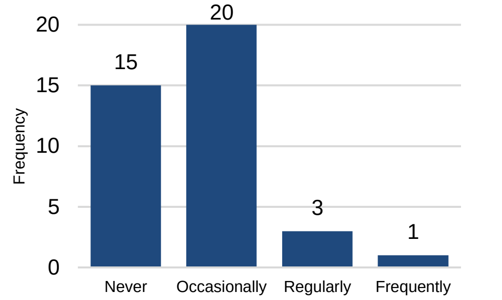


Figure 5-6 Sources to obtain information about IT outsourcing in practice

Theme 4: Extent and types of communication with practitioners. Nearly half of the respondents read practitioners' publications regularly, and one-third of the participants read them occasionally (Figure 5-7a).



a) Frequency of reading IT practitioner's publications by researchers

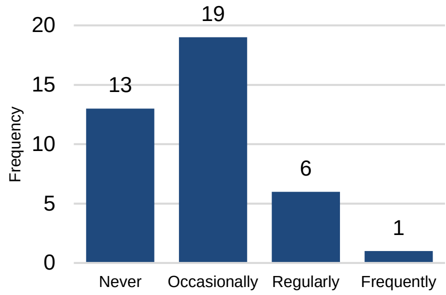


b) Frequency of writing for practitioner's publications

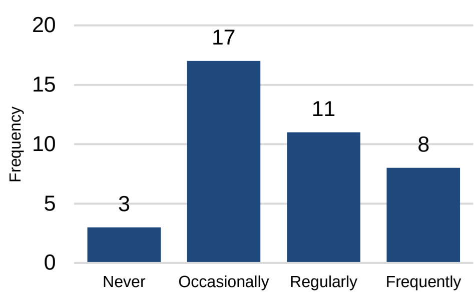
Figure 5-7 Researchers' interactions with practitioners' media

As shown in Figure 5-7b, the majority of researchers never or only occasionally wrote for practitioners' publications (e.g. IT sections of newspapers, web/social media, etc.).

The participants reported a low level of attendance at non-academic events (e.g. seminars organised by Gartner or IT vendors) as shown in Figure 5-8a.



a) Frequency of attending non-academic events



b) Personal communication with IT managers

Figure 5-8 Researchers' personal communication with industry practitioners

Approximately half of the participants had regular or frequent personal communication (formal or informal) with IT managers as shown in Figure 5-8b. The frequency of personal communication with IT managers was *occasionally* or *never* for the other half of the participants. It should be noted that three participants who chose *frequently* and two respondents who chose *regularly* and one person who chose *occasionally* were practitioners (not academic researchers) at the time of completing the survey.

Theme 5: Knowledge transfer activities. The majority of participant researchers (69%) reported collaboration with industry practitioners in conducting their research. The next most frequent mechanisms used by researchers to disseminate their research results to practice were 'informal transfer (e.g. through informal communications with practitioners)' and 'presentations to practitioners in events (e.g. seminars)' (both 56% of the survey participants) as shown in Figure 5-9. Transmission of research-generated knowledge through teaching or a book/book chapter publication was reported by 44 percent of the participants. About 23 percent of the researchers offered consultancy for implementation of their decision support model/tool. Publishing in practitioners' media and developing software based on research results was reported by 20 percent of the participants. The least used mechanism was establishing a spin-off company. The majority of participants (80%) reported the use of multiple knowledge transfer activities.

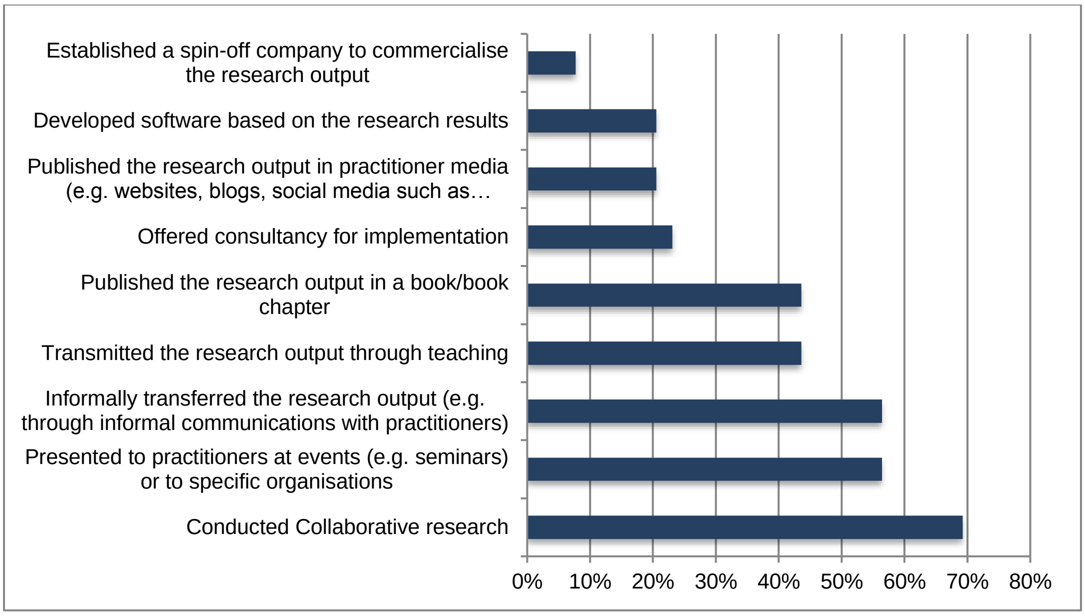


Figure 5-9 Knowledge transfer activities of ITO decision support researchers

5.3.4. Views on possible means to increase research relevance and adoption

The majority of participants (92%) believed that collaborative research with practitioners is a promising strategy to increase the practicality (relevance) of ITO decision support research (Figure 5-10). The other two strategies suggested were adopting practice-oriented methodologies such as design science research (DSR) or action research, and reform of the academic promotion system in such a way that encourages academic researchers to conduct more practical research. These strategies were selected by 56 percent and 44 percent of the participants respectively. One researcher suggested "supporting qualitative research instead of rigorously proving trivialities with quantitative methods" as a way to increase the practical relevance of research.

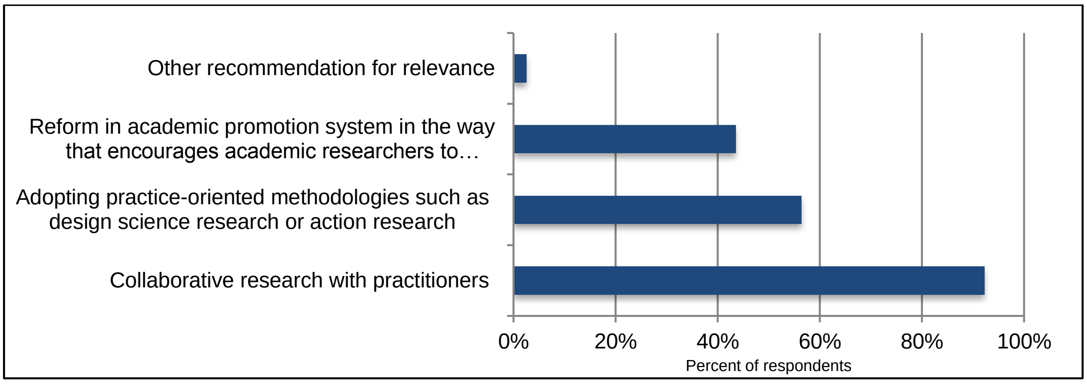


Figure 5-10 Potential initiatives to increase the practicality (relevance) of research into ITO decision-making

Among the four possible initiatives that were suggested to increase the adoption of ITO decision-making research, *collaborative research* was noted by over three-quarters (87%) of survey respondents. The other three suggested initiatives were perceived as potentially useful by about two-thirds of the participants as shown in Figure 5-11.

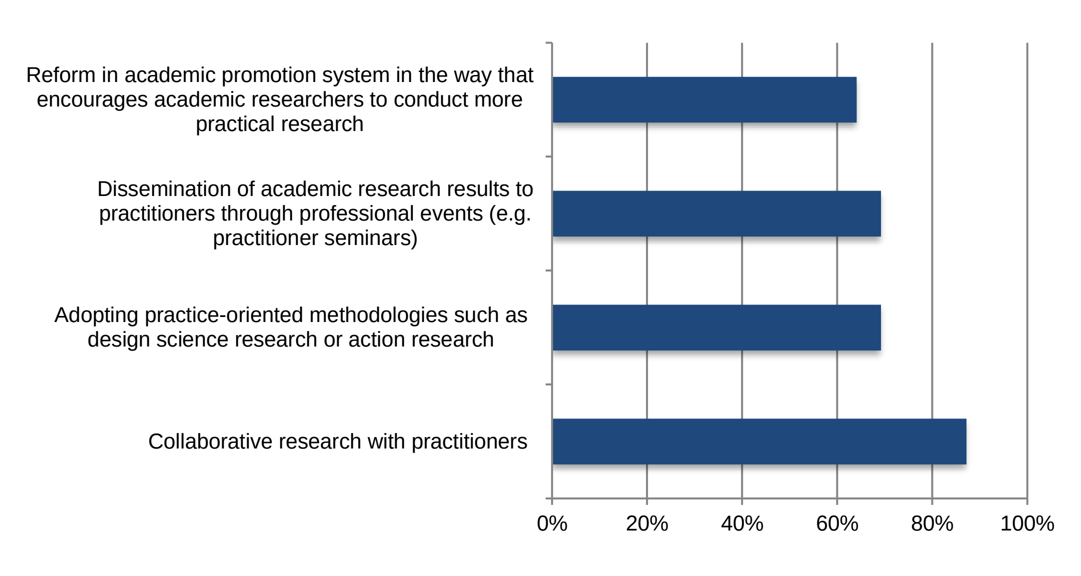


Figure 5-11 Possible initiatives to increase the adoption of ITO decision-making research by practitioners

5.3.5. Limitations/challenges of implementation of the suggested decision-making support model/tool

Figure 5-12 shows researchers' views about the limitations or challenges of implementation of their suggested decision support model/tool. The most frequent limitation/ challenge was perceived to be 'availability of data/information to be processed in the model', followed by 'the high amount of time and resources' required for implementation of the model.

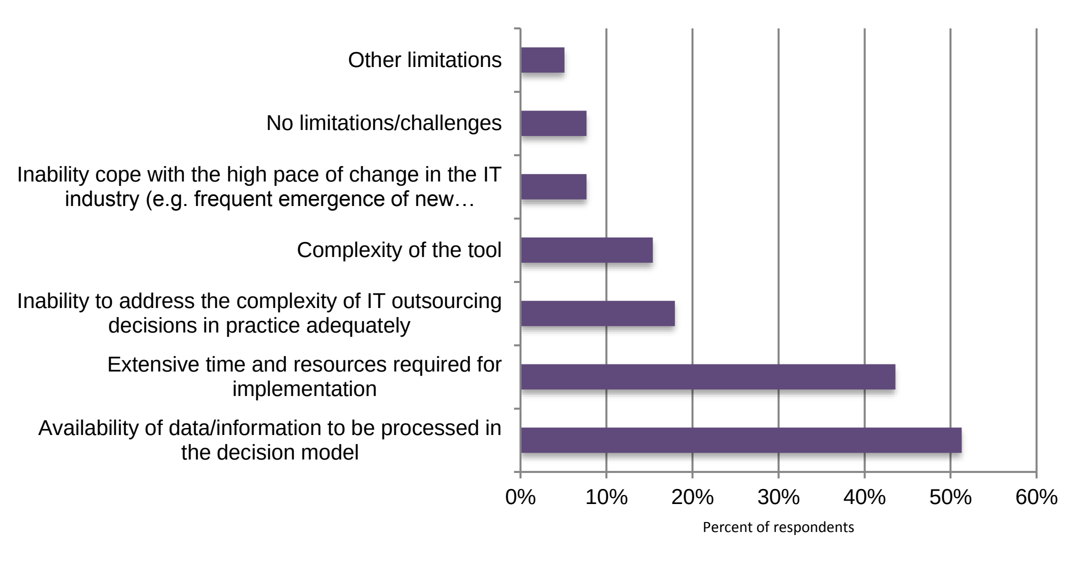


Figure 5-12 Limitations/challenges of implementation of the suggested model/tool

5.3.6. Identification of effectiveness factors in academic knowledge transfer

To analyse the impact of different factors on the effectiveness of knowledge transfer activities, the responses were divided into two groups based on participants who were or were not aware of the implementation of their suggested decision-making support model/tool in an organisation. Knowledge transfer was considered *effective* whenever the researcher reported being aware of the implementation of his/her published decision-making support model/tool in an organisation. One-third of the respondents (33%) stated that they were aware of the implementation of their published decision support model/tool for IT outsourcing/cloud sourcing in an organisation.

A Chi-Square test was used to examine the association between 24 independent variables across five themes with effective knowledge transfer as the dependent variable. Table 5.2 shows the result of this analysis. Shaded rows indicate the factors found to have an impact on effective knowledge transfer.

Table 5.2 Chi-Square Test of association of different factors with effective knowledge transfer

Theme	Variable	Chi-Square Test				Effect Size	
		Pearson χ^2 value[a]	df	Asymptotic Sig. (2-sided)	Test result	Phi	Approx. Sig.[c]
Motivation	Motivated to achieve research publications	2.730	1	0.098	Supported**	-0.265	0.098**
	Motivated to support practitioners	7.800	1	0.005	Supported *	0.447	0.005*
Initiators of the research process	Personal feeling for the need to research the topic of IT outsourcing	1.045	1	0.307	Not supported	0.218	0.173
	Finding the research idea while reading research papers	0.321		0.571	Not supported	-0.145	0.365
	Request from practitioners to do the research	0.000	1	1.000[b]	Not supported	0.000	1.000
	Request from co-author(s) to engage in the research	0.000	1	1.000[b]	Not supported	-0.115	0.474
	Journal or conference call for paper	0.000	1	1.000[b]	Not supported	0.054	0.735
Sources to obtain information about ITO in practice	Interviews with practitioners	0.821	1	0.365	Not supported	0.145	0.365
	Personal industry/work experience	1.303	1	0.254	Not supported	-0.183	0.254
	Secondary sources (industry surveys, publications …)	2.167	1	0.163[b]	Not supported	-0.236	0.141
	Survey of practitioners	1.325	1	0.250	Not supported	0.184	0.250
	Personal contact/communication with practitioners	3.391	1	0.060	Supported**	0.295	0.066**
Extent and types of communications with practitioners	Frequency of reading practitioners' publications	3.566	1	0.083	Supported**	-0.302	0.059**
	Frequency of writing in practitioners' publications	0.557	1	.589[b]	Not supported	0.120	0.455
	Frequency of attending practitioners' events	5.571	1	0.030[b]	Supported*	0.378	0.018*
	Frequency of personal communication with IT managers	6.209	1	0.013	Supported*	0.399	0.013*
Knowledge transfer activities	Development of software based on the research results	3.853	1	0.090[b]	Supported**	0.314	0.050*
	Transmission of the research output through teaching	0.052	1	0.819	Not supported	0.037	0.819
	Publication of the research output in a book/book chapter	0.052	1	0.819	Not supported	0.037	0.819
	Publication of the research output in practitioner media	3.853	1	0.090[b]	Supported**	0.314	0.050*
	Presentation to practitioners at events (e.g. seminars) or to specific organisations	0.209	1	0.648	Not supported	0.037	0.648
	Offering consultancy for implementation of the decision model	0.650	1	0.447[b]	Not supported	0.129	0.420
	Transfer of the research output through informal communications with practitioners	3.337	1	0.068	Supported**	0.293	0.068**
	Establishing spin-off company to commercialise the research output	6.500	1	0.031[b]	Supported*	0.408	0.011*
	Collaborative research with practitioners in conducting the research	2.167	1	0.269[b]	Not supported	0.236	0.141

* CI= 95% ** CI=90% a: with continuity correction b: Fisher's Exact Test c: Approximate significance

To summarise, ten variables were found to be associated with effective academic knowledge transfer to industry. Researcher's motivation *to support practitioners* was positively associated with *effective knowledge transfer* while the motivation *to achieve research publication* was negatively associated with *effective knowledge transfer*. The effect of researcher's motivation on effective transfer of knowledge to the industry can be illustrated as shown in Figure 5-13. The group of researchers who were motivated to support practitioners were more effective than the others (here called *impact-minded* researchers) in transferring their knowledge to practice. Sixty percent of impact-minded researchers effectively transferred their published decision model to the industry. The least effective group were researchers who were motivated to achieve research publications and not motivated to support practitioners (dubbed *publication-minded* researchers). None of the publication-minded researchers reported effective knowledge transfer to industry.

Motivation: To achieve research publication	Motivation: To support practitioners: No	Motivation: To support practitioners: Yes
Yes	**Low effectiveness** ***Publication-minded*** (11 researchers – 0 effective KT)	**Average effectiveness** (14 researchers – 6 effective KT)
No	**Low** ***Misc. motivation**** (4 researchers – 1 effective KT)	**High effectiveness** ***Impact-minded*** (10 researchers – 6 effective KT)

* Miscellaneous motivations e.g. self-interest or contribution to research community

Figure 5-13 Classification of researchers according to their motivation to conduct research and effectiveness in knowledge transfer

Source: Author

As shown in Table 5.2, establishing a spin-off company to commercialise the research output had a strong positive association with effective knowledge transfer while development of software based on the research results showed an average association. Both variables - *frequency of attending practitioner's events* and *frequency of personal communication with IT managers* - had strong positive associations with effective knowledge transfer.

Four variables had average positive associations with effective knowledge transfer: obtaining information about ITO practice through personal contact/communications with practitioners; informal transfer of the research output e.g. through informal communications with practitioners; frequency of reading practitioners' publications; and publication of the research output in practitioner media.

5.4. Chapter summary and conclusion

Interviews with three academic researchers who suggested ITO decision models revealed that the academics' views on the practical relevance of their own suggested models varied. One of the participants perceived the model suggested in his papers as a *suggestion* that practitioners *could* use but was reluctant to take a prescriptive approach to give advice to practitioners in their decision making. The second academic also believed that practitioners *could* benefit from his suggested model, but he considered dissemination of research to practice and implementation of the suggested model to be outside the duties of an academic researcher. In contrast, the third academic believed that Information Systems and Management researchers should try their best to produce relevant and practical outputs, and he had personally implemented his suggested model in several organisations. The academic participants believed that the *academic promotion system* did not encourage and even discouraged practical research. Moreover, decision making in practice was perceived to have case-specific characteristics or was inherently too complex, and those characteristics cannot be incorporated in academic research papers. In other words, it was perceived that academics had to sacrifice relevance for publishing research that is more generalisable. The academic participants were in favour of collaborative research with practitioners as a possible way of increasing practical relevance of research, although they stated some difficulties in those collaborations and their views on the potential power of collaboration to solve the relevant problem varied among them.

The findings of this phase showed that research in the ITO decision support field was largely initiated from the academy, not industry. In most cases, the ITO research project was initiated because of the researcher's personal opinion of the need to conduct the research or finding the research topic while reading academic papers, e.g. based on peer academic researchers' suggestions in papers. Researchers obtained information about IT outsourcing practice through various sources and tried to stay up-to-date with industry trends and innovations.

Chapter 6. Adoption of ITO decision-making knowledge by practitioners

6.1. Introduction

Having considered knowledge transfer from the knowledge producers' perspective in the preceding chapter, this chapter shifts the focus to the intended users of the research-generated knowledge – the practitioners. This chapter presents the key results of the analysis of Phase C in which the data collected from ITO practitioners comprised ITO decision makers (e.g. CIOs) and ITO consultants.

Section 6.2 introduces the preliminary case study which comprised four interviews and presents the key results from the data analysis and the conclusions derived from the preliminary case study. Section 6.3 presents the case study of ITO decision making in four large Australian organisations from different sectors (Higher Education, Finance, Manufacturing, and Local Government). In each of the four organisations, two interviews were conducted to provide triangulation. A cross-case analysis of these four cases is presented to conclude §6.3. The key results from the analysis of interviews with three IT consultants are presented in §6.4. The results from the analysis of a survey of ITO practitioners are presented in §6.5. The final section of this chapter provides the summary of the key findings and conclusions drawn from analysis of the interviews and the survey. The overall structure of this chapter is illustrated in Figure 6-1.

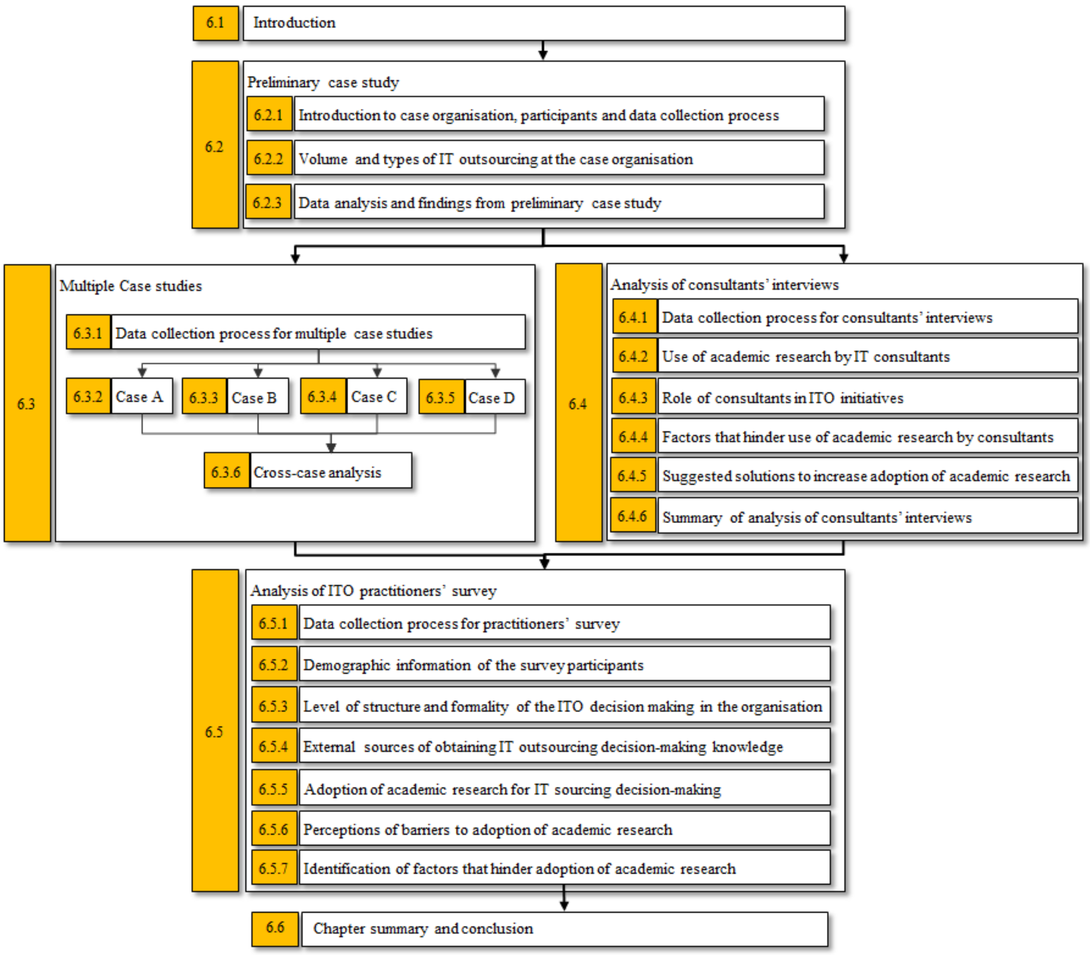


Figure 6-1 Structure of Chapter 6

6.2. Preliminary case study

The preliminary investigation of ITO decision making in practice was conducted as a single case study to obtain an in-depth understanding of the topic and assess the appropriateness of the initial research questions and approaches to the research.

6.2.1. Introduction to case organisation, participants and data collection process

The University of Southern Queensland (USQ) was selected for several reasons. Firstly, the size of USQ (1,654 staff members) was large enough to meet the inclusion criteria of this study. Secondly, USQ managers were accessible and available for interview. Thirdly, use of Information and Communication Technology (ICT) at USQ is extensive, both for supporting organisational processes and for delivering online education to more than 20,000 online and 7,000 on-campus students (USQ 2014).

Thus, ICT infrastructure and services are vital to the university and IT managers were experienced in with major IT sourcing decisions. Table 6.1 provides an overview of the case organisation.

Table 6.1 8 Overview of preliminary case organisation

Type/Sector	Public University / Higher Education
Geographic location	Australia/Queensland
Number of employees	1,654 (1,382 Full-Time Equivalent)
Number of employees in ICT Division	100 (Full-Time Equivalent)
Areas of ITO	☒Software development and maintenance ☒ Hardware maintenance and support ☒ Telecommunication and network ☐ IT/IS Planning and Management ☒ Cloud services (infrastructure, application, platform)
ITO model	☐ Single sourcing ☒ Multi-sourcing

Participants in the preliminary data collection phase were four USQ staff members involved in ITO decision-making at USQ: the Strategic Procurement Administrator (Financial and Business Services), and three ICT executives: Deputy Vice-Chancellor and Chief Information Officer (CIO); Director of Planning, ICT Services; and Executive Director of ICT Services. As shown in Table 6.2, the average duration of employment for the four participants at USQ was 20 years. The three IT managers had more than 23 years of experience in the ICT field and more than 13 years on average working with IT sourcing decisions.

Table 6.2 Demographic information of Case A participants

		Interviewee 1	Interviewee 2	Interviewee 3	Interviewee 4
Position		ICT Services - Director of Planning	Executive Director of ICT Services	Deputy Vice-Chancellor and CIO	Strategic Procurement Administrator
Education		Master Degree	Master Degree (MBIT)	PhD	High School
Graduation year		1998	2003	1995	1975
Gender		Male	Male	Male	Male
Work experience (Years)	**In the organisation**	38	20	2	35
	In ICT field	30	20	20	-
	With ITO decisions	15	13	13	24*

* Experience with procurement decisions

Based on a review of the literature, the factors (both internal and external) that might affect ITO decisions were identified and used as the basis for the interview questions. Some of the interview questions were adapted from Davidson and Nowicki (2012) and Nielsen, Mitchell and Nørreklit (2014).

In this exploratory case study, four USQ managers were asked about the process of making ITO decisions, the people involved in the process, and internal and external factors that influence ITO decisions.

The interview questions are provided in Appendix B.1. The four USQ managers were invited to participate in the study by my Principal Supervisor, and she accompanied me in the four interviews. Each interview took approximately one hour. Several organisational documents e.g. procurement policy (USQ 2015) were also analysed to provide a richer picture of the ITO decision-making process at USQ and to provide triangulation with the interview data. The interviews were conducted in May/June 2014. A detailed report of this preliminary study was published as a research paper at the ACIS2015 conference (Rajaeian, Cater-Steel & Lane 2015). The following section provides a brief summary of the key results.

To protect interviewees' privacy, their names are not reported in this thesis. Instead, they are referred to by A1, A2, and so on. The letter (e.g. A) refers to the Case organisation and the number indicates the individual interviewee.

6.2.2. Volume and types of IT outsourcing at the case organisation

IT outsourcing at USQ involved various types of IT services including but not limited to: application management, student email, the design and building of a data centre, support on server application and server deployment, security audit, desktop management, training packages, audio/visual installation (projectors, video conferencing, etc.) and database management (A1). The annual ICT budget at USQ was approximate $19 million in 2014, comprising $11.2 million of the operational budget, $4 million of the capital budget and around $3.8 million of recurrent expenditure that involves the cost of software licenses, maintenance, internet traffic, etc. The value of ITO in terms of the budget was estimated at around $1 million per year (A1). The cost of IT consultancies was approximate $0.4 million in 2014 (USQ 2014). The geographic location of USQ's ICT service providers included a wide geographic pool of providers that extends from local (Toowoomba City) and State (Queensland) to other states of Australia and even some other countries (International) (A1).

6.2.3. Data analysis and findings from preliminary case study

6.2.3.1 IT outsourcing decision-making at USQ

The study showed that there was no explicit formal policy and strategy with regards to ITO at USQ. Outsourcing decisions were made individually for each business case, as a part of the project management methodology (A1; A2; A3; A4). However, there were some sourcing policies documented in the Procurement and Purchasing Policy and Procedure, for instance: 'Before sourcing any goods or services externally, a Procurement Officer or Finance Officer will, in the first instance, investigate if the supply can be met from internal University sources' (USQ 2015).

A large number of different staff members were involved in the process of decision-making, from the system sponsor (Functional Manager) to the project board, Legal Services, ICT Portfolio Committee, the ICT Strategy Board, CIO, Deputy Vice Chancellors, Vice Chancellor and the University Council depending on the size and specifications of the proposed project. The ICT Portfolio Committee was in charge of assessing proposed projects considering university priorities and recommending the priority of proposed projects to the ICT Strategy Board. The ICT Strategy Board acted as advisor to the CIO, and the CIO made the recommendations to the Vice Chancellor for approval (A1; A2). Decisions about investments up to a certain amount were made within the Divisions. Projects over that threshold required approval by the Vice Chancellor's Committee (A1). External IT consultants could also be engaged to support the ITO decision making (A1; A3). For instance, USQ was under a voluntary audit by an external consultancy firm for readiness assessment for large-scale cloud-based arrangements at the time of conducting the interviews (A1).

6.2.3.2 Determinants of ITO decisions in the case organisation

Regarding internal determinant factors, the three IT managers (A1; A2 and A3) were asked to rate the impact level of different factors on ITO decisions at USQ in a questionnaire (Appendix B.1). Several inconsistencies were found, most noticeable of them was the lack of agreement on the 'cost reduction' factor. 'Cost reduction' is claimed to be the most important driver for a majority of client firms' ITO decisions, from the earliest studies to more recent ones (Lacity et al. 2010). However in this study 'cost reduction' received three different impact ratings. One of the IT managers (A1) believed that cost is a key determinant of ITO decisions at USQ (ranked high) and another participant (A2) rated cost as 'Medium' impact level. On the other hand, the third interviewee (A2) maintained that cost was not a key determinant of ITO decisions at USQ and noted:

> *"… cost reduction is almost never a key determinant … [with outsourcing] we can buy a set of skills at great expensive rates for short periods of time rather than put staff ourselves to do that. I don't think we are saving money doing that … with the exception of very commoditised services, the make-buy decisions we did on very big systems [showed] they are almost always exactly equal" (A2).*

6.2.3.3 Use of academic ITO research to inform and support ITO decisions

Another major finding from the preliminary study was the reluctance of IT practitioners to adopt research-based decision models. One of the senior ICT executives emphasised the practitioners' inclination to adopt the decision models and frameworks from practitioners rather than academic researchers. He also believed that the practicality of the models/frameworks had priority over their rigour in the organisational decision-making process. He noted:

> *"Our inclination is to be looking at practice models … in practice we would probably take a rather pragmatic/practice orientation … I do think that procedure or rigour is important and asking the right questions is important … at the end of the day, these things are always value judgments, that is, we will ask ourselves whether we are comfortable with the potential of losing this application for a period of time, and what's the likelihood and what's the impact. So [for instance] for student email we made a decision [to outsource] … but staff email didn't [successfully] pass that [criteria to outsource]" (A3).*

In sum, the results of analysing the interview data showed that ITO decisions involve group decision making, various internal and external factors and there was no specific ITO strategy or formal decision-making process in the case organisation. The outsourcing initiatives followed a standard procurement process. However, the process does not include any decision model or framework with established decision criteria. The findings of the preliminary case study indicate that ITO decision making in practice is not entirely explored and echoed the voice of the researchers who reported a lack of ITO research utilisation by practitioners (as discussed in §2.2).

6.2.3.4 Conclusions from preliminary case study

The preliminary case study provided deep insights into ITO decision making in practice and highlighted several inconsistencies between theory and practice of ITO decisions. For instance, ‘cost reduction’ is reported as a determinant of ITO decisions in the ITO literature, e.g. 36 out of 40 papers examined in Lacity et al.’s (2010) literature survey reported ‘cost reduction’ to motivate positively and significantly ITO decisions. However, there was a lack of agreement among the participants on the role of the cost factor in ITO decisions at the case organisation. The lack of adoption of academic research was confirmed by the four USQ managers interviewed in the case study. The unwillingness of practitioners to adopt academic research was revealed and directed the research questions in the next phase of this research (Multiple Case Studies) to investigate “where and how do practitioners seek/obtain ITO decision-making knowledge?” and if academic research is not one of those impactful knowledge sources, what are the factors that lead to such non-adoption?

6.3. Multiple Case Studies of ITO decision-making in practice

The aim of the multiple case study interviews was to understand the sources of ITO decision-making knowledge in the organisations, particularly the possible role of academic research, as well as the factors that may hinder the adoption of research-based decision models by practitioners. The formality and degree of structure and perceptions of practitioners about the complexity level of different ITO decisions were also investigated. The *degree of structure* is defined as “the degree of cause and effect knowledge and access to an established procedure for decision making” (Nilsson 2008, p. 108). The *degree of complexity* is related to the number of factors considered and their inter-relationships. High complexity is associated with unclear preferences and environmental (external) change (Nilsson 2008). Interviewees were asked to rate the *degree of structure* and *degree of complexity* of different ITO initiatives at their organisation. The interview questions are provided in Appendix B.2.

6.3.1. Data collection process for multiple case studies

A list of Queensland organisations was obtained from the IBISWorld[6] database (234 organisations) and categorised based on their industry/sector. From this list, 20 ***large*** organisations were shortlisted in different sectors based on the supervisory team's perception of the feasibility of gaining their participation in this study. After several e-mail communications with six organisations, managers at four of these organisations agreed to participate in the study. It worth mentioning that the key to establishing successful relationships with managers at all of the three participant organisations was personal contact by the supervisory team members with that organisation. Without such personal contact, it would have been more difficult to persuade organisations to participate in the research. The preliminary case organisation also agreed to participate in this stage. All of the organisations (Table 6.3) were large (i.e. having more than 200 employees). In addition, the four case organisations were selected from different industries to provide the opportunity to achieve theoretical replication (Perry 2013).

Table 6.3 Overview of case study organisations

	Case A	**Case B**	**Case C**	**Case D**
Type/ Sector	Public University / Higher Education	Bank /Finance	Food (Diary) Production /Manufacturing	Local Government/ Public
Location	Australia Queensland	Australia Queensland	Queensland branch of a multinational company	Australia Queensland
Number of employees	1,654 (1,382 FTE*)	765	2,150 in Australia (Global 16,000*)	1,500
Number of employees in ICT Department	100 FTE*	70 FTE*	38 FTE* (in Australia)	51 FTE*

*** Full-Time Equivalent**

In total, ten ITO decision makers participated in the case studies from the four selected organisations. The selection was based on "relevance rather than their perceptiveness like respondents in random survey" (Perry 2013, p. 113) and availability. The relevance criteria here was that the participant must have at least five

[6] IBISWorld (ibisworld.com.au) provides profiles the top 2,000 Australian companies. The ranking is based on the most recent available financial data and include listed and non-listed public companies, private firms, foreign-owned businesses, trusts and governmental departments.

years of ITO experience in ITO decision-making to ensure that they have sufficient and relevant information to respond to the research questions.

The main four case studies comprised interviews with two ITO decision makers in each of the four organisation. Two participants from Case A were interviewed twice, first for the preliminary case study and again as one of the four case studies. All of the case study interviews were conducted individually face-to-face at the participants' offices, with an average duration of approximately one hour. Interview questions used for the four case studies are provided in Appendix B.2.The interviews provided data about the types and attributes of the decision-making processes and the (possible) decision aids (e.g. frameworks, models) that practitioners use for ITO, practitioners' sources of obtaining ITO decision-making knowledge, and their attitude toward academic-generated knowledge.

6.3.2. Case A

Fifteen months after the preliminary study, two USQ IT managers (A1 and A2) were interviewed in August 2015, for approximately 50 minutes each.

6.3.2.1 ITO decision-making process at Case A

A description of the ITO decision-making processes at Case A was provided in the previous section (6.2.3.1). There was a "structured process around procurement" (A2) and a "contract management system in such a way that it follows a particular flow chart of activities" (A1). However, no specific ITO decision-making process with predefined/documented decision criteria and decision model was established, and ITO decisions were taken in group decision-making processes:

> *"I think we typically make decisions based on a shared level of understanding and knowledge. It's typically not just one person making a decision. It's usually a team of people" (A1).*

Participants highlighted some of the contingency factors that influenced ITO decision making, including industry/sector, size and maturity of the organisation and its position in the organisational lifecycle.

> *"Smaller business don't have the legacy, or structure, that we have at the uni[versity] size ... Whereas the uni[versity] has quite a balanced view and some*

of it, is actually to do with our risk profile and acceptance of risk. Some are because where we are in our life cycle. ... quite often the decision if we insource or outsource only gets triggered when we consider replacing the product. If we have existing infrastructure, existing processes, existing resources, we are unlikely to look at outsourcing unless we have an external driver" (A2).

The financial value of the outsourcing project also affects the level of structure of decision making as noted by A1:

"The more money we are going to spend, the more structured the procurement process is, and there's usually more rigour around reference sites and providing assurance that the supplier can satisfy your requirements" (A1).

Overall, ITO decisions were considered to be semi-structured at Case A by both participants. However, the level of structure varied among different ITO initiatives. As shown in Table 6.4, outsourcing of 'Software development and maintenance' was perceived to be a highly structured decision at the organisation by both participants. There was also agreement on the semi-structured nature of the 'Platform as a Service' sourcing decision. For other sourcing initiatives, while there were different views on the level of structure, those views were very close to each other. Thus the data illustrates a consistent and reliable view of the different degrees of the structure of ITO decisions at Case A.

Table 6.4 Perceived degree of structure of different ITO decisions at Case A

IT Service/Function		**Fully Structured**	**Highly Structured**	**Semi-Structured**	**Less Structured**	**Not Structured**
Software development and maintenance			A1 A2			
Hardware maintenance and support			A2	A1		
IT Help Desk / end-user support				A2	A1	
Telecommunication and network			A2	A1		
IT/IS Planning and management				A1	A2	
Cloud services	**Infrastructure as a service**			A2	A1	
	Application as a service			A2	A1	
	Platform as a Service			A1 A2		

The perceptions of participants about the extent of complexity of different ITO decisions is presented in Table 6.5.

Table 6.5 Perceived degree of complexity of different ITO decisions at Case A

IT Service/Function		Not Complex	Low Complexity	Average Complexity	High Complexity	Very High Complexity
Software development and maintenance					A1 A2	
Hardware maintenance and support			A2	A1		
IT Help Desk/end-user support				A1	A2	
Telecommunication and network			A2	A1		
IT/IS Planning and Management				A1	A2	
Cloud services *	**Infrastructure as a service**		A1	A2		
	Application as a service		A1		A2	
	Platform as a Service			A1	A2	

As Table 6.5 shows, there was a consensus among the two Case A managers interviewed on the level of complexity of different ITO decisions except about application as a service.

6.3.2.2 Accuracy and comprehensiveness of ITO decision-making at Case A

Participants in Case A believed that there had been a few occasions where ITO decisions were not optimal and resulted in problems for the organisation. One example was an instance of poor vendor selection that led to several problems for Case A, and finally termination of the ITO contract:

> *"as an example ... our identity management implementation and I guess we selected a vendor to provide a solution for us and it became apparent that ... the vendor we had chosen couldn't actually deliver the solution we were looking for. So, there was a range of communications between the university and the vendor to end the relationship" (A1).*

The cause of outsourcing problems was considered to be a lack of knowledge and experience in both the outsourcer organisation and in the market, particularly in new "bleeding edge" (A1) technologies:

> *"When you are implementing something that is new and there's not a lot of examples elsewhere where it's been done. So to some extent leading the way in developing a new solution or system and you're learning as you go. You're*

> *learning that your combination of systems and hardware and software may or may not suit the particular application that you are looking to implement" (A1).*

One of the participants emphasised the value of a pre-defined structured decision process, in preventing wrong sourcing decisions, and highlighted the relationship between the level of structure in ITO decision-making process and the effectiveness of the outsourcing arrangement:

> *"The more structure you've got, the higher the level of assurance that there won't be any surprises. So that you would have considered things before you've actually signed an agreement with a company" (A1).*

6.3.2.3 External sources of decision-making knowledge at Case A

This section outlines the key sources of decision-making knowledge that informed ITO decisions reported by the participants. In this study, the mechanisms or channels of knowledge/information dissemination are differentiated from the sources. For instance, while books are mechanisms or a channel of communication of knowledge, the book's content can be sourced from an academic, an IT practitioner or a consultant. Five sources of ITO decision-making knowledge acquisition are discussed next.

A) Peer IT practitioners

One of the key sources of decision-making knowledge (e.g. sourcing methodologies) and information (e.g. sourcing options) for practitioners was their peer IT practitioners. Lessons learnt (success/failure) from the implementation of previously made decisions was considered the most beneficial outcome of seeking knowledge and information from peer IT practitioners:

> *"We typically try to learn from others and to eliminate risk ... we will typically look to leverage off what we called 'standing offer arrangements' that have been implemented by either the federal or state governments or the organisation that represents IT directors within Australia called CAUDIT[7] ... because we don't want to re-invent the wheel, we don't want to go through the process of doing work that's already been done by others" (A1).*

[7] Council of Australian University Directors of Information Technology

The main mechanism or channel of communication used was “community of practice meetings”. Other mechanisms were “symposiums”, “conferences”, “CIO forums” and “webinars and online meetings”:

> *“There are other Communities of Practice that underpin and support CAUDIT, and there are other units … they will organise webinars and online meetings …” (A1).*

> *“Certainly the [members of the] peer organisation that I’m a member of, are incredibly important for sharing experiences like both sourcing methodologies as well as sourcing options. For example, I’m the Chair of the Queensland Universities IT group. This is where all Directors of IT across Queensland Universities meet regularly. We review what each other is doing, share stories ... I’m also a member of the national body of IT Directors ... That’s incredibly useful as well. There is also a number of industry organisations like CIO forums and CIO symposiums, which are run by broader groups across industries. Again, they are incredibly useful and mostly because they are giving real life experiences with methodology, different vendors, different types of approaches, different types of sourcing” (A2).*

There was some evidence of a *bandwagon effect* or *mimetic institutional force* since participants perceived the practice of leading organisations as best practice:

> *“When we’re looking at outsourcing or sourcing solutions, we might look at best practice … typically what we might do is be a follower rather than a leader. What we will do is we will look at other organisations in our sector to see what they’ve done and how they’ve approached some of these large implementations. We’ll also try and leverage off who are the companies and contractors that they’ve used” (A1).*

B) Consultants

Consultants were the other source of ITO knowledge cited by Case A participants. The mechanisms of knowledge dissemination were consultancy services, consultants’ publications or events organised by consultancy firms (e.g. summits, webinars …). Consultants were perceived as “expert in a particular domain” (A1) or had “a track record in a particular skill or area”. Consultants’ publications were perceived as “current” (A1) and “up-to-date” (A2), “accepted by peer groups and industry groups” (A2) (bandwagon effect), “very well marketed” (A2) and “promote [their] research as part of their marketing activities" (A1) (marketing push). These factors were considered influential in the adoption of consultants' information, knowledge and services:

"I think the Gartner style research is probably more lightweight than academic research, but it's fairly more current … it is also very well marketed. I think it's potentially lower quality research; they are masquerading as full-scale academic research; the idea is it's not, but it's better marketed, more current and they're probably the key differences" (A2).

"I think what we look for in advice; we are looking at our peers and we are looking at consultants. That's typically how we get advice. So we'll look at people who have got a track record in a particular skill or area" (A1).

C) IT Vendors/Service Providers

As part of their marketing initiatives, and to engage organisations in their product development and evaluation, vendors disseminate information to their clients (sometimes, potential clients) and potentially influence their ITO decisions by offering sourcing solutions or lessons learnt from dealing with their past clients. The information dissemination mechanisms used by vendors were seminars, webinars, online meetings, user group forums and practitioner's media:

"We get a lot of invitations to vendor seminars, so they are pretty well pointed" (A2).

"… they will organise webinars and online meetings fairly regularly between major vendors and representatives within uni[versitie]s to hear what prospective vendors might be wanting to market. Another thing is, if we look at other PeopleSoft and Oracle systems, there are conferences in advance that are put on by those vendors annually. They are basically user group forums ... major events held around the world ... So, representatives, as well as the associated vendors will come together to talk about what's coming, what changes are going to occur, how have people overcome some of those issues, how have organisations implemented some of those new systems. So, for significant investment in systems, there will be user group forums held" (A1).

D) Mass media organisations

Mass media organisations may influence the IT decision making. Their channel of information/knowledge dissemination is various types of online and offline media:

"The information might come from market base forces, as opposed to academic research which tends to be more longitudinal or delayed in response" (A2).

"We don't rely too much on magazines. We take note of what's in the press – both paper-based [and online], for example, the IT section in the Australian [newspaper] on Tuesday and Higher Education on Wednesday. There's also a range of online information we subscribe to. It's predominantly marketing information that companies are pushing to gain interest. I think that information is used to see what changes are occurring. They are not the primary driver to think about a product or service" (A1).

E) Not used mechanisms/channels

Books, training and workshops were not used as a source of obtaining decision-making knowledge by the participants. Books were perceived unable to keep up with the high pace of change in the IT field:

"…not related to training. Not necessarily related to workshops either. Books, I haven't found as useful for some of the IT decision making. I use books for a general business strategy and communication strategy and those sorts of things. But with the pace of change with some of the products in the IT space, for a book to get out in the market, it's probably information which may be two or three years old, which is almost too old. The information currency needs to be within six months, really. Even when you are buying products, or sourcing decisions, companies and sourcing providers can move quite rapidly" (A2).

6.3.2.4 Use of academic research and perceptions of relevance and benefits of research at Case A

The participants seldom read academic research papers nor did they seek advice from academics in their decision making. Participants' perception of academic research was that it was theoretical rather than experience-based and evaluated in practice, lagging behind market trends (lack of timeliness). Furthermore, participants believed that poor dissemination of academic research to practitioners, e.g. not through practitioner-targeted *channels of dissemination***,** has led to poor awareness. Consequently, these factors lead to the low rate of adoption of academic research by practitioners:

"I'm a member of the Australian Computer Society. They used to, as an example, put out a monthly magazine and journal as well. There were academic articles in that that were very theoretical ... there's a bit of a gap between theory and practice" (A1).

> *"I wouldn't think we'd approach academics too often ... It's probably because they are not close enough to current trends happening at the moment ... maybe they are more involved in the theoretical side of things rather than the practical application … academics would come very low down on the scale of people we would look at first … they [academics] don't have the up to date knowledge about those systems and how they all fit together. The vendor and contractors have that knowledge. And our peer organisations who have implemented that have that knowledge" (A1).*

> *"It [academic research] is not trusted, there's not as much weight allocated to it. Just thinking about sourcing and outsourcing, it's not something that … you think about that that's the first area I need to look at when I'm making those types of decisions. Unless, as I said, that research is coming from peer organisations and large IT companies and knowledge companies that's their business. For example, you might look at what does Gartner say on enterprise systems" (A1).*

> *"When we're looking at outsourcing or sourcing solutions, we might look at best practice. But then we'd look at which organisations have implemented it and how have they done that? So you might look at academics for the theory of that, but when you're actually making the decision, we wouldn't go to ITIL and say tell us how we should do this. We would go to the University of X, or to a particular provider that has implemented that system or solution at Universities … we are interested in best practice to ensure we have tested and researched and implemented solutions so that they don't fail" (A1).*

Moreover 'access to academic research' was not a barrier to adoption in this case because both participants had access to academic research publications through the university's subscription to various academic journal databases:

> *"I do come across those [academic research publications]. But what tends to happen is … we would be more likely to read vendor publications or social media releases, or things done by Australian Computer Society, like practitioner groups. They then actually link to academic research. It's been quite a while since I've read the MIS Quarterly, or those sorts of things when I was actually studying. I used to do that quite regularly. But now that I am a practitioner, I'll still get the influence of that, but it's not directly. It's via the practitioner level" (A2).*

Timely dissemination of research outputs in practitioners' media and choice of the appropriate channel of dissemination was considered as determinant factors for adoption of research outputs. Publishing in non-academic publications was suggested as a way of timely dissemination of research results to practitioners since it usually does not require the long period of peer review:

> *"Academics [who] publish in non-academic publications, the information is much more current and might be reflected or related to their ongoing research. You are getting stuff much faster ... You typically find that the style or writing of what they are doing and putting out there isn't necessarily research methodology based. It's more practitioner-oriented" (A2).*

> *"Basically publishing bits of insight or case studies is about what they are looking at, while building 20 case studies, to finalise their research, they can publish some insights into one case study more frequently and engage in some presence. You could view that as marketing or you could view it as informal work-in-progress publications. Also, targeting the media that is actually coming at people. A lot of media is pushed by vendors or marketing companies or IT research companies, as opposed to traditionally coming out in journals" (A2).*

Information overload was perceived as a challenge for practitioners' adoption of research outputs:

> *"When you are in a market with enormous amounts of information, there's heaps of information; you don't need to go look at a journal and actually find information, whatever you want. Being able to demonstrate that something is of high quality and high level of validation is actually pretty hard. You tend to find, it's like sorting through the haystack, looking for needles. That's probably the challenge to look for good academic research. How does it engage and make itself look more visible?" (A2).*

> *"I would suspect it's probably awareness. In my experience, I'm barraged by media sources giving me insights and opinions and new bits of information. I would say that a small percentage of that would be backed by academic research, a lot would be marketing or opinion based, or people just generating content ... the media would come through that. I think that's the biggest influence – overloaded with information and models" (A2).*

'Active marketing' was perceived as an influential factor in the successful dissemination of information and knowledge from consultants and vendors to practitioners. Participants also believed that poor marketing of academic research outputs was negatively affecting their adoption. The participants argued that information overload along with a poor effort to disseminate research outputs to practitioners resulted in poor awareness about available academic research outputs (e.g. ITO decision models):

> *"I think the models are good for thinking about and once organisations have been through them, they become more reliable, based on peer information; practitioner groups. I think one of the challenges of the models coming out of the academic community is they are probably not marketed as strongly as what you would get out of the vendor community or commercial research organisations, like Gartner and Ovum. Not only are they supposedly generating the research, and publishing papers or models around that sort of thing, they also actively market it. Whereas if an academic researcher comes up with a model, and it's fantastic, they'll publish it, but then it really needs a pretty dedicated marketing effort to get it outside of the research community, outside of their peers … it's got to be valuable, but it's also got to be well disseminated. The best model in the world can be published, but will it be picked up by social media or any of the mainstream groups? It probably won't really fulfil its potential because the awareness isn't there" (A2).*

> *"I was reading a paper yesterday about Price Waterhouse Coopers, social media concept model, or whatever it was … That's a model that will be used into the future because a big consulting firm is pushing it. I can see a lot of weaknesses [in the Price Waterhouse Coopers' model]" (A2).*

Both participants had positive views on the potential of academic research to support practice and collaborative research as a way of increasing the practical relevance of research.

One participant believed that 'longitudinal' research that provides 'lessons learnt' from the outcome of practitioners' decisions can be relevant to practice:

> *"I think there's scope there. … They [academics] are very good at looking at how organisations have changed. What methodologies have they used, what systems have they used, what mistakes did they make and what did they learn. Those types of things ... Academics provide, I suppose, a written record about history. That maybe some businesses don't have the time or resources to devote*

to these days ... These days, everyone is time poor. It's all about agility and lessening the time to market. There's not a lot of reflecting on what you've done; it's more looking ahead and how we are going to get there. I think academics do that type of research much better than anyone else" (A1).

The relevant research was also described as *objective* and *validated* research.

"I think it [academic research] can [help practitioners in their decision making]. I think there's an enormous amount of weight put on publications like Gartner, or InfoTech Resources or Ovum because it gives an objective opinion on how to address uncertainty in the market. A lot of executives and decision makers are looking for that objective opinion which has been based on data which saves them time and is like justifying going through all the data themselves" (A2).

Choosing the right research partner for collaboration was another influential factor in the adoption of research outputs. It was suggested that the likelihood of adoption of research increases when the practitioners involved in collaborative research are leaders (not followers) in a particular market. This belief was rooted in the practitioners' view that leader organisations can take more risk because they have more resources. Furthermore, follower organisations take less risk and look at the practice of leading organisations as 'best practice' or at least practically shown successful experience:

"I suppose, you need to look at the organisations who are influencing these decisions. So within the Australian Government, there's the Australian Government Information Management Office, and I think there's a procurement arm associated with them. Within Queensland government you've got the Department of Science, Info[rmation] Tech[nology] and Innovation, so they look after IT procurement … they look after setting up standing offer arrangements for Queensland government departments. If we look at CAUDIT they've got a strategic procurement arm as well ... you might want to develop relationships with those organisations to be able to then publish information more widely to understand" (A1).

"I don't think there's any unwillingness within the practitioner community to use academic research. It's the fact that what's available and promoted to you is the stuff you will see first. If we had the time and luxury to do our own literature review and survey what is available, that'd be nice, but probably impractical for a lot of people" (A2).

6.3.2.5 Summary of Case A findings

ITO decisions in Case A were not based on a formal decision-making process with established decision models and pre-defined decision criteria. The ITO decision making was group based and semi-structured. The level of structure varied for different ITO initiatives and also according to the financial value of the decision. External sources of decision-making knowledge and information at Case A are summarised in Table 6.6.

Table 6.6 External sources of decision-making knowledge and information at Case A

Source	Channel/ Dissemination Mechanism	Underlying Reason For Adoption
Peer IT practitioners	Community of practice meetings Symposiums Conferences CIO forums Webinars Online meetings	Learning from experience of others Obtaining current information about other organisations' IT practice Risk reduction Saving time and resources Following practice of market leaders (Bandwagon effect)
Consultants	Consultancy services Publications Events (symposiums, summits…)	Access to up-to-date information Reputation as domain experts Marketing push Following practice of market leaders (Bandwagon effect)
IT Vendors/Service Providers	Seminars Webinars User group forum Practitioners' media	Awareness of state-of-the-art technologies, solutions, market trends Knowledge sharing (lessons learnt from implementation of solutions or success/failure information) Marketing push
Mass media organisations	Online media (the web, social media) Offline media (e.g. IT sections in newspapers)	Access to up-to-date information

Case A practitioners did not report any use of academic research in their ITO decision process. Table 6.7 provides a summary of Case A participants' views on factors that inhibit adoption of academic research.

Table 6.7 Factors inhibiting adoption of academic research at Case A

	Problem	Suggested Solution
Channel of dissemination	Awareness: Practitioners do not read academic papers (even when they have access) Perception that 'leading organisations are the audience of research'.	Dissemination through practitioners' media to increase visibility and awareness of academic research Collaboration with leading organisations
Relevant research for practitioners	Practitioners do not see themselves as the audience for academic research and perceive academic research less relevant because it: - is theoretical rather than experiential and evaluated in practice - lacks timeliness	Conduct research that satisfies the practitioners' relevance criteria: - timely and up to date - evaluated and validated in practice
Dissemination effort	Information overload No marketing push from academic sources versus active marketing forces of non-academic sources.	Marketing of academic research outputs (push to market) to increase its visibility and awareness

6.3.3. Case B

The second case organisation was an Australian bank. Details of Case B are summarised in Table 6.8.

Table 6.8 Overview of Case B organisation

Type/Sector	Bank - Non-Government/Finance
Geographic location	Australia
Number of employees	765
Number of employees working in ICT	70 (Full-time equivalent)
Areas of ITO	☐ Software development and maintenance ☒ Hardware maintenance and support ☒ Telecommunication and network ☐ IT/IS Planning and Management ☒ Cloud services (infrastructure, application, platform)
ITO model	☐Single sourcing ☒ Multi-sourcing

The Manager of IT Operations and Manager of IT Systems (software development) were interviewed individually in August 2015. The two managers had an average of 23 years of experience in ICT field and 14 years of experience in working with ITO decisions. Table 6.9 provides the demographic information of the participants.

Table 6.9 Demographic information of Case B participants

		Interviewee 1	Interviewee 2
Position		Manager – IT Operations	Manager – IT Systems (software development)
Education		Bachelor Degree	Bachelor Degree
Graduation Year		1996	1991
Gender		Male	Male
Work experience (Years)	**In the organisation**	3.5	25
	In ICT field	21	25
	With ITO decisions	11	17

6.3.3.1 ITO decision-making process at Case B

Although an IT strategic plan ("digital blueprint") existed in Case B, it did not cover IT sourcing strategies. IT outsourcing decision making was not a well-established and formal process.

> *"We have a digital blueprint, which we are in the process of executing. [but] outsourcing isn't as a strategic objective. There's nothing to say we will look to outsource this" (B2).*

ITO decisions were constrained chronologically. In other words, the previous decisions of the organisation whether to outsource a particular IT service/infrastructure continued to affect the sourcing of that IT service/infrastructure:

> *"Telecommunication was always provided by an external [supplier], whereas software has always been provided by internal. So it's just historically how we got there. And telecommunication, we can't do it ourselves, unless we dig holes and put in phone cables ... You have no choice" (B1).*

> *"[In software development] we probably have been very in-house based ... there was a piece of work where we needed to do the work by a certain time, and we didn't have the internal capability to deliver it by that time, and the knowledge and skill were easier to engage with a vendor and outsource to them to do the development work" (B2).*

The decision-making was in the form of a general tender process e.g. Request For Proposal (RFP) and vendor selection, with no specific outsourcing decision model, on a case by case basis rather than as a pre-planned sourcing strategy. The financial value of the decision also affected the level of structure of the decision process:

> *"The full process is part of an RFP document ... It's a document as in a large amount of money project. Small projects, not really ... we went to RFP and said this is what we need; these are the uptimes and the Service Level Agreements you*

> *need to provide us. It's come back with a price and three companies responded and each was reviewed and scored accordingly, and we chose one" (B1).*

As shown in Table 6.10, different opinions were expressed by the two participants regarding the level of structure of ITO decisions at the case organisation. The second participant attributed the overall degree of the structure as semi-structured, but he did not rate the cloud sourcing items because of lack of experience with cloud sourcing decisions. The perceptions of the level of structure varied for different ITO initiatives.

Table 6.10 Perceived degree of structure of different ITO decisions at case B

<table>
<tr><th colspan="2" rowspan="2">IT service/Function</th><th>Fully Structured</th><th>Highly Structured</th><th>Semi-Structured</th><th>Less Structured</th><th>Not Structured</th></tr>
<tr><th colspan="2">High knowledge & established procedure</th><th></th><th colspan="2">Less knowledge & no established procedure</th></tr>
<tr><td colspan="2">Software development and maintenance</td><td></td><td>B1</td><td>B2</td><td></td><td></td></tr>
<tr><td colspan="2">Hardware maintenance and support</td><td>B1</td><td></td><td>B2</td><td></td><td></td></tr>
<tr><td colspan="2">IT Help Desk/end-user support</td><td></td><td>B1</td><td></td><td></td><td>B2</td></tr>
<tr><td colspan="2">Telecommunication and network</td><td>B1</td><td></td><td>B2</td><td></td><td></td></tr>
<tr><td colspan="2">IT/IS Planning and Management</td><td></td><td></td><td>B1</td><td></td><td>B2</td></tr>
<tr><td rowspan="3">Cloud services</td><td>Infrastructure as a service</td><td>B1</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Application as a service</td><td></td><td></td><td>B1</td><td></td><td></td></tr>
<tr><td>Platform as a Service</td><td></td><td>B1</td><td></td><td></td><td></td></tr>
</table>

* Participant B2 did not rate the cloud sourcing items

The ITO decisions were taken collectively:

> *"I think for Managers making decisions, we depend on other people helping us make those decisions. It's not one person making the decision. It's collective decision making because different people have more knowledge ... I'll go and speak with others in my team, or consult the specialists as required to help me make an informed decision" (B2).*

As shown in Table 6.11 different ITO decisions were perceived to have different degrees of complexity depending on the type of IT.

Table 6.11 Perceived degree of structure of different ITO decisions at case B

IT Service/Function		Not Complex	Low Complexity	Average Complexity	High Complexity	Very High Complexity
Software development and maintenance				B2	B1	
Hardware maintenance and support			B1 B2			
IT Help Desk/end-user support		B2		B1		
Telecommunication and network			B2	B1		
IT/IS Planning and Management			B2		B1	
Cloud services *	**Infrastructure as a service**			B1		
	Application as a service		B1			
	Platform as a Service	B1				

* Participant B2 did not rate the cloud sourcing items

6.3.3.2 Accuracy and comprehensiveness of ITO decision-making at Case B

Case B participants believed that their ITO sourcing decision-making process was not comprehensive and there were instances of decisions with negative outcomes:

> *"I think our model isn't very mature and would say there were decisions made wrong ... There are probably instances where we could have gone outsourced, or made a judgement call on it, but we didn't do outsourcing, so we missed the opportunity. An example might be internet banking. We used an outsourced model ... we weren't happy with the responsiveness to deliver on what we asked to meet our business expectations, so we ended up bringing that back in the house. Because of poor performance by that vendor ... we probably had engagement with that partner for ten years, and it was a good relationship to start with" (B2).*

6.3.3.3 External sources of decision-making knowledge at Case B

Both participants agreed that "experience from other organisations and consultants" (B1) had a major impact on the ITO decision-making at Case B. Vendors and media were other sources used to obtain decision-making information and knowledge. Five sources of ITO decision-making knowledge acquisition are discussed next.

A) Peer IT practitioners

A key source of decision-making knowledge was peer IT practitioners who share information, knowledge and lessons learnt from ITO engagement in their affiliated organisations:

"My boss, the [General Manager] of Technology meets with seven of his peers from other institutions, and they talk about what they are doing within their organisation. They share information … [organisations] of similar size and ability that aren't necessarily competing directly with us" (B2).

"Every two months, there is a get together for the CIOs for all the Mutuals – banks our size … It does sometimes guide you, in a sense that someone else has tried and completely failed and then the next person would fail again. It would probably send you down the path of not making that choice … you should learn from other people's mistakes" (B1).

"We are not at the forefront. We are not global leaders, so you can rely on other organisations to hopefully have made the mistakes before you and hopefully deal with it that way" (B1).

"But as far as trying to do best practice, we haven't done anything to say we are trying to align with best practice for outsourcing. We don't necessarily look at it as a best practice … I'd be looking at our peers to say how are they getting an advantage out of outsourcing, compared to how we are doing it? Then I'd look at our environment and location as well" (B2).

B) Consultants

IT consultants were another source of support for practitioners' ITO decision making through their consultancy services and publications. Consultants were perceived to be useful because of their experience-based knowledge gained from working with various clients and up-to-date information about the IT market and current technologies:

"We are looking at replacing our financial management system. We've had that for 33 years now ... we've engaged a specialist person. He's an ex-analyst from Gartner, and he specialises in helping organisations implement those solutions" (B2).

"[Consultants] are very useful. I think there's a lot of knowledge out there. They are the specialists" (B1).

"I read articles on it… it will be Gartner and vendor articles about what other companies have done. Nothing academic" (B1).

One rare example of using the consultancy services of an academic was mentioned by one of the participants:

> *"There is only one example that I know of [using an academic consultant]. Probably ten or more years ago. We had a consultant, she was an academic, wanting to do some research and she offered her services for input. But that's the only example in IT that I can think of" (B1).*

C) IT Vendors/Service Providers

IT Vendors or IT service providers disseminate information about their products and services and new technologies and lessons learnt from implementation:

> *"... then there's probably a lot of common vendors. Vendors would set up sessions between people as well" (B1).*

> *"I don't think any of the managers make decisions based on their own knowledge. But I think we are well positioned because we use vendors and consultants to help us make those decisions" (B1).*

The other mechanism of knowledge/information exchange between vendors (e.g. IBM) and IT practitioners at Case B was through collaboration in pilot projects:

> *"Recently we did some work with IBM. IBM was offering us free support all the way to their senior managers in the US to explore some cloud technology, called 'Bloomings'. They were looking for sites around the world that could look to see if there was a business opportunity where Bloomings get used in ... We were working with them to see if there was a way we could leverage this technology ... that's an example where we might engage with vendors in their new technology and research" (B2).*

D) Mass media organisations

"Online media" (B1) such as web content and content received through mailing list subscription was used by the participants:

> *"For me, my main source is the internet. The email content I receive, or I go off and read about things" (B2).*

E) Sources not used

Training courses and books were not used by the Case B participants to obtain ITO information and knowledge.

6.3.3.4 Use of academic research and perceptions of relevance and benefits of research at Case B

Neither of the participants in Case B read academic research papers and they did not consider themselves an audience for academic research. Lack of awareness about available academic research outputs and poor exposure to research by practitioners were considered as influential factors on the non-adoption of academic research:

> *"I guess its availability. If I look for a way to do something, looking for a policy, you look at your partners and vendors, first of all, then you do research on what they recommend, and you'll end up on ITIL or COBIT website, or something like that. So I guess, as I said, probably the lack of exposure. Where do I find it? I mean, if I went to anybody and said where I find that, nobody would know" (B1).*

One participant believed that academics with practical experience could result in more relevant research:

> *"not without experience. I think working environment is a lot different to studying, or purely academic… I think academic people will have a better understanding to aid us if they had a working history in working environment, experience" (B1).*

Validation of effectiveness of the research outputs through implementation in practice or being endorsed by consultants or vendors was suggested as criteria for relevance:

> *"You need to prove the application of it ... I look at the Gartner ratings. I find a piece of software. I then go to my vendors and say this is what I'm trying to achieve, these are the products I've seen. They will then say: 'well, none of those is good. I've got this one, and I'll show you an example' ... I reckon you'll need a practical example of it working with a vendor because that's where we go" (B1).*

Although participant B2 was familiar with methods of access to academic publications (e.g. Google Scholar), he had never used academic research in his decision making due to the perception of the low practical value of academic research, and because of time impositions to search and find related research reports, the need to take decisions in a limited amount of time:

> *"Time is always the pressing part – you never have enough time to make a choice. So, if you're making a decision … how do find that research paper that you need to help make that decision? That, for me, I've never gone to Google Scholar and said I want to make a decision on that. Google Scholar is an interesting thing anyway ... I haven't used academic research to help me make decisions. Probably because I don't know if it would add value to the decisions I have to make – in my specific circumstance. Not to say that it doesn't, but I don't know, what I don't know" (B2).*

In the perception of the participants, market leaders (not followers) had more potential to adopt research, because of their continuous demand for new knowledge to give them a competitive advantage and their ability to risk more, due to their larger resource base:

> *"I suppose, if I worked for the market leaders, in our industry, maybe they're at the edge where they're looking for the thing that gives them the edge. Whereas, what we're saying is how do we keep up with them? … but are we going to be setting the trend or trying to pick up on what the latest research is helping us do? ... we can look to our peers and say they are already doing it, so how do we keep up? Because they are doing it first, they probably have the amount of money to take the risk. If it doesn't work, they can write it off and move on. Whereas if we make a decision, we need to have a lot of confidence that we aren't going to waste a lot of money and it's going to be a success. It's very rare that we implement a project and then write that project off" (B2).*

6.3.3.5 Summary of Case B findings

ITO decisions in Case B were not based on a formal decision-making process with an established decision model and predefined decision criteria. The ITO decision making was group based and semi-structured overall. The level of structure varied for different ITO initiatives and according to the financial value of the decision. The practitioners did not report any use of academic research in the decision process. The ITO decision making was considered as immature and not comprehensive. Findings from the analysis of case B interview data are summarised in Table 6.12 and Table 6.13

Table 6.12 shows the different sources of ITO decision-making knowledge and the channels of knowledge transfer to practitioners in the view of Case B participants.

Also, participants' reasons for adoption from each source (e.g. benefits) are described in this table.

Table 6.12 External sources of ITO decision-making knowledge at Case B

Source	Channel/ Dissemination Mechanism	Underlying Reason For Adoption
Peer organisations	Community of practice meetings	Learning from experience of others Obtaining current information about other organisations' IT practice Risk reduction
Consultants	Consultancy services Publications	Access to up-to-date information Access to experience-based knowledge Reputation as domain experts
IT Vendors/Service Providers	Events (e.g. seminars) Consultancy services Collaboration on pilot projects	Awareness about state-of-the-art technologies and solutions and market trends Knowledge sharing (lessons learnt from implementation of solutions or dealing with issues) Marketing push
Mass media organisations	online media (e.g. web content, email subscription content)	Access to up-to-date information

Table 6.13 presents a summary of factors that participants accounted as barriers to adoption of academic research in practice, and their suggested solutions for overcoming those barriers.

Table 6.13 Factors inhibiting adoption of academic research at Case B

	Problem	Suggested Solution
Channel of dissemination	Awareness: Practitioners do not read academic papers (even when they have access) Perception that 'leading organisations are audience of research'	Dissemination through practitioners' media to increase visibility and awareness of academic research Collaboration with leading organisations
Relevant research for practitioners	Practitioners do not see themselves as the audience for academic research and perceive academic research less relevant because of being theoretical rather than experiential and evaluated in practice.	Conducting research that satisfies the practitioners' relevance criteria: - Evaluated and validated in practice - Endorsed by leading consultants or vendors.
Dissemination effort	- Practitioners' time limitation to find relevant research	

6.3.4. Case C

The third case study was conducted at the Australian branch of a large multinational food manufacturing company in September 2015. A brief overview of Case C is provided in Table 6.14.

Table 6.14 Overview of case C organisation

Type/Sector	Non-Government/ Food Product Manufacturing
Number of employees	2150 in Australia (Global 16000*)
Number of employees in ICT Department	38 (Full-time equivalent)
Areas of ITO	☒ Software development and maintenance ☒ Hardware maintenance and support ☒ Telecommunication and network ☐ IT/IS Planning and Management ☒ Cloud services (infrastructure, application, platform)
ITO model	☐Single sourcing ☒ Multi-sourcing

* Source: company's Annual Report 2014

The two senior IT managers of Case C who participated in the interviews had on average more than 27 years' experience in the IT field and more than 16 years in ITO decision making. Table 6.15 shows the demographic summary information of the participants.

Table 6.15 Demographic information of Case C participants

		Interviewee 1	**Interviewee 2**
Position		CIO	Technical Manager
Education		Advanced Diploma	Bachelor Degree
Graduation Year		2000	1994
Gender		Male	Male
Work experience (Years)	**In the organisation**	4.5	38
	In ICT field	17	38
	With ITO decisions	12	20

6.3.4.1 ITO decision-making process at Case C

In Case C, no formal decision model was used in the ITO decision-making process, and the decision-making criteria were not documented in the organisational procedures. ITO decisions were made through the general procurement process:

> *"We have tender processes that we use formally on larger complex pieces of work ... As an example, we did BI [Business Intelligence System] vendor selection a few years ago, and that was quite a formal process using a standard procurement process of tendering. But there's no formal outsourcing process we use, other than that" (C1).*

> *"Decision is based on what makes sense, what is the core that you want to have in-house to look after" (C2).*

The influence of contingency factors on ITO decisions was emphasised by one of the participants. For instance, even for one type of decision such as software development outsourcing, the decision was different according to the type of software:

> *"Why would you hire a bunch of developers in a manufacturing company to build a website? That makes no sense. But it makes sense to hire a bunch of people in IT to look after the manufacturing systems and processes … so I have an insource functional analyst team" (C1).*

In addition, strategic factors (e.g. ability to innovate, and protection of intellectual property), as well as political factors (e.g. preferences of different stakeholders), were influential factors on IT decisions:

> *"That's what drove the decision to this outsourcing arrangement, not necessarily cost, not necessarily a capacity or skills gap, but its ability to innovate and bring new things to the customer and look at things in a different way and service those and add additional capability" (C1).*

> *"We are also mindful of the level of intellectual property that we built up over the years and if we want to lose that or not, and our capability to understand what we've done in the past as well" (C1).*

In addition, the involvement of political factors in sourcing decisions increased the complexity of ITO decision-making at Case C:

> *"There's a political factor involved in outsourcing as well … our head office is sitting in France and what vendors we can select. There is some bias towards [certain] vendors because globally they have relationships" (C1).*

Furthermore, the decision criteria could be different for different stakeholders in the organisation:

> *"The CFO here, he looks at the way Australia operates … whereas in Europe, they don't have chargebacks ... So, we have to explain to two different groups" (C2).*

The CIO of Case C emphasised the strategic impact of ITO decisions and the influence of his personal strategic view on the ITO decisions:

> *"I would not outsource a Help Desk as an example. Not because I think it can't be done from an outsource perspective cheaper, but I'm sure it can be, but we lose our identity. We are judged on how we support our systems and processes … Then we lose visibility, lose touch with what's going on in the world … that's my personal view, and I will never outsource the Help Desk for that reason. But other companies have done it semi-successfully, but I think long term, I see companies outsource it then bring it back in when they have a change of management" (C1).*

As Table 6.16 shows, there was a high level of consensus between the two participants that the ITO decisions at the case organisation were typically semi-structured.

Table 6.16 Perceived degree of structure of different ITO decisions at case C

IT Service/Function		**Fully Structured**	**Highly Structured**	**Semi-Structured**	**Less Structured**	**Not Structured**
Software development and maintenance				C1 C2		
Hardware maintenance and support			C2	C1		
IT Help Desk/end-user support			C1	C2		
Telecommunication and network			C1	C2		
IT/IS Planning and Management			C1 C2			
Cloud services	Infrastructure as a service			C1 C2		
	Application as a service		C1	C2		
	Platform as a Service			C2	C1	

As shown in Table 6.17, different ITO decisions were perceived to have different degrees of complexity.

Table 6.17 Perceived degree of structure of different ITO decisions at Case C

<table>
<tr><th colspan="2">IT Service/Function</th><th>Not Complex</th><th>Low Complexity</th><th>Average Complexity</th><th>High Complexity</th><th>Very High Complexity</th></tr>
<tr><td colspan="2">Software development and maintenance</td><td></td><td>C1</td><td>C2</td><td></td><td></td></tr>
<tr><td colspan="2">Hardware maintenance and support</td><td></td><td>C1
C2</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">IT Help Desk/end-user support</td><td></td><td></td><td>C1
C2</td><td></td><td></td></tr>
<tr><td colspan="2">Telecommunication and network</td><td></td><td>C2</td><td></td><td>C1</td><td></td></tr>
<tr><td colspan="2">IT/IS Planning and Management</td><td></td><td>C2</td><td></td><td>C1</td><td></td></tr>
<tr><td rowspan="3">Cloud services *</td><td>Infrastructure as a service</td><td></td><td>C1</td><td></td><td></td><td>C2</td></tr>
<tr><td>Application as a service</td><td></td><td></td><td>C2</td><td></td><td>C1</td></tr>
<tr><td>Platform as a Service</td><td></td><td></td><td>C2</td><td>C1</td><td></td></tr>
</table>

6.3.4.2 Accuracy and comprehensiveness of ITO decision-making

Participants believed that when the outsourcing decision was about "pioneering" (C2) sourcing options such as cloud computing, the required decision-making knowledge was lacking in the organisation:

> *"There's a real lack of knowledge about how those types of engagements [cloud sourcing] work, so there's a bit of a fear around using those types of services in general. But once you have that knowledge, or you've used those services before, it becomes quite an easy decision" (C1).*

Nevertheless, the ITO decision-making knowledge obtained from past experiences was perceived to provide a satisfactory level of decision accuracy:

> *"I wouldn't say [our decision making is] comprehensive. I would say [it is] accurate, as we know how to do. Again, it comes down to base knowledge and experiences from the past in outsourcing ... if you've used them before and you know how their engagement works, it's quite a simple process you do that. Whereas if you don't know how it works, there is a fear of trying to spend a lot of effort" (C1).*

6.3.4.3 External sources of decision-making knowledge at Case C

A "mix of different sources" (C1) was used by participants to obtain decision-making knowledge and information, in addition to the "inherent knowledge" (C1) of individuals in the organisation, as outlined in this section. Five sources of ITO decision-making knowledge acquisition are discussed next.

A) Peer IT practitioners

Peers were a primary source of decision-making knowledge and information for Case C participants, because of the opportunity to learn from their experiences:

> *"Personally I have a peer network of like-minded individuals, CIOs, in the industry that I've known over many years that I lean on for advice if they've done it before. Definitely, to me, that's more powerful than anything you read in online media or research or so on because these people have experienced it first-hand. They know the trials and tribulations beyond just the academic approach to that ... It purely goes on the outcome of that decision" (C1).*

> *"We take our lead probably from what other companies have done, or are doing and what success they're having ... we look at other companies, other clients and other areas in the business or like-minded business who have done a similar thing" (C1).*

The mechanisms of communication were formal or informal meetings (C1), conferences, and seminars (C2).

Even the underlying usefulness of conferences, symposiums or workshops (e.g. events organised by large IT consultancy firms) was considered networking and sharing the experience with peers, rather than training:

> *"Conferences are useful but not from a content point of view. They're more useful for meeting people there and chatting over coffee and in a coffee break have you done this, have you done that? So that's probably where they're more relevant. The topics themselves are quite superficial" (C1).*

> *"When I've gone to a Gartner symposium, for example, they do run workshops … but more or less, those workshops are around presenting an analyst's research and having people in the room validate or share experiences around that topic. So probably less on the training" (C1).*

The CIO of Case C described seeking knowledge from peers as a "universal way of sharing information and making decisions and getting peer input" (C1) among IT managers:

"I think it does happen around the world. I just came back from France,... global CIOs ... come together in Paris ... so, I think it's not just an Australian way of doing business" (C1).

B) Consultants

Both participants mentioned using consultants as a source of knowledge and information (e.g. market information):

"In the past, we have used Gartner as times ... we have used them for advice, or some of their analysts to see what is happening in the market" (C1).

Saving time and faster access to the required information and knowledge was the main reason to use consultants for one of the participants:

"[We used consultants] mainly for cloud services ... this particular consultant had knowledge on Amazon web services and their costing ... but it might have taken me 4 or 5 months to work it out. Whereas I wanted to know an answer fairly quickly because we had to make a decision with what we were doing here. You can do it all yourself, but you can't wait ... Get the people who have done it and learn from them ... It's that speed and agility ..." (C2).

One participant believed that top consultancy firms "are part of the help, but they are not the main help" (C2) because the knowledge and information they provide is just a summary of what they collected from practitioners (not original and visionary contribution):

"They engage and interview with many and then it's a sum, and they come up with an idea. So, the thing is, do we follow the herd? No, we make our own decisions. They are part of the help, but they are not the main help. So they give us a guide. They used to give us probabilities ... let's say we go back ten years and they say cloud services are coming… and then they had the probability it would happen or not. They've dropped off that sort of thing. Now they've taken a different approach. They regurgitate what they have found when speaking to CEOs around the world, and then they come up with their analysis. ... Are they visionary? Are they leaders? Are they falling behind?" (C2)

C) IT Vendors/Service Providers

IT vendors were another source that communicates their information/knowledge through "webinars, workshops, seminars, conferences" (C2):

> *"There are vendors in the space that you often lean on to understand how various solutions will work" (C1).*

> *"Generally the vendors themselves have a lot of information" (C2).*

> *"They [vendor] did a webinar. Webinars are great" (C2).*

D) Mass media organisations

Participants used online media (C2) or social media (C1) as a useful source:

> *"Online is important to get what visibility is in the market because that's a very up to date process. Social media is becoming a lot more [important], especially with LinkedIn and the sharing of knowledge that's going on on LinkedIn. Some of those groups have quite thorough discussions on topics, and you get a very wide perspective on what's happening in the industry. That's quite a good source of, I wouldn't say vetted knowledge, but it gives you an understanding of where to start with what you're looking at" (C1).*

E) Sources not used

Books were not used because they were perceived to be incomprehensive to support decision-making due to lack of detailed and contextual information. Also, books were perceived unable to be kept updated with the fast changes in IT market: "books get out of date quickly" (C2) and do not cover the detailed situational information about the decision-making case they report:

> *"even books you read don't cover the ancillary information that is impacted by that decision you've made" (C1).*

6.3.4.4 Use of academic research and perceptions of relevance and benefits of research at Case C

Neither of the participants read academic research and they did not consider themselves as the audience for academic research:

> *"Academic research? No. Not really" (C2).*

Academic research was perceived to be useful more for leading organisations and not proved effective in practice:

> *"If you're a leader in the field, you are probably looking at academic research. But we don't all need to be leaders in the field … We don't need to be those people on the leading edge of technology … or proving things that may or may*

> *not work ... we're sort of not a leader, but we're not a complete follower either. We are sort of somewhere in between ... So, I think for us, it's more about looking at what's tried and true and what has worked for other companies" (C1).*

The timeliness of research outputs was considered as a relevance criterion (C1, C2):

> *"If, and only if, the research keeps up pace with what is happening the industry ... the days of spending years on a research topic and then releasing a research paper are gone ... because the market is moving so quickly and the different options available become irrelevant quickly" (C1).*

> *"It's speed to get it delivered. Because if it takes too long, it's gone past. It's got to be up to date" (C2)*

The pace of change in IT industry was considered to make some of the decision aids (e.g. new sourcing models resulting from new technologies) rapidly outdated:

> *"Even some of the Gartner models used in the past, probably aren't as relevant today. ...Those days if you wanted to develop a website, you'd hire developers, or you'd outsource that development work ... These days ... you can buy pre-built websites" (C1).*

Other relevance criteria were "proven through practical application" and "easy to understand and implement" (C2):

> *"Look at ITIL [IT Infrastructure Library] as a good example ... it's quite a practical framework that can be used or leveraged. So, whereas with academic [frameworks], it tends to be a lot of this - interviewing of understanding what's happening, but the feedback loop doesn't come back from the practical application of that" (C1).*

> *"Research and models that come out of that [academia] need to be shown how to be practical and applicable ... even Gartner doesn't get it right either. You look at the supply/demand strategy model. I've found very few individuals that apply that because it's quite a tricky model to apply outright because there's not much practicality. So, I think it's about ensuring that people understand how it's applied ... people like me will use that tool if it does provide a clear and easy to understand directive in how to achieve an outcome. In my mind, there is a very distinct gap between academia and business today ... the curriculum is slowly catching up to where industry has been heading" (C1).*

> *"Do I believe the guy who's done all the research and written a model or do I believe the guy who's actually done it? I'm going to go to the guy who's done it and ask what challenges did you have? How did you get it to work? Are you getting benefit out of it? That's really where the value comes in" (C1).*

Generalised decision models were conceived to be less useful because of the complexity and contingency nature of ITO decisions:

> *"… the decision making becomes quite different in both [manufacturing and service sectors]. And I think that's where a lot of models try to generalise too much. So they come with this big model and say this model applies when in fact there are all different levels" (C1).*

> *"It's such a wide area; it's very difficult to put rules around a lot, especially in the IT area as it is such a complex area to deal with … those particular areas all have different factors that affect how you make those decisions. They're not always obvious until you launch into the process of selection either" (C1).*

Crossing the boundaries of academia and business, and academics' collaboration with practitioners in the implementation of research results was suggested as a promising solution to increase adoption of academic research:

> *"I think the next step is to step into the boundaries of business, on both sides, so there are a closeness and understanding. So, they can work together for an understanding of how these models potentially do get applied. Once it's proven and it does get done, I guess when you have business able to articulate to other businesses. That makes sense. That's the model we are using and try to share this information" (C1).*

6.3.4.5 Summary of Case C findings

In Case C ITO decision making was considered strategic and complex with several contingency decision factors. ITO decision making was not formal, with no established decision model or pre-defined decision criteria. The ITO decision making was group based and semi-structured overall.

The level of structure varied for different ITO initiatives and according to the financial value of the decision. No use of academic research literature/outputs was mentioned in the ITO decision process. Participants felt the lack of comprehensive knowledge for making inexperienced decisions particularly about new sourcing models such as cloud sourcing. Table 6.18 and Table 6.19 provides a summary of the analysis of Case C interview data.

Table 6.18 summarises the channels of knowledge transfer to practitioners, and the underlying reasons for adoption from the different sources of ITO decision-making knowledge.

Table 6.18 External sources of ITO decision-making knowledge at Case C

Source	Channel/ Dissemination Mechanism	Underlying Reason For Adoption
Peer IT practitioners	Formal or informal meetings with a peer network of individuals (CIOs) Symposiums Conferences Workshops	Learning from the experience of others Obtaining current information about other organisations' IT practice Risk reduction Save time and resources
Consultants	Consultancy services Publications Events (symposiums, workshops …)	Access to up-to-date information Access to decision-making knowledge Speed and agility in decision making
Vendors	webinars workshops seminars conferences	Awareness about state-of-the-art technologies and solutions and market trends Knowledge sharing
Mass media organisations	online media/social media (e.g. LinkedIn)	Obtaining a broad perspective on current topics in IT market.

Table 6.19 presents a summary of potential inhibiting factors of academic research adoption in the view of Case C participants, and their suggested solutions for overcoming those barriers.

Table 6.19 Factors inhibiting adoption of academic research at Case C

	Problem	Suggested Solution
Channel of dissemination	Awareness: Practitioners do not read academic papers (even when they have access) Perception that ‘leading organisations are audience of research’	
Relevant research for practitioners	Practitioners do not see themselves as the audience for academic research and perceive academic research less relevant because: - it is theoretical rather than experiential and evaluated in practice - lacks timeliness - it is over generalised	Conduct research that satisfies the practitioners’ relevance criteria: - timely dissemination - agile research (to cope with fast changes in IT field) - evaluated and validated in practice Improve ease of understanding Researcher collaborate with practitioner for implementation of research Conduct context-specific research
Dissemination effort		Marketing of academic research outputs (push to market) to increase its visibility and awareness

6.3.5. Case D

The fourth case study was conducted in a local government organisation in Queensland (see Table 6.20 for more details). The Manager of ICT and Manager of Application Services were interviewed individually in September 2015. The two managers had on average 27 years of experience in the ICT field and more than 12 years of experience in ITO decisions.

Table 6.20 Overview of case D organisation

Type/Sector	Local Government Body
Number of employees	1,500
Number of employees in ICT Department	51 (Full-time equivalent)
Areas of ITO	☒ Software development and maintenance ☒ Hardware maintenance and support ☒ Telecommunication and network ☐ IT/IS Planning and Management ☐ Cloud services (infrastructure, application, platform)
ITO model	☐Single sourcing ☒ Multi-sourcing

Table 6.21 provides the demographic information summary of the participants.

Table 6.21 Demographic information of case D participants

		Interviewee 1	Interviewee 2
Position		Manager of ICT	Manager of Application Services
Education Level		Master Degree	Bachelor Degree
Graduation Year		2011	2003
Gender		Male	Male
Work experience (Years)	**In the organisation**	4 months	20
	In ICT field	30	24
	With ITO decisions	20	5

6.3.5.1 ITO decision-making process at Case D

There were no established or formalised processes for ITO decision-making at Case D:

> *"When we prepare our business cases and project initiation for consideration for that governance group, we need to be specific about scope, our outcomes and a whole number of factors around that, including financials. In considering the financials, there has to be some review of the sourcing models ... We don't have any established rules at this point in time, but I think we are duty bound to include some form of analysis in that respect" (D1).*

ITO decisions were highly affected by "the budgetary process of the organisation", and political factors such as "reputational issues". The procurement policy of Case D was "favoured for the local procurement" (D1). Outsourcing of "new implementation[s], or service[es]" was a preferred strategy to prevent an increase in the government size, because it was perceived that "it's enough of a burden now on the rate payer" (D1). However, for outsourcing of decisions about current in-house infrastructure and services, protecting the job security of the current employees had a higher priority over the other factors such as cost:

> *"The local government environment is quite unique in that an awful lot of local engagements are in commitment and anything that would put at risk employment positions, within Council, would be considered by Council themselves" (D1).*

> *"From a Council perspective, every member of staff is effectively an investment in the community. There're wages going into the local community; they're being serviced by the local community. Whereas if you buy services in, it may not have the same local aspect to it, and that's very crucial to a Council" (D1).*

As Table 6.22 shows, there was no specific decision-making process in place for cloud sourcing. The two participants concurred that the decisions about outsourcing *hardware maintenance and support* are highly structured at the case organisation. Other traditional ITO decisions were rated semi-structured to non-structured.

Table 6.22 Perceived degree of structure of different ITO decisions at case D

IT Service/Function		**Fully Structured**	**Highly Structured**	**Semi-Structured**	**Less Structured**	**Not Structured**
		High knowledge & Established procedure				**Less knowledge & no established procedure**
Software development and maintenance				D1	D2	
Hardware maintenance and support			D1 D2			
IT Help Desk/end-user support					D2	D1
Telecommunication and network			D2		D1	
IT/IS Planning and Management				D1		D2
Cloud services *	**Infrastructure as a service**					
	Application as a service					
	Platform as a Service					

* No decision-making process for cloud sourcing

As shown in Table 6.23 different ITO decisions were perceived to have different degrees of complexity depending on the type of IT. There was a consensus among participants that decisions about outsourcing *IT Help Desk/ end-user support*, and adoption of the *application as a service* model are highly complex.

Table 6.23 Perceived degree of structure of different ITO decisions at case D

IT Service/Function		**Not Complex**	**Low Complexity**	**Average Complexity**	**High Complexity**	**Very High Complexity**
Software development and maintenance		D1		D2		
Hardware maintenance and support			D1 D2			
IT Help Desk/end-user support					D1 D2	
Telecommunication and network				D1 D2		
IT/IS Planning and Management			D1			D2
Cloud services	**Infrastructure as a service**		D2	D1		
	Application as a service				D1 D2	
	Platform as a Service			D2	D1	

6.3.5.2 Accuracy and comprehensiveness of ITO decision-making at Case D

Both participants confirmed the lack of a comprehensive ITO decision-making process at Case D and believed that "having a more structured [ITO] decision process could have resulted in better decision" (D2). The Manager of ICT described some of the problems Case D experienced in its ITO initiatives.

> *"We had one particular outsourced service arrangement, that whilst it's probably meeting 80 percent of our needs, we have real problems in terms of the ability to change the service levels within it. ... Secondly, the cost implications haven't been forecasted accurately for growth ... consideration of the possibilities of fluctuation of normal operating processes over time [was another problem]. Another contract we have ... we have no key performance metrics around a certain area that really wasn't heavily utilised at the time the contract was initially implemented" (D1).*

> *"I don't think we have a good handle on the metrics around the services we deliver ... when we make a decision… I'm not sure if the metrics are right to help us. We don't have a good evidence-based decision-making process" (D1).*

6.3.5.3 External sources of decision-making knowledge at Case D

Five sources of ITO decision-making knowledge acquisition are discussed next.

A) Peer IT practitioners

Peers from similar government organisations were a source of sharing information and knowledge through formal meetings and informal communications. For the Manager of ICT the "first and foremost" type of decision-making knowledge was "how are other people doing it" (D1).

> *"[There is] the South East Queensland Chief Information Officer Network for local government and we meet quarterly and rotate around the organisations. It's really to talk about what's happening at each site. What developments they have under way and how they are going to market this, that and the other and looking to information to share and gain support ... we are a small group of professionals who have known each other for many years, and we have those informal opportunities as well" (D1).*

The benefits of communication with peers were lessons learnt from others' experience and identification of pioneers in different specialisations.

> *"It does give the opportunity to consider your chosen path and then compare with the lessons learnt of other sites. You quickly develop an understanding of who is forging ahead in certain areas that you're interested in. You've got the opportunity to go and speak with them and conduct a very informal case study in comparison to your own environment" (D1).*

Participant D2 had less communication with external peers. Instead, seeking advice from his colleagues (within the organisation) was a source of improving decision-making knowledge.

B) Consultants

A diverse range of IT consultants (both firms and individual) was the source of support for ITO decision making in Case D.

> *"We use them for initial terms of strategy development ... [for] scoping and design ... for initiation and deployment and transition ... if we are going external, what are the things we need to consider and how do we take it to market?" (D1).*

> *"There's generally a healthy footprint of the big four [consultancy firms]. The KPMG and so forth ... [and] there's a number of local firms that have been engaged in the past" (D1).*

Also, consultant publications such as "market analysis report" (D1) and Gartner's reports (D2) were used by Case D participants. However, one participant described consultant's models (such as Gartner's magic quadrant) as something...

> *"that everyone likes to promote to you", but "there is the uncertainty of capability for that solution" (D1).*

C) IT Vendors/Service Providers

One participant used "industry publications such as … market and vendor publications". However, he was cautious about their potential bias:

> *"I look at them with care. First I look to author's affiliation to see how fair it is" (D2).*

Some IT service providers provided not only information (e.g. market trends) but also consulting services to Case D:

> *"There are a number of integrators that have consultancy arms ... And there are niche specialists. Small companies and individuals that assist us" (D1).*

> *"Market informs you as to what the trends are ... that's not to say you are reactionary to the market, but you look to see what is happening in that space" (D1).*

D) Mass media organisations

Both participants mentioned the use of "market publications" (D1; D2):

> *"Market informing us we need to consider the size and sustainability of the provider. That might be a really shallow comparison, but if the market is telling us that's what's picking up the market share, we need to do some analysis as to why and ensure that analysis is included in our decision making" (D1).*

6.3.5.4 Use of academic research and perceptions of relevance and benefits of research

One of the participants (D2) was not a reader of academic research publications and did not consider himself as an audience of academic research. The other participant (D2) read academic research "from time to time, but definitely not regularly" (D1), although not specifically ITO research. Academic research was perceived more relevant for "early adopters":

> *"Because we are not at this competitive edge, you don't get a lot of research analysis back here" (D1).*

The push force behind frameworks and standards (e.g. rules that mandates use of them) was perceived to increase their visibility and subsequently their popularity and adoption:

> *"Probably something as simple as popularity and visibility. For example, if you have a look at some of the frameworks, they are generated out of the UK and have a mandated application against certain sectors of the UK. There's a perception [that] it has some suitability to the same environment in Australia, so we should be using it" (D1).*

To be relevant, research outputs were expected to consider contingency factors:

> *"... Council considers an employee [as] an investment in the community ... So if you have a prescriptive approach that ignores that sentiment, then it's not necessarily going to have application" (D1).*

Although participant D2 did not read academic research, his perception of the potential impact of academic research on practice was positive “because they [academics] can provide fair and unbiased view”, as opposed to the possible bias of the information received from vendors, consultants and mass media. Other inhibiting factors against adoption of academic research were poor “awareness” (D2) or poor “popularity and visibility” (D1) of academic research outputs and “time constraint” of practitioners to search and find research publications (D2). Other criteria for relevant and practicable decision models were being “easy to understand and implement” (D2) and “tried and tested” (D1).

In the view of both participants, collaborative research with practitioners was a promising way for increasing relevance and adoption of academic research.

6.3.5.5 Summary of Case D findings

ITO decision making was affected by government rules and regulation and socio-political factors such as protecting the organisation’s reputation and supporting the local community. ITO decision making was not formal, with no established decision model or pre-defined decision criteria. The level of structure varied for different ITO initiatives. No use of academic research literature/outputs was found in the decision process. Participants reported the lack of a comprehensive, evidence-based decision-making process. Table 6.24 and Table 6.25 summarise the analysis of Case D interview data. Table 6.24 summarises the channels of knowledge transfer to practitioners, and the underlying reasons for adoption from the different sources of ITO decision-making knowledge discussed by Case D participants.

Table 6.24 External sources of ITO decision-making knowledge at Case D

Source	Channel/ Dissemination Mechanism	Underlying Reason For Adoption
Peer IT practitioners	Formal or informal meetings with peers	Learning from experience of others Identification of pioneers in different domains of expertise Obtaining current information about other organisations’ IT practice
Consultants	Consultancy services Publications Events (e.g. symposiums)	Access to up-to-date information (e.g. market trends) Access to decision-making knowledge
Vendors	Publications Consultancy services	Awareness about state-of-the-art technologies and solutions and market trends Marketing push
Mass media organisations		Access to decision-making information such as size and sustainability of IT providers

Table 6.25 provides a summary of potential inhibiting factors of academic research adoption in the view of Case D participants, and their suggested solutions for overcoming those barriers.

Table 6.25 Factors inhibiting adoption of academic research at Case D

	Problem	Suggested Solution
Channel of dissemination	Awareness: Practitioners do not read academic papers (even when they have access) Perception that "leading organisations are audience of research"	Dissemination through practitioners' media Collaboration with leading organisations
Relevant research for practitioners	Practitioners do not see themselves as the audience for academic research and perceive academic research less relevant because: - It is theoretical rather than experiential and evaluated in practice - lacks timeliness - does not consider contingency factors	Criteria for relevant research: - timely dissemination - evaluated and validated in practice - easy to understand and implement - customised research for specific settings Researcher collaborate with practitioner for implementation of research
Dissemination effort	Push forces (e.g. legislation or marketing push) affects popularity and adoption of frameworks, etc.	Marketing for academic research outputs (push to market) to increase its visibility and awareness.

6.3.6. Cross-case analysis

6.3.6.1 ITO decision-making process

The ITO decision-making process had different levels of structure across the four Case organisations and for different ITO initiatives.

The eight participants from the four Case organisations expressed different views on the complexity level of ITO initiatives as shown in Table 6.26. Nevertheless, the average level of complexity was higher and more divergent about the complex nature of cloud sourcing options. The finding showed that the participants perceived a lack of decision-making knowledge was higher about the emerging sourcing models, i.e. cloud sourcing. The highest level of consensus among participants on the level of complexity among different types of ITO decisions was on "Hardware maintenance and support" sourcing decisions.

Table 6.26 Summary of participants' perceived degree of complexity of different ITO decisions

<table>
<tr><th colspan="2">IT Service/Function</th><th>Not Complex</th><th>Low Complexity</th><th>Average Complexity</th><th>High Complexity</th><th>Very High Complexity</th></tr>
<tr><td colspan="2">Software development and maintenance</td><td>D1</td><td>C1</td><td>B2
C2
D2</td><td>A2
A1
B1</td><td></td></tr>
<tr><td colspan="2">Hardware maintenance and support</td><td></td><td>A2
B1
B2
C1
C2
D1
D2</td><td>A1</td><td></td><td></td></tr>
<tr><td colspan="2">IT Help Desk/end-user support</td><td>B2</td><td></td><td>A1
B1
C1
C2</td><td>A2
D1
D2</td><td></td></tr>
<tr><td colspan="2">Telecommunication and network</td><td></td><td>A2
B2
C2</td><td>A1
B1
D1
D2</td><td>C1</td><td></td></tr>
<tr><td colspan="2">IT/IS Planning and Management</td><td></td><td>B2
C2
D1</td><td>A1</td><td>A2
B1
C1</td><td>D2</td></tr>
<tr><td rowspan="3">Cloud services *</td><td>Infrastructure as a service</td><td></td><td>A1
C1
D2</td><td>A2
D1</td><td>B1</td><td>C2</td></tr>
<tr><td>Application as a service</td><td></td><td>A1</td><td>B1
C2</td><td>A2
D1
D2</td><td>C1</td></tr>
<tr><td>Platform as a Service</td><td></td><td>B1</td><td>A1
C2
D2</td><td>A2
C1
D1</td><td></td></tr>
</table>

* One participant (B2) did not rate cloud sourcing items

6.3.6.2 Accuracy and comprehensiveness of ITO decision-making at the Case organisations

In each of the four Case organisations, the ITO decision-making process was not perceived comprehensive and optimal. The participants reported some instances of ITO decisions that had created problems or resulted in the loss of opportunities for their organisations. The feeling of a lack of decision-making knowledge was reported mainly about *bleeding-edge* technologies and sourcing options such as cloud computing because of lack of experience with those decisions. Establishment of a formally structured decision process was considered potentially useful to prevent erroneous IT sourcing decisions and to enhance the effectiveness of ITO decision making (A1; D2).

6.3.6.3 External sources of decision-making knowledge

The analysis of the interviews revealed consistent agreement across the Case organisations and interview participants that ‘Peer IT practitioners’ e.g. CIOs of other organisations, ‘IT consultants’ referring both to firms (e.g. Gartner) and individuals, ‘IT vendors/service providers’ and ‘Mass media organisations’ were the main external sources of ITO decision-making knowledge and information for the IT practitioners who participated in the interviews. As shown in Table 6.27 the sources of acquisition of ITO decision making and knowledge were similar and consistent across the four studied organisations.

Table 6.27 External sources of ITO decision-making knowledge and information for practitioners

	Case A		Case B		Case C		Case D	
	A1	**A2**	**B1**	**B2**	**C1**	**C2**	**D1**	**D2**
Peer IT practitioners	✔	✔	✔	✔	✔	✔	✔	
Consultants	✔	✔	✔	✔	✔	✔	✔	✔
IT Vendors/Service providers	✔	✔	✔	✔	✔	✔		✔
Mass media organisations	✔	✔	✔	✔	✔	✔	✔	✔

The most beneficial type of knowledge to support practitioners’ decision making was experienced-based knowledge for example lessons learnt from the success or failure of implementation of ITO initiatives. The information and knowledge disseminated to IT practitioners through various channels of communication and mechanisms are outlined in Table 6.28. Peer IT practitioners and consultants were reported as the primary sources of decision-making knowledge and information.

Table 6.28 Summary of dissemination mechanisms and underlying reasons for adoption of knowledge and information for the eight participants

Source	Channel/ Dissemination Mechanism	Underlying Reason For Adoption
Peer IT practitioners	**Community of practice meetings (e.g. CIO forums):** • formal and informal meetings,) • face to face or online **Networking in professional events** • Symposiums • Conferences • Workshops	• Learning from experience of others • Obtaining current information about other organisations’ IT practice • Risk reduction • Saves time and resources • Identification of pioneers in different domains of expertise (domain experts) • Following practice of market leaders (Bandwagon effect)

Consultants	• Consultancy services • Publications • Events (symposiums, summits …)	• Access to up-to-date information (e.g. state-of-the-art technologies, solutions, market trends) • Access to experience-based knowledge • Reputation as domain experts • speed and agility in decision making (saving time) • Marketing push • Following practice of market leaders (Bandwagon effect)
IT Vendors/Service Providers	• Seminars • Webinars • Conferences • User group forums • Publications in practitioners' media • Collaboration on pilot projects • Consultancy services	• Awareness about state-of-the-art technologies, solutions, market trends • Knowledge sharing (lessons learnt from implementation of solutions or success/failure information) • Marketing push
Mass media organisations	• Online media (the web, email subscription content, social media) • Offline media (e.g. IT sections of newspapers)	• Access to up-to-date information and wide perspective on current topics in IT market

6.3.6.4 Use of academic research and perceptions of relevance and benefits of research

Of the eight IT managers who participated in the research interviews, seven did not read academic research papers and did not consider themselves as an audience for academic research. One participant (D1) read academic research papers occasionally but not ITO research literature. In the view of all participants, academic research was not a suitable source to inform IT practitioners' decision making and they reported several reasons for non-adoption of academic research, summarised in Table 6.29.

Table 6.29 Factors leading to non-adoption of academic research by IT practitioners

		Case A		Case B		Case C		Case D	
Category of Reasons	**Reason For Non-Adoption**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**D1**	**D2**
Perceived Attributes of Academic Research	Not proved to be applicable and effective (evaluated in practice)			✔	✔	✔	✔	✔	
	More suitable for leading organisations (early adopters) than followers			✔	✔	✔		✔	
	Lack of timeliness (Not up-to-date)	✔	✔			✔	✔		
	Too generalised and fails to consider contingency factors					✔		✔	
	Nature of research is theoretical, not practical	✔	✔	✔			✔		
	Academic research studies historical phenomena and has limited ability to offer advice on emergent issues	✔	✔						
Dissemination & Awareness	Poor dissemination (e.g. poor marketing, not via practitioners' media)		✔			✔		✔	
	Poor awareness about available research outputs		✔	✔	✔			✔	✔
	Time and resource constraint of practitioners to find and analyse literature	✔	✔		✔				✔

6.4. Analysis of consultants' interviews

As noted in the literature review (§2.2) IT consultants are one of the key parties involved in ITO initiatives. From this study's perspective, IT consultants are one of the potential users of academic ITO decision support research. In other words, academic research may be adopted by consultants and then they could utilise the adopted research-generated knowledge to support organisations in their ITO initiatives. Hence, the views of IT consultants were investigated in this study. Three consultants from leading IT consulting companies were interviewed in this study to identify the possible use of academic ITO research by IT consultants, their perceptions of the relevance of academic research to practice and the role they play in supporting organisations with their ITO decisions.

6.4.1. Data collection process for consultants' interviews

The first consultant was introduced by the principal supervisor. The name of the second consultant was found on the CIO.com website along with his quote on a data-driven approach to ITO decision making. After a background search on the web, it was found that he was the CEO of a private IT consultancy company that specialised in ITO and has given advice to several US government departments on their ITO strategies, thus could be a well-suited participant. These two interviews were conducted by video conference via Zoom software, recorded and then transcribed. Each of these two interviews took approximately one hour. Because Gartner is one of the leading IT consulting firms in the world and it was the most frequent consulting firm that IT practitioners mentioned in the interviews, the third participant selected was one of Gartner's senior research analysts. Three of Gartner's senior analysts whose main field of work was "Outsourcing & IT services" were identified from the list of Gartner analysts on the Gartner website[8] and were invited via email to participate in an interview. After the second follow-up email, one of the three invitees agreed to participate in a telephone interview but did not consent for the interview to be audio-recorded. Hence, during the telephone interview, I took notes of the responses. The telephone interview took approximately 45 minutes. The Gartner participant also provided some of Gartner's internal documents to clarify Gartner's approach to ITO research, but due to their confidentiality, these documents are not used directly in this thesis. The interview questions are provided in Appendix B.3. Demographic information of these three participants is provided in Table 6.30.

Table 6.30 Demographic information of the consultant interviewees

	Consultant 1	Consultant 2	Consultant 3
Company/Years of work in the company	Fujitsu, Japan (2.5 years) Previous work: Fujitsu, Australia (4 years) Gartner (12 years)	CEO of Private IT consulting company, USA	Gartner, Australia (15 years)
Country	Japan	USA	Australia
Education	MBA (1996) DBA Student	MBA (1991)	Bachelor Degree (1974)
Gender	Male	Male	Male
IT consultancy experience (Years)	18	20	20

6.4.2. Use of academic research by IT consultants

Academic research was seldom used by the three IT consultants and their companies (e.g. Gartner). Instead, IT consultants usually have developed their own decision

[8] http://www.gartner.com/analysts/coverage

methodology and models mainly based on their own experience of working with various client organisations over the years and their own research:

> *"None of the consulting firms I know use anyone's processes or models other than the one they develop themselves ... Big companies like KPMG have a complete outsourcing practice, and they've developed their own models on how to advise clients to outsource or not" (Consultant 1).*
>
> *"Even a small [consulting] company may have done more than 100-120 consulting engagements in the last 15 years ... so they've got 10-15 cases in each area [(sector)] and they know what worked and what didn't" (Consultant 1).*
>
> *"We use a data-driven methodology which has literally 60-70 question that gets asked ... Each element is scored. There's a scoring methodology related to each element. Behind that sits an algorithm ... there is [also] an algorithm mentality, a formula-based approach which gets to compare which supplier is right for you ... we started this 15 years ago; it was based entirely on the thinking of a few of us that were early in the company. So we put that together. Since then, literally, in the methodology, we have benefitted from 250+ client engagements. Every time we have done a client engagement, our methodology has gotten richer ... We haven't looked at any academic institutions in terms of getting information from them or leveraging them" (Consultant 2).*

The Gartner senior researcher/analyst described Gartner as a "mega-university", and "experienced-based research organisation". Gartner's outsourcing methodology was developed based on experience gained over a long period of time. It relies mainly on industry experience (e.g. best practices), feedback from clients, surveys, internal research and analysis of trends (Consultant 3).

One of the participants (Consultant 1) noted that in the early days of ITO, IT consultants read academic research (e.g. "case studies on Kodak and General Motors", "the top ten reasons people should outsource") because "people didn't really understand it", they did not have a mature methodology "they were developing their methodology", and "things were moving a lot more slowly".

One occasional use of academic ITO literature was considered to be supporting a consultant's argument, in an opportunistic way:

> *"Occasionally, they [(consultants)] might want to prove a point, so they will search for research that proves their point. But they won't use it … for the best practice advice and trying to find out how to do it. They will do it to support their argument because they are in sales, generally … They will pick and choose to make their argument as a lawyer would in a court case. Some evidence is discarded, and the other evidence is included" (Consultant 1).*

6.4.3. Role of consultants in ITO initiatives

Participants explained the role of IT consultants in ITO engagements and the factors that resulted in the adoption of IT consultants' services by their client organisations. IT consultants were not only a source of decision-making knowledge and information but also could be involved in the implementation of ITO decisions.

6.4.3.1 Providing decision-making knowledge

Different types of knowledge were offered by consultants to their clients, including: ITO decision-making methodology and sourcing models (Consultant 1; Consultant 2; Consultant 3), success/failure factors (Consultant 1), pricing models (Consultant 1), technical knowledge (Consultant 1) and data analytics (Consultant 2). An example application of data analytic knowledge was a prediction of market trends such as sustainability of IT vendors/service providers based on available data (e.g. the safety stock of fuel of a data centre) (Consultant 2). The role of trust was emphasised as a factor that enables clients to rely on consultants' decision-making knowledge, even if the clients do not understand the consultant's methodology:

> *"We make the role of something complex simple for clients … one has to then make an effort that the client understands the model … [but] there's a tremendous amount of trust the clients put into a consultant. So many times, they may not fully understand the models. It's almost like, imagine a sausage right, most people who love a sausage don't care about what happens behind in the factory. Very often, clients are like that. They really don't care about the decision model that sits behind. They care about the outcome and the conclusion" (Consultant 2).*

The structured, model-based and data-driven approach to ITO decision making was proven to be practically possible as the IT consultancy firm managed by Participant 2 developed and launched a web-based software solution for selection of IT vendors:

> *"location analysis, for example, we actually launched the product. If you go to ***.com[9], you'll notice it's an entirely [standalone], we took the consulting out of it. It's an analytical data service where you can run your own comparison of suppliers and own comparison of locations. Because we have all the data in there and it's being updated real time. So I think decision models are data driven but have intelligence, algorithms, behind it, are absolutely the way forwards. Especially in areas where significant amounts of data exist. The connection of data to the outcome is known. Why is it known? Because we have been doing it for 15 years. So we know what that connection is, right ... 60+ companies that are using that service" (Consultant 2)*

6.4.3.2 Providing decision-making data and information

In addition to decision-making knowledge (e.g. sourcing methodology/models), IT consultants provided the data and information required for ITO decision making. This information included "available vendors/service providers in different geographical locations" (Consultant 1; Consultant 2), "current market prices of IT product and services" (Consultant 1), legislation (e.g. data privacy act) (Consultant 1) and real-time information about IT products and services in the market (Consultant 1; Consultant 2):

> *"Gartner, for example, takes over 200,000 questions a year by phone from their customers in 30-minute increments. The other thing [they do is] they survey and will spend 4 hours a day on the phone with a big company. Someone will call and say I'm thinking of implementing SAP, version X, can you tell me has anyone had any problems with this? And the Gartner analysts will deal with 100 customers who have implemented SAP, and he'll go, yeah, version X isn't quite ready, I'd go with version Y ... Because they know instantly ... If something happens with Microsoft Windows10 then the analyst within a fraction of a second ... so that's what I did for 12 years" (Consultant 1).*

6.4.3.3 ITO implementation

In addition to the data, information and knowledge useful for making ITO decisions, and other benefits of IT consultants were reported in the implementation phase of outsourcing including negotiations with vendors, administration of the contracts (e.g.

[9] Website address removed to protect anonymity of the participant

preparation of tender documents), and mediation between client and vendor (Consultant 1).

6.4.4. Factors that hinder use of academic research by consultants

6.4.4.1 Inability of academic research to cope with pace of change in IT industry

The rapid pace of change in the IT industry along with the slow pace of conducting and completing academic research and long lead time of dissemination of academic research results were considered as the factors that contributed to the poor adoption of academic research by IT practitioners.

> *"The problem is that the IT industry developed in a very different way to other industries. It developed very, very quickly" (Consultant 1).*
>
> *"Cloud lets you create something now, an application, get it up and running now, or the next day, let it run for a couple of weeks and if the application fails, or you don't get the customers, you can shut it down. It can start very quickly and you can fail very quickly and then you can do it again. So you can start and fail ten times in a year" (Consultant 1). "No one can wait 3-4 years to produce a study on the best model of outsourcing ... because someone wants to decide now" (Consultant 1).*
>
> *"Timing is another limitation of the academic research. For example, a PhD research takes 3 to 4 years, but the speed of change in IT industry is much higher these days than before" (Consultant 3).*
>
> *"Also timing for publications is a problem. For example, publishing a journal paper may take a couple of years. Even for Gartner researchers time is a barrier, some research notes take two months to be published, and for some reports, it may take even six months" (Consultant 3).*

6.4.4.2 Perception of Academic research as theoretical rather than practical

The consultant interviewees perceived academic research as theoretical rather than practical, and they believed this view on academic research was common among IT practitioners:

> *"Now I'm doing a doctorate ... part of the reason I'm not doing a PhD and doing a DBA [Doctor of Business Administration] ... because it's too theoretical. Whereas the DBA, although very similar, the focus is on solving our real problem*

and applying it to industry instantly ... There is a cynicism about academic research within the whole industry" (Consultant 1).

"There is a fundamental belief that people in academia are not connected enough to industry and what's happening today" (Consultant 2).

"Whenever I look at academic papers, it is really hard to get to the right conclusions. I would rather read or look at an academic piece that was published in the Harvard Business Review or Sloan Management Review than read a true academic paper. Our perspective is I'm not interested in theory. I'm interested in practice, and to me, if someone has done the research and they've looked at 100 companies and then say here are five things that successful companies do, then that matters to me. Because it's based on actual experience of companies" (Consultant 2).

The Gartner senior researcher/analyst (Consultant 3) also believed that academic research was not experience-based and had "little value" to practitioners. Thus practitioners "would not listen to it". He believed that practitioners could only rely on "well-proved solutions".

6.4.4.3 Keeping consultancy services unique

Consultants considered their methodology as their competitive advantage. Thus the development of their methodology was usually in-house, not using academic research that is "available to everyone".

"It's important to recognise that consultant firms will be very reluctant to use something that they did not develop or not specifically developed by them. Otherwise, there's nothing unique you bring to a client then. So [a] consulting company is much more likely to use an academic research methodology because [only if] it was done in collaboration with that consulting company" (Consultant 2).

6.4.4.4 Poor visibility and awareness

Poor visibility of academic research in the practice world and lack of awareness about available research and researchers who are experts in a particular domain were considered as factors that limit adoption of research by practitioners.

"It's not always clear on who is working on our kind of problems" (Consultant 2).

6.4.5. Suggested solutions to increase adoption of academic research

Potential solutions to increase adoption of academic research were suggested by the participants as outlined in this section. Nevertheless, one of the participants was pessimistic about the practical value of academic information systems research and believed that “academics should focus on teaching best practices. They cannot keep up with the speed of changes in the industry” (Consultant 3).

6.4.5.1 Criteria of research topics

Firstly it is suggested that the research should address a contemporary problem/issue (Consultant 1; Consultant 2; Consultant 3) that “people don’t really have any background on” (Consultant 1) such as “cloud computing” or “sourcing from cloud” (Consultant 1; Consultant 2) or “internet of things and its impact on sourcing” (Consultant 3). Secondly, lessons learnt (e.g. case studies of ITO success/failure) (Consultant 1; Consultant 3) was considered as the type of research that could be relevant to practitioners.

6.4.5.2 Timely dissemination through practitioners media

Timely dissemination of research results to practitioners through popular practitioners’ media was suggested as a possible way of increasing the chance of adoption of academic research:

> *“Someone, like you, might complete a study on outsourcing that has some interesting outcomes, you would issue a media release and just completed a study and send out a link to the top ten findings or make the article public as a pdf and get it into the Australian [newspaper] IT section or Information Age through the ACS[10]. … but if you don’t do that, they [(practitioners)] may not find it” (Consultant 1).*

> *“When you are publishing, you are not only publishing in the journals, but you are also in the magazines or blogs or others that practitioners would read” (Consultant 2).*

[10] Australian Computer Society

6.4.5.3 Engagement with the practice world

Collaborative research, particularly with leading organisations specialised in ITO, and academics' engagement with the practice world were the other suggested solutions to increase practical relevance of academic research:

> *"There're about 3-4 organisations around the world that focus on it [(ITO)]. For example, IAOP (International Association of Outsourcing Professionals) is putting a lot of time behind making sure academia is part of that association now. Why? Because they recognise that academia is interested in decision models or research around this topic and they can play a very big role. Because often we are not putting the kind of rigour that should be put, whereas academia will put that kind of rigour so the whole industry can benefit. So I would suggest participate in those associations" (Consultant 2).*

> *"When you publish an article ... make sure to collaborate with companies in the space, so the research is not purely academic ... so you are actually getting data that's live from companies in the space" (Consultant 2).*

> *"Collaboration and working with leading organisations can result in better outcomes" (Consultant 3).*

> *"I go back to my MBA and think about one professor who literally every summer did one or two consulting assignments for brand companies compared to another who took the summer off to write her book. From my perspective, I would never go to the person who wrote a book ... in fact, the number one person was on my board [of directors] for a number of years because he was very practical ... whereas the other one was very idealistic ... So, one would expect academia to show if they're interested in connecting with corporations that they have a good understanding of the industry they are trying and that they are actively engaged in that. Not just doing research, but actually, have operations experience" (Consultant 2).*

6.4.5.4 Timeliness

Increasing the pace of research conduct and dissemination was considered a requirement for relevant research:

> *"I think it's less about rigour; it's more about speed. You know, for us we are very used to making decisions where we have 60 - 80% of data. We never have 100% of the data. The whole concept of fail fast. If you're going to fail, fail fast*

... I think rigour is important, but I would sacrifice rigour for the speed. The question for you as an academic would be, could you have the same rigour, but have a faster cycle?" (Consultant 2).

6.4.6. Summary of analysis of consultants' interviews

The interviews with the three IT consultants who had extensive working experience with ITO decisions and worked with leading IT consultancy firms (two of them with Gartner) revealed that IT consultants developed their sourcing methodologies mainly internally with seldom use of academic research. Consultants provided not only the decision-making knowledge (e.g. sourcing methodology) but also the data/information required for making the ITO decisions (e.g. sourcing options), and these are bundled when they provide consultancy services. Furthermore, consultants might undertake the implementation role for ITO decisions such as negotiation with vendors or administration of the contract and procurement process. The factors considered to hinder adoption of academic research by practitioners were "inability of academic research to cope with pace of change in IT industry", "practitioners' perception of Academic research as theoretical rather than practical", "consultants' strategy to keep consultancy services unique", and "poor visibility and awareness of academic research outputs". Suggested solutions to increase the practical relevance of academic research and likelihood of its adoption were "focusing research topics on contemporary phenomena", research in the form of lessons learnt from practice (e.g. case studies), timely dissemination of research outputs through practitioners' media, increasing the speed of research conduct, and collaborative research, particularly collaboration with leading organisations specialised in ITO such as IAOP.

6.5. Analysis of ITO practitioners' survey

As discussed in the research plan (§3.5.1) another set of data collected in Phase C used an online survey to obtain the views of a larger population of ITO practitioners and examine the generalisability of findings from the qualitative stages (§6.2, §6.3, and §6.4). The analysis of responses to the survey of ITO practitioners and key findings are presented in this section.

6.5.1. Data collection process for practitioners' survey

The survey questionnaire was developed based on the relevant literature together with themes that emerged from the analysis of the interview data. Some of the questions adapted from Broekkamp and Van Hout-Wolters (2007). The literature-based hypotheses presented in §2.5 were another source for designing the survey questions. The content validity of the questionnaire was ensured by means of careful definition of the survey questions through literature review as well as using expert judgment. To obtain experts' views, the questionnaire was piloted by three IT managers who had been involved in IT outsourcing decisions, and their feedback was incorporated into the questionnaire instrument. The three IT managers were based in Australia, USA and Iran. The survey was administered online in March 2016. The questionnaire is provided in Appendix C.1.

As noted in §3.5.3 the planned participants for the practitioners' survey were members of the International Association of Outsourcing Professionals (IAOP) LinkedIn Group. However, after seeking permission from the group administrator and posting the on-line survey link, after one week no one had participated in the survey. The survey link was re-posted in the online group but another week passed without any response from members. Next private messages were sent to 15 members of the LinkedIn group to invite them to participate in the survey. Again, no one replied or completed the survey. The plan to use LinkedIn groups to recruit survey participants was not a successful strategy, and this experience can inform other researchers in designing their data collection plans.

Next, as an alternative way to recruit survey participants, a mailing list of 'IT decision makers' was purchased from a website[11] and contained 140,732 records of contact details. However, after the invitations were sent to the people listed on the mailing list it became clear that the mailing list is not up-to-date because many email addresses were expired. To overcome this problem, software (Atomic Mail Verifier[12]) was used to check the validity of the email addresses. Only 5,600 email addresses were valid and these were used to send the invitation to participate in the research. Twenty-one correspondents declined the invitation via reply emails because they were retired, no longer working in the IT industry or wanted to be removed from the mailing list.

[11] http://www.perfectemaillist.com/it-decision-makers-email-list.php
[12] https://www.atompark.com/bulk-email-verifier/

Five respondents wrote to the principal supervisor to make sure that the survey was genuine before they participated. It is worth mentioning that other mailing lists of IT managers/decision-makers (possibly with higher accuracy) were found during the internet search but purchasing them was not possible due to the limited financial resources available to this study.

An email invitation (Appendix C.4) was sent to the mailing list and asked members to participate in the survey if they had been involved in making IT sourcing decisions. In total, 65 survey responses were received. However, four responses were excluded from data analysis because the respondents were from small organisations (organisations with less than 20 employees) thus out of the scope of the study, or the responses were found to be inconsistent or invalid.

6.5.2. Demographic information of the survey participants

IT outsourcing practitioners from 10 countries participated in the survey. The majority of participants (73.8 %) were from the USA, followed by Australia (10%) and Canada (5%). Other countries included United Kingdom, France, Germany, Japan, Denmark, Switzerland, and Spain.

As shown in Figure 6-2, all participants had a higher education degree. The most frequent education level was masters degree which was held by 51 percent of the participants, followed by bachelor degree (38%), doctorate (6%) and higher education diploma (5%).

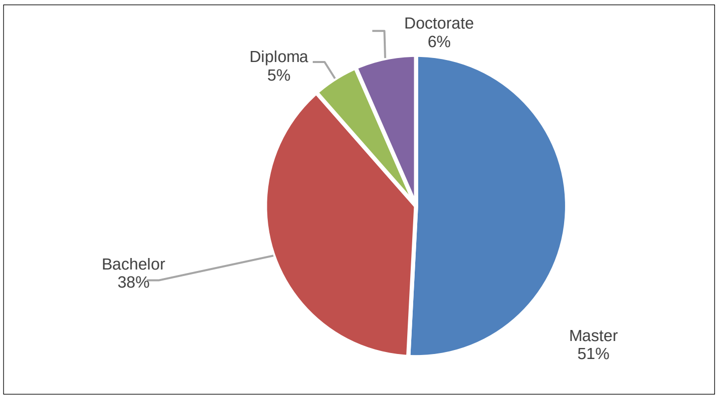
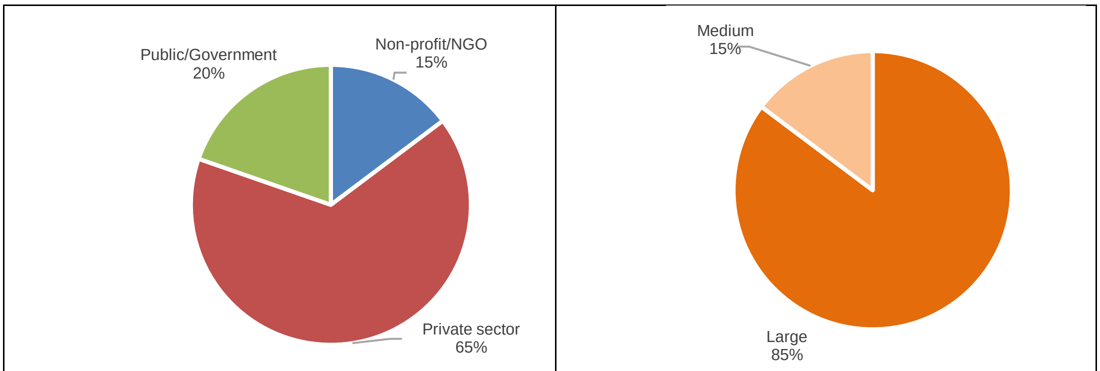


Figure 6-2 Distribution of participants' education level

Approximately two-thirds of the participants worked in the private sector, nearly 20 percent in the public or government sector and the remaining 15 percent in nonprofit or NGO organisations (Figure 6-3a). Participants represented a wide-range of industries such as Manufacturing, Real Estate, Construction, Higher Education, Information and Communication Technology, Oil & Gas, Healthcare, Pharmaceutical, Insurance, etc. As shown in Figure 6-3b the size of participants' organisation was large (200 or more employee) for 85 percent of the participants and medium (20 to 200) for the rest.



a. Distribution of participants' working sector

b. Distribution of organisation size

Figure 6-3 Background of participants' organisations

Most of the participants (80%) had an IT related job at managerial level (e.g. Chief Information Officer, IT Director, etc.). Three percent of the participants were Chief Executive Officers, and 16 percent had various non-managerial positions. Two participants did not indicate their organisational positions.

The vast majority of respondents (93.4%) identified their role as a practitioner who has been involved in making IT outsourcing decisions at the organisations where they worked. The remaining four respondents were IT consultants who provided consultancy services to organisations for their IT outsourcing decisions. The length of experience of participants in dealing with IT sourcing decisions is presented in Figure 6-4. Length of participants' experience with IT outsourcing was more than ten years for 79 percent of the participants, five to ten years for 13 percent, and less than five years for 8 percent of respondents.

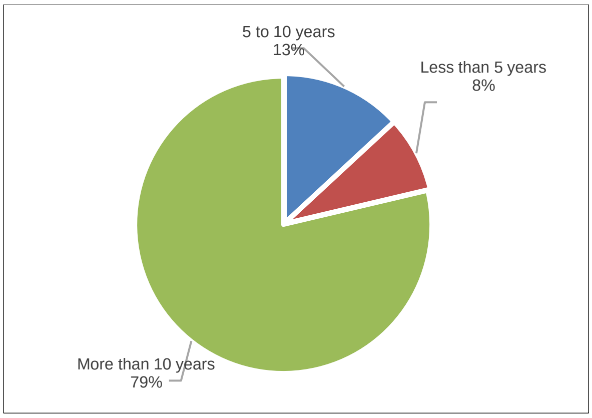


Figure 6-4 Participants' experience with IT outsourcing

6.5.3. Level of structure and formality of the ITO decision making in the organisation

To indicate the level of structure and formality of the ITO sourcing decision making in their organisations, participants were asked to identify whether any of the four elements shown in Figure 6-5 exist in their organisational ITO decision-making process. As shown in Figure 6-5, more than half of the respondents reported the existence of an established set of criteria for making ITO decisions in their organisations. The ITO decision-making process/framework was predefined and documented in almost 40 percent of respondent organisations. Use of decision support systems for ITO decisions was reported by about 10 percent of the participants.

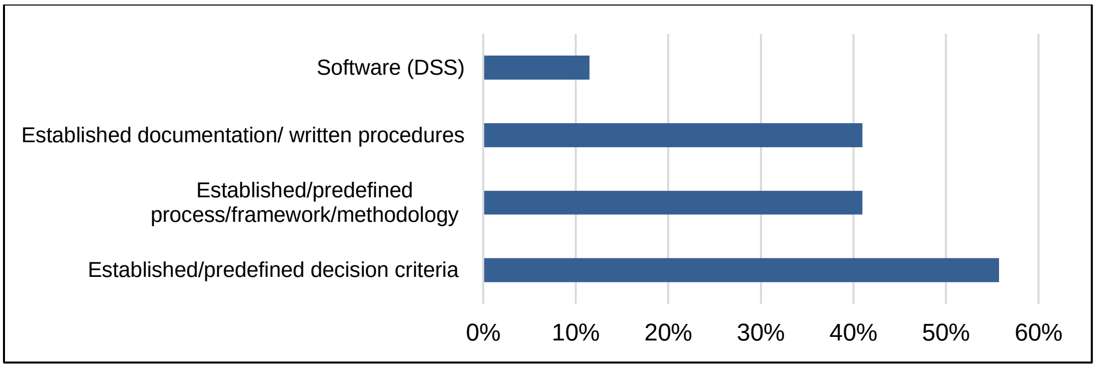


Figure 6-5 Formality and level of structure of the ITO decision making in the case organisations

6.5.4. External sources of obtaining IT outsourcing decision-making knowledge

Participants were asked to indicate the extent that they perceived five different sources had informed their knowledge of making IT outsourcing decisions. Figure 6-6a to e shows the distribution of responses for each of the five sources.

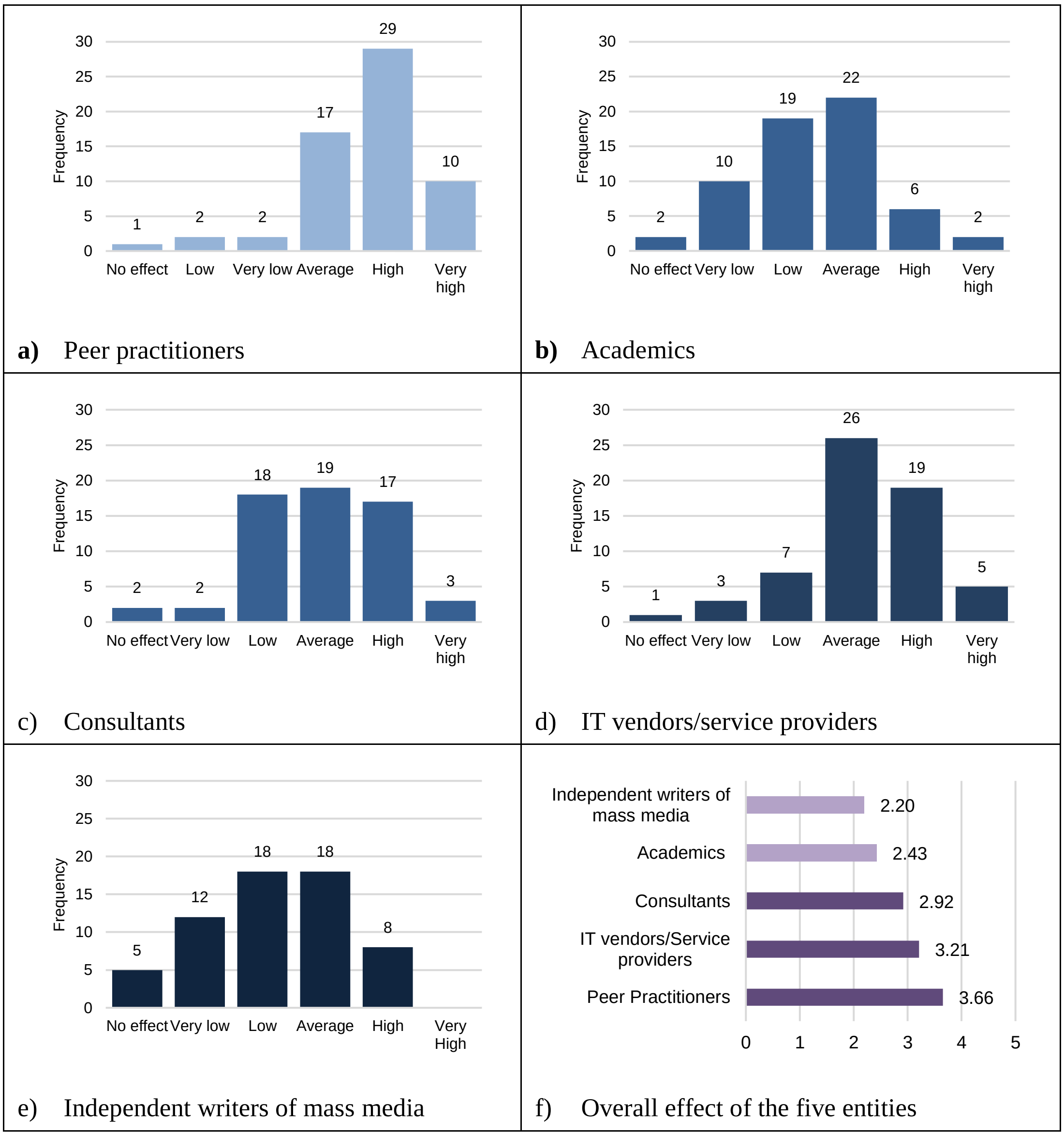


Figure 6-6. External sources of obtaining IT outsourcing decision-making knowledge

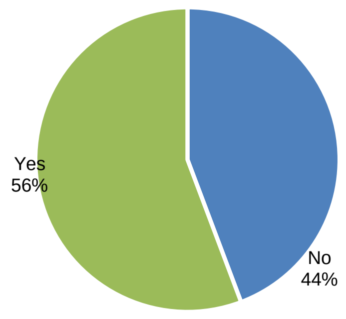
For the purpose of comparison, a numerical value was assigned to each category of response, ranging from zero for ‘no effect’ to five for ‘very high effect’. The result of this quantification ranked ‘peer practitioners’ as the most influential source, followed by IT vendors/service providers and then consultants (Figure 6-6f).This method of quantification introduces some degree of approximation to the analysis because it necessitates the assumption that the intervals between categories are equal. Nevertheless, without such an approximation approach, ranking alternative sources is practically impossible.

To draw generalisable conclusions about the overall preferences of practitioners with regard to the influence of each of the five sources, the six-point scale was converted to a dichotomous scale of ‘No effect to Low’ or ‘Average to Very High’.

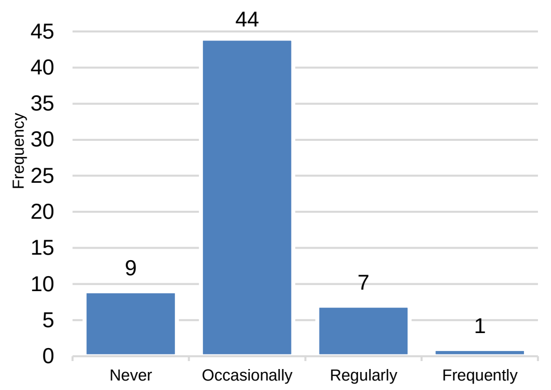
We found the majority of ITO practitioners perceived ‘Peer practitioners’, ‘IT vendors/Service providers’ and ‘Consultants’ as having an ‘Average to Very High’ effect on their ITO decision making (binomial test, cut point =2, test proportion= 0.5, confidence interval (CI)=95%). About the influence of ‘academics’ and ‘independent writers of mass media’, the distribution of responses was not significantly skewed towards either ‘No effect to Low’ or ‘Average to Very High’. The survey also revealed that the majority of participants (70%) had not received any training with regard to making ITO decisions, and about half of the participants had not read any ITO books.

6.5.5. Adoption of academic research for IT sourcing decision-making

Almost half of the respondents (44%) did not consider themselves as an audience for academic research papers (journal or conference papers) (Figure 6-7a). As shown in Figure 6-7b the majority of respondents (72%) read academic research papers ‘Occasionally’.



a) Perception about being an audience for academic research



b) Frequency of reading academic research articles

Figure 6-7 Reading Academic research papers

A binomial test indicated that the proportion of ITO practitioners who read academic research ‘Frequently’ or ‘Regularly’ was lower than 50 percent (p=0.000 2-sided). It should be noted that the term ‘academic research papers’ refers not only to scholarly peer-reviewed journal articles and conference papers but also to practitioner-oriented journals such as Harvard Business Review (HBR) which were mentioned in the participants’ comments. The survey data does not provide detailed information about the exact type of academic papers that participants read.

To identify the level of adoption of academic research, participants were asked if they have ever used academic research papers or consulted an academic to inform their IT sourcing decision-making. The majority of respondents (70%) did not use academic research papers as a source of support for their ITO decision making. Only 21 percent of the participants had consulted an academic/faculty member to obtain advice on IT outsourcing decision-making.

Considering either ‘using a research paper’ or ‘consulting an academic’ as an instance of the use of academic ITO research, approximately one-third (32.8%) of the respondents can be considered as research users. Based on binomial tests (Test proportion= 0.5, CI=95%), it can be concluded that adoption of ITO research through reading academic articles or seeking consultation from academics was not prevalent in the majority of ITO practitioners (2-tailed significance 0.002 and 0.000 respectively).

Participants considered four potential sources of decision support models, frameworks or methodologies for making IT sourcing decisions and rated the likelihood of using each source as shown in Table 6.31. A weighted average of responses provided an approximate measure to rank the level of tendency to use decision models/frameworks from the four sources. The most popular (first ranked) source was ‘well-known IT consultancy firms’, and a binomial test indicated that the proportion of ‘Average or High’ responses (0.66) was more than 50 percent for this source. The second and third most popular sources were ‘organisations with similar characteristics’ and ‘a leading organisation in the same sector’ respectively. However, for these two sources, no clear tendency of ITO practitioners towards either of ‘Average or High’ or ‘Low or below low’ categories was found.

Academic research was reported as the least likely source of decision models/frameworks and according to a binomial test the proportion of ‘Low or below low’ responses (74%) was significantly more than 50 percent for this source (see 6.31 for details of the statistical tests).

Table 6.31 Likelihood of adoption of decision support models, frameworks or methodologies based on their sources

Model/framework source	Not likely (0)	Very low (1)	Low (2)	Average (3)	High (4)	Distribution	Overall weighted average score (0-4)	Exact Significance (2-tailed) for Binomial test, Cut point=2, test proportion= 0.5, CI=95%
A well-known IT consultancy firm	5	3	13	32	8		2.57	0.020
An organisation with similar characteristics	2	2	21	34	2		2.52	0.020
A leading organisation in the same sector	7	3	17	29	5		2.36	0.443
Academics	3	13	29	16	0		1.95	0.000

6.5.6. Perceptions of barriers to adoption of academic research

Participants were asked to indicate their level of agreement with 12 statements about academic research and its application in practice. Table 6.32 lists the statements and presents the distribution and analysis of the responses. A weighted average scoring method was used to provide an approximate overall perception of the participants for each statement.

Four statements focused on different aspects of perceived usefulness (to be exact, perceived uselessness) of academic research in practice (a-d). The result of the data analysis did not show a dominant negative view of the practical usefulness of academic research in general, among the participants. Nevertheless, about the usefulness of ‘academic research-based frameworks/models’, the majority of ITO practitioners agreed that those frameworks/models are ‘far from the real world (e.g. too generalised, are based on too many assumptions)’ (b).

Table 6.32 Participants' perceptions about academic research

Statement	Strongly Disagree (-2)	Disagree (-1)	Neutral (0)	Agree (+1)	Strongly Agree (+2)	Distribution	Overall weighted average score (-2 t0 2)	Binomial Test Test Proportion 0.50 Exact Sig. (2-tailed)	Generalised Overall Perception
a) Academic research is not experience-based and proven to be effective in practice	2	19	26	12	2		-0.11	.3105	Neutral
b) Academic research-based frameworks/models are far from real world (e.g. too generalised, are based on too many assumptions ...)	1	13	19	25	3		0.26	.0436	Agreement
c) Academic research lacks timeliness and is not up-to-date enough to inform practice	1	16	24	17	3		0.08	.7428	Neutral
d) Academic research is not practical	6	22	27	3	3		-0.41	.0002	Disagreement
e) Practitioners do not adopt academic research because they lack time to search for relevant academic research	0	8	13	30	10		0.69	.0000	Agreement
f) Practitioners do not adopt academic research because reading academic research publications demands too much time for practitioners	1	8	13	31	8		0.61	.0000	Agreement
g) The language of academic research publications is complex (e.g. uses jargon, mathematical formulae), thus not easily understandable by practitioners	4	9	22	24	2		0.18	.0533	Neutral
h) If practitioners have sufficient access (e.g. free or through workplace subscription) to academic research, they will read more academic publications	0	5	21	32	3		0.54	.0000	Agreement
i) Practitioners do not adopt academic research because they lack awareness of available academic research	1	7	7	39	7		0.72	.0000	Agreement
j) Practitioners lack the skill/knowledge to implement academic research	6	24	17	12	2		-0.33	.0226	Disagreement
k) Academic research is not a commonly used source for practitioners to acquire decision-making knowledge	0	7	12	33	9		0.72	.0000	Agreement
l) Academic research is more suitable for leading organisations (early adopters) than followers	3	22	17	18	1		-0.13	.4514	Neutral

The majority of the ITO practitioners perceived 'lack of time to search for relevant academic research' (e), 'too much time required for practitioners to read academic research publications' (f), 'lack of awareness' (i) and 'limited accessibility' (h) hindered adoption of academic research. However, the majority disagreed that 'practitioners lack the skill/knowledge to implement the findings of academic research' (j).

There was broad agreement with the statement that ‘academic research is not a commonly used source for practitioners to acquire decision-making knowledge’ (69%). Participants’ perceptions on the remaining statements (a, c, g and l as shown in Table 6.32) were not proven to be skewed towards agreement or disagreement.

6.5.7. Identification of factors that hinder adoption of academic research

Responses were divided into two groups according to whether participants did or did not use academic research. A Chi-square test for independence indicated significant associations between six factors and ‘use of academic research’ with medium to large effect sizes as shown in Table 6.33.

Table 6.33 Positive and negative factors associated with practitioner use of academic research

	Factors	Chi-Square Value*	Sig.**	Effect Size		Odds Ratio
				Phi	Approx. Sig.***	
i.	Frequency of reading academic papers (+)	9.813	0.002	0.453	0.000	21.5:1
ii.	Perception about being an audience for academic research (+)	12.168	0.000	0.482	0.000	14.1:1
iii.	Perception that ‘academic research-based frameworks/models are far from real world’ (-)	6.431	0.011	-0.447	0.004	1:8.0
iv.	Perception about ‘lack of timeliness of academic research’ (-)	7.892	0.005	-0.520	0.002	1:12.9
v.	Perception that ‘reading academic research publications demands too much time’ (-)	7.538	0.006	-0.453	0.002	1:11.7
vi.	Perception that ‘academic research is not a commonly used source for practitioners to acquire decision-making knowledge’ (-)	6.939	0.008	-0.438	0.002	1:16.9

* Chi-square with Yates Continuity Correction ** Asymptotic significance (2-sided)
*** Approximate significance
(+) positive association (-) negative association

According to this analysis, practitioners who read academic research regularly or frequently were 21.5 times more likely to use academic research than those who read occasionally or never. Also, practitioners who perceived themselves as an audience for academic research were 14.1 times more likely to use academic research than those who did not.

The other four factors that were negatively associated with use of academic research included: a perception that ‘academic research-based frameworks/models are far from real world’, a perception that academic research lacks timeliness, a perception that ‘reading academic research publications demands too much time for practitioners’, and a perception that ‘academic research is not a commonly used source for practitioners to acquire decision-making knowledge’.

No significant associations were found between other factors (education level, the length of ITO decision-making experience, ITO training and reading ITO books) and use of academic research.

6.6. Summary and conclusion

This chapter provided analysis of the data collected for the qualitative phase of the research comprised 15 interviews across two groups of people involved in ITO practice: ten ITO decision makers and three ITO consultants.

The four case studies were focused on IT managers’ viewpoints. The two main sources of knowledge and information used by IT managers to inform ITO decisions were peer IT practitioners and IT consultants. Vendors and mass media organisations were the other sources accessed. ITO knowledge and information were disseminated to practitioners through various mechanisms such as meetings, events, publications. The most relevant and useful type of knowledge for IT practitioners was perceived to be up-to-date, experience-based knowledge that resulted from implementation of decisions in practice.

The ITO decision-making process in all of the four case organisations was not formal, and no pre-defined decision criteria/model existed. The participants reported a lack of comprehensive decision support for ITO decisions and the need for a more structured approach to ITO decision making. This need was more significant with regard to emerging sourcing options such as cloud computing, that were perceived more complex than traditional non-cloud-based sourcing initiatives.

The multiple case studies and interviews with ITO consultants revealed that none of the participants used academic research to inform their ITO decision making and they consider academic research to have limited practical value (relevance). Nevertheless, to increase the adoption of ITO academic research by practitioners, participants suggested some solutions. The suggested solutions were focused on *improving the practical relevance of research* (e.g. through evaluation of research-based decision models in practice, collaborative research and increase in the pace of research) and *dissemination of research results* (e.g. active marketing of academic research outputs, publishing in practitioners' media, and timely dissemination of research outputs).

The decision-making knowledge of IT consultants (e.g. decision models/methodologies) was developed in-house and seldom informed by academic research. In addition to ITO decision-making knowledge and experience, IT consultants offered up-to-date data and information needed by the ITO decision-makers. IT consultants could also engage in the implementation of ITO initiatives e.g. by administration of the ITO procurement process.

IT consultants perceived academic research to lack timeliness, to have limited practical relevance and was poorly disseminated into practice, therefore less adopted by them. Consultant participants' perceptions of academic research were consistent with the views of participant IT managers. Another possible reason for non-adoption of academic ITO research was the competitive advantage achieved by focusing on the development of unique in-house methodologies. The three IT consultants suggested various solutions to increase the adoption of academic research by practitioners such as focusing on a contemporary problem/issue, conducting case studies to distil lessons learnt from implementation in practice, agile conduct of research and timely dissemination of the research results through practitioners' media and collaboration with leading organisations specialised in ITO.

Chapter 7. Retroductive Analysis and Discussion

7.1. Introduction

The aim of this chapter is to discuss the findings of the study in the context of prior knowledge available in the literature to provide answers to the six research questions investigated for this PhD Thesis (stated in §1.2). Throughout the discussions, a retroductive inference process is followed to determine the possible generative mechanisms and underlying structures that cause the phenomena observed in the study. The retroductive process begins with a description or appreciation of the research situation. The next steps are hypothesising possible mechanisms or structures capable of generating the phenomena that have been observed, and then critical assessment and elimination of the alternative explanations (Zachariadis, Scott & Barrett 2013). Section 7.2 provides the discussion about RQ1 and RQ2. Section 7.3 presents the discussion about RQ3 and RQ4. Section 7.4 presents the discussion regarding RQ5. In §7.5 to discuss the answer to RQ6 first a conceptual model based on social system theory is developed. Then, the result of the retroductive analysis is integrated with the conceptual model to present a comprehensive framework that includes possible causes of the research-practice gap in the ITO field. Section 7.6 provides a brief summary of this chapter. The overall structure of this chapter is illustrated in Figure 7-1.

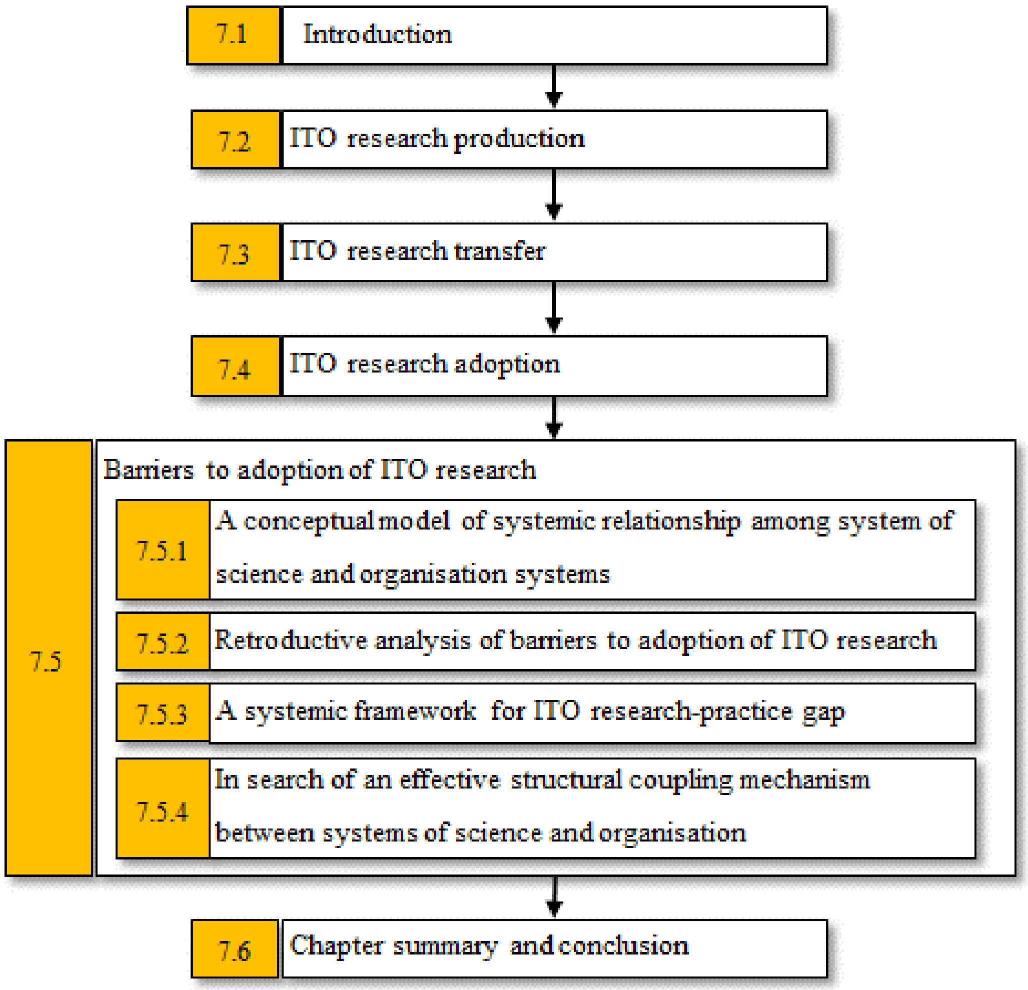


Figure 7-1 Structure of chapter 7

7.2. ITO research production

This study investigated the existing research that has been produced on ITO DSS. All the ITO DSS papers analysed in this study are normative, i.e. they suggest a decision model/tool to support practitioners with their ITO decision-making. This body of research was generated mainly motivated by the researchers' perceptions of practitioners' needs or research opportunities, but less due to requests from practitioners. The researchers reported the use of a variety of primary and secondary sources to obtain information about IT outsourcing in practice, and various types of communication with practitioners.

RQ1: What type of decision support artefacts have been suggested in the literature to support organisational IT outsourcing decisions?

To answer the first research question (RQ1), a systematic literature review was conducted, and 133 academic research papers were identified that applied various decision analysis methods to support different ITO decisions. The review identified the potential of various decision analysis methods to support different decisions involved in the process of ITO and cloud sourcing. These methods included MCDM methods, optimisation, system dynamics, real options and other mathematical models. The most frequent IT outsourcing decisions supported in the surveyed literature were ITO vendor or cloud service provider selection (46%) followed by ITO/Cloud adoption (38%), what to outsource? (10%), deciding the level of outsourcing or sourcing model (8%), where to outsource (onshore or offshore)? (4%) and cloud deployment model selection (one article).

RQ2: What level of rigour has been applied by researchers who developed model-driven artefacts for supporting organisational IT outsourcing decisions?

The second research question (RQ2) concerned the level of rigour applied by researchers in developing IT outsourcing decision-support artefacts. Only one-third of the identified articles cited one or more ITO reference theories. Although the majority of the surveyed articles reported an evaluation of their decision support artefact, in most cases the evaluation was a simulation or execution of the model in an artificial setting to demonstrate the feasibility of their suggested model but did not include its validation. Lack of validation of the decision support artefact in the vast majority (93%) of articles was the main weakness identified in our analysis of the ITO decision support literature. These findings are consistent with the prior assessment of DSS literature (e.g. Arnott & Pervan 2005, 2008b, 2008a; Purao & Storey 2008) in which limited use of validation and naturalistic evaluation methods was raised as a major shortcoming in terms of relevance with real practice in DSS literature. Validation of models in real-life trials is essential for decision support research (Bertrand & Fransoo 2002). Otherwise, the research lacks relevance and can be perceived by practitioners as addressing "fictitious problems" (Meredith et al. 1989, p. 320). In the absence of rigorous verification and validation, a decision support model can produce optimum results, but those results are only valid for the hypothesised model, not the real-world phenomenon being modelled. In such situations, the relevance of the decision model for making real-life decisions will be questionable.

Despite these findings, only a minority (18%) of the researchers who participated in the survey (Phase B) agreed that their published decision model could not adequately address the complexity of ITO decision-making in practice. Other limitations indicated by the participants were mainly operational challenges e.g. availability of data/information to be processed in the decision model, and time/resource constraints for implementation of the decision model.

In sum, ITO DSS literature suggested various decision-support artefacts to help practitioners with their ITO decision-making (chapter 4), but in the majority of the published papers, no justification for the usefulness of the artefact was available. In other words, one or a hybrid of decision analysis methods were applied to one or more ITO decisions without proving that the suggested approach would provide any benefit over traditional decision-making approaches. Consequently, the real-world application of much of the existing academic research in this domain could be questioned. The limited level of rigour applied to ITO decision support research, and the fact that some of this research is published in high-ranked journals, provides an instance that supports Gill's (2010) assertion that the rigour of Business/IS research findings is vastly overestimated.

The next step in the retroductive analysis is finding potential generative mechanisms by asking why the observed problems are occurring. Here, the question would be why the ITO DSS research has limited practical relevance?

The literature (§2.5) provided six hypotheses for the cause of poor research relevance:

H1: Researchers are detached from practice.

H2: Researchers' lack practical experience/skills.

H3: Researchers focus on traditional research rather than contextualised and collaborative (Mode 2) knowledge.

H4: There are too few incentives for practical research in academic reward schemes.

H5: Researchers select/use/apply the wrong type of research methods.

H6: Academic research lacks timeliness and is not up-to-date enough to inform practice.

Next, I eliminate any of the hypotheses that cannot be supported or contradicted by the empirical data collected during this study.

The interview and survey data clearly showed that H1 and H2 are not supported because the researchers reported various types of communication and interaction with ITO practitioners and some of them had personal work experience in the IT industry. Also, H3 is not supported because the majority of researchers reported collaboration with practitioners during their research.

The findings of this study strongly support H4 and confirm prior research (e.g. Cherney et al. 2012; Ouimet et al. 2014) that inadequate reward systems in most academic settings are one of the main reasons for poor practical relevance and contributes to the research-practice gap. H5 is another potential cause of the problem. The findings showed that most ITO DSS papers used a quantitative modelling methodology. While quantitative modelling is well-established to overcome the complexity of real-world problems, relying solely on such methodologies can lead to models that could be far from real-world. Hence the solutions found for a non-validated model may not apply to the real-world problem. In contrast, practice-oriented research methodologies such as design science research, case study and action research prioritise relevance. Evidence from the assessment of DSS literature has confirmed the higher chance of relevance for studies that used case study or design science research methodologies (Arnott & Pervan 2008a). Scholars argue for the adoption of practice-oriented methodological approaches that explicitly includes evaluation as part of the research. In particular, *design science research* has been developed to increase the practical relevance of IS research. Many scholars in the IS (Kuechler & Vaishnavi 2011; Winter 2008) and Management (Boehme, Ordigoni & Deakins 2014; Hodgkinson & Starkey 2011, 2012) disciplines argued for DSR as a promising approach to overcome the relevance gap. However, among the 133 ITO papers, only three papers used a DSR approach.

The current academic environment seems to be dominated by institutional pressures of ‘publish or perish’ and the career advancement of academic staff is mainly conditional on achieving research publications in high ranked journals. On the other hand, academic journals seldom employ objective measures to evaluate the *potential* relevance of the research they publish. Usually, it is not possible to confirm the relevance of research, i.e. the "*fitness*" of the designed artefact (Gill & Hevner 2013, p. 2) before it is has been adopted and used in practice. However, the "*utility*" of the designed artefact can be estimated by the designers (i.e. researchers) (Gill & Hevner 2013, p. 2), and subsequently *potential* relevance of research can be evaluated upon publication using a set of relevance criteria (Rosemann & Vessey 2008).

The academic reward schemes and academic publishing structures are the two main structures of the system of science that do not encourage research relevance. First, these schemes are structured in a way that enables science communications within the system of science, not outside of it. Second, the human motivation structure – which from Luhmann's (1995) perspective is situated within the *psychic system* of researchers – learns from the system of science through a structural coupling where relevance is not a valued criterion for academic publications. In the presence of such structures, it is not surprising that academic researchers focus on publishing papers with less attention to research relevance. However, relevant research is possible due to researchers' intrinsic motivation rather than external rewards to increase the potential relevance of research.

Regarding H6, a time-lag between research and practice was not found to be a significant barrier to adoption of ITO DSS research. As the analysis of ITO DSS literature (chapter 4) showed, there has been a continuous supply of decision support models/tools from academia, and even for emerging IT sourcing models, such as cloud computing, several decision-support tools can be found in the literature. The overall view of the practitioners who participated in the survey was neutral about H6. However, in the interviews with practitioners, some of them claimed that academic research lags behind practice, and suggested academic researchers should focus on contemporary research problems such as adoption of cloud computing. Thus, in the case of ITO DSS research, the notion that academic research is not up-to-date can be only a perception of practitioners, not fact.

7.3. ITO research transfer

This section presents the discussion about RQ3 and RQ4.

RQ3: What knowledge-transfer activities are employed by academic researchers in the IT outsourcing decision support field?

The findings show that ITO researchers used a variety of activities, often multiple activities, to transfer their research-generated knowledge to industry. As suggested in prior studies, these activities form a knowledge transfer system that academic researchers use with the aim of enhancing their knowledge transfer performance (Landry et al. 2010). The knowledge-transfer activities that were used more frequently were traditional methods such as presenting research at events (e.g. seminars). However, similar to prior studies (e.g. Klofsten & Jones-Evans 2000), entrepreneurial knowledge transfer activities such as establishing spin-offs and developing software based on the research results (i.e. product development) were found to be the least used methods.

RQ4: What factors may explain effective academic knowledge transfer from academic researchers to practitioners?

Analysis of researchers' survey data enabled the establishment of a profile of academic researchers who effectively disseminated their research-generated knowledge to industry, i.e. those who reported the implementation of their decision support model/framework they developed in an organisation. Effective academic engagement with practice was associated with researcher's motivation to support practitioners, personal communication with practitioners, active communication through practitioners' media (reading and writing), and proactive approaches to research dissemination (e.g. spin-off formation and software development).

However, contrary to the claim that collaborative research will increase the adoption of research-generated knowledge, no significant effect was found in this study. In other words, both groups of academic researchers who were and were not aware of the implementation of their research, reported engagement in collaborative research with practitioners in their research projects. Nevertheless, the majority of participant researchers considered collaborative research as a possible means of increasing research relevance as well as research adoption by practitioners. Hence, the findings could be due to the variation in the quality of collaboration, and do not necessarily undermine the *potential* benefits of collaborative research. Given this low degree of entrepreneurial approach, it seems that sufficient motives and/or support might not be in place for entrepreneurial knowledge transfer by academic researchers to occur.

The literature (§2.5) provided two hypotheses about the factors that influence knowledge transfer.

H7: There are too few incentives for engagement of academics with practice and knowledge transfer.

H8: Channels to transfer academic research to practice are missing or unsuited.

The findings strongly support H7 and the suggestion by Perkmann et al. (2013) that individual discretion is the main determinant of academic engagement. The analysis showed that the motivation of some academic researchers to conduct research is mainly *to achieve research publications* thereby providing them with extrinsic personal benefits such as promotion or tenure. Moreover, the findings suggest that these researchers were less effective in knowledge transfer of their research to practice.

The findings supported H8. The findings suggest that *personal communication channels* were significantly more effective in the dissemination of research-generated knowledge (i.e. decision model) to industry compared to publication in mass media channels. Singhal (2009) also identified the importance of personal communication channels. This finding is in line with the diffusion of innovation theory about the role of *personal* communication channels, as “the decision to adopt an innovation depends largely on discussions with peers who have already evaluated and made a decision about whether to adopt the innovation” Singhal (2009, p. 309). In addition, a mismatch was found to exist between researchers’ dissemination channels and practitioners’ adoption channels as suggested by Kock et al. (2002). For example, practitioners only occasionally read academic publications, while academic researchers only occasionally write in practitioner media.

Similar to research production, the interplay between structures of the science system and motivation of researchers does not promote engagement of academics in knowledge transfer and entrepreneurial activities.

7.4. ITO research adoption

This section presents the discussion about RQ5.

RQ5. To what extent are practitioners' IT sourcing decisions informed by academic research compared to rival external sources of decision-making knowledge?

In response to RQ5, the findings revealed various external sources of practitioners' knowledge of IT outsourcing decision making. The most influential source was peer practitioners, followed by IT vendors/service providers and consultants. Participants were most inclined toward using a decision support model/framework from well-known IT consultancy firms and least from academic research. Academic articles were occasionally read by the participant ITO practitioners, but more than half of the participants did not consider themselves as an audience for academic research papers. Overall, academic research was the source least used by practitioners for acquiring ITO decision-making knowledge. These findings supports the notion of limited use of IS and Management research by practitioners as widely claimed in the literature (Bansal et al. 2012; Becker et al. 2015; Benbasat & Zmud 1999; Darroch & Toleman 2005; Jabagi et al. 2016; Kieser, Nicolai & Seidl 2015; Looney et al. 2014; Pearson, Pearson & Shim 2005)

7.5. Barriers to adoption of ITO research

This section provides a discussion to answer the sixth research question.

RQ6. What factors may hinder the adoption of research-generated knowledge by ITO practitioners?

Barriers to adoption of academic-generated knowledge by ITO practitioners can occur in any of research production, transfer and adoption phases. Hence, the findings from the three phases of this study which were concerned with production, transfer and adoption of academic research are integrated into this section to answer RQ6.

As it is not possible to discuss the research adoption/relevance without considering the relationship between academia and industry (practice world) (Darroch & Toleman 2005), first a conceptual model is presented to show how the system of science relates to the organisation system. Next, the retroductive analysis is applied to findings of the study in the context of literature. Following this, the results of the retroductive analysis are integrated with the conceptual model to create a comprehensive framework that explains the key causes (generative mechanisms and system structures) that have given rise to the various problems in research production, transfer and adoption processes observed in this study.

7.5.1. A conceptual model of systemic relationship among system of science and organisation systems

As noted in §2.4.2 several scholars (Kieser 2002; Kieser & Leiner 2007, 2009; Kieser, Nicolai & Seidl 2015; Kieser & Nicolai 2005; Nicolai & Seidl 2010; Rasche & Behnam 2009; Seidl & Mohe 2007; Wingens 1990) applied Luhmann’s (1984, 1995, 2006) system theory to the research-practice gap problem. Recently, Kieser, Nicolai and Seidl (2015) reviewed the literature on the research-practice gap (rigour-relevance debate) and called for further research to exploit “system theoretical models of differentiating between Management science and practice” (p.214), and management fashion theory. Luhmann’s notion of social systems provides a superior approach over conventional social theories for the study of academic knowledge transfer and the research-practice gap. The conventional definition of social systems portrays the science system as a group of researchers (or scientists), and the practitioners as a distinct group of people working in organisations (sometimes called the practice world). For instance, the two communities theory (Caplan 1979) portrays two distinct groups: researchers and policy makers (practitioners). Such definitions are problematic because they fail to consider several facts.

First, the researcher (or scientist) and practitioner are non-mutually-exclusive attributes (or roles) assigned to individual persons. In other words, a person can be both researcher and practitioner at the same time. My analysis of the affiliation of the

ITO DSS papers (Chapter 4) showed some cases where practitioners were authors of research articles published in scientific journals and conferences. Moreover, survey responses indicated that practitioners were involved in collaborative research. On the other hand, some researchers were engaged in ITO practice e.g. by offering consultancy services for ITO decision-making. Thus, dividing people into two mutually exclusive communities of researchers and practitioners is inaccurate.

Second, academic organisations (e.g. universities) function in the system of science (and simultaneously in other systems e.g. education, economy) but the system of science is not restricted to them. The research reported in the academic publications (e.g. ITO decision support literature) has not necessarily been conducted in the academic organisations. The scientific publication criterion is not the affiliation of the researcher (author), but accordance with scientific methods. For instance, in my literature search, I found ITO DSS papers that were authored by researchers from IBM Company.

Third, as explained in §2.4.2 an organisation such as a university operates as an organisational system using the decision as its code of communication, and at the same time is involved in multiple functional systems e.g. science, education and economy. In this view, a university produces scientific knowledge, and at the same time is a potential consumer of knowledge. An example is higher education research and practice that both typically take place at universities. Despite sharing the organisational domain, the research-practice gap problem is frequently highlighted in the education research literature (Broekkamp & Van Hout-Wolters 2007). Hence, we cannot assume that all education researchers use their own research findings in their education practice (e.g. teaching, learning assessment). Similarly, a researcher who published an ITO decision support model may not use his/her own decision model if he/she is in charge of decision-making in practice (an organisation system). Thus, the conceptualisation of a system of science that encompasses academic research based on organisational boundaries or people is problematic. Subsequently, theories such as the two communities theory (Caplan 1979) that assume researchers and practitioners as two distinct groups of people are flawed.

The Luhmann-based definition of a system of science describes the system at an *abstract* level that does not suffer from the limitations of the conventional definitions

(Seidl 2004). From a social system theory perspective, the system of science as an *abstract* concept is defined based on scientific communications. Such a system can be observed only by the chain of citations between research papers. Although the role of researchers is essential in the production of scientific communications, Luhmann's (1995) definition of a system of science does not include the researchers in the system. A researcher (like any other person) is a conglomerate of a living system (i.e. body) and a psychic system. A structural coupling mechanism relates the researchers' psychic system to the system of science.

As shown in Figure 7-2, each real-world organisation has three distinct abstracted models in social system theory. The system of science considers only science communications. The scientific communications are not restricted to or defined by organisational boundaries.

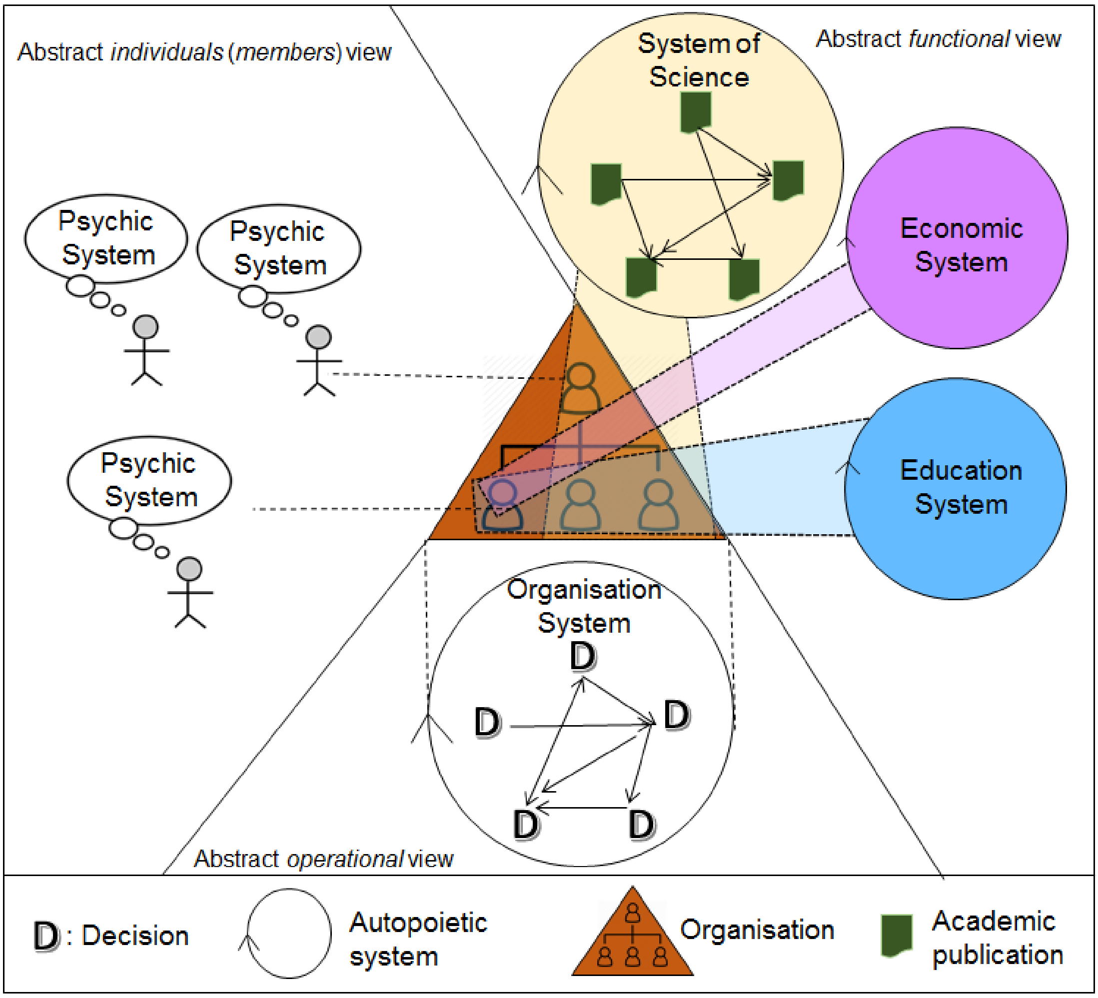


Figure 7-2 Three abstracted views of an organisation

Source: Author

Other functional systems such as the economy, mass media and education constitute the environment for the system of science. The organisation system only considers the chain of decisions and portrays the organisations as a "decision-making machine" (Nassehi 2005, p. 178).

Figure 7-3 illustrates a systemic model of two organisations. In this figure, organisation A is an institution involved in academic research production (e.g. a university), and organisation B is one of the potential consumers of the research-generated knowledge. As shown in Figure 7-3 the knowledge producer can be a potential knowledge consumer in some cases (e.g. for higher education research). The decisions of one organisation can communicate with the decisions of other organisations because both are the same type of communication codes. For example, practitioners learn from the decisions made by other practitioners. The psychic system of researchers and practitioners can communicate through interactions. For instance, ITO researchers reported interaction with practitioners. Note the researcher is referred to as a role or attribute, not the person. Hence, in this conceptual model one person can be simultaneously both a researcher and a practitioner. However, according to social system theory, a functional system cannot directly communicate with an organisation system because they use the different codes for communication. Instead, functional systems and organisation systems use a structural coupling to *irritate* each other and *trigger* the internal structure of the other system to respond. Hence, identification of the structural coupling mechanism between the system of science and the organisation system is essential for improvement of practical relevance of IS and Management research that aims to support organisational decision-making.

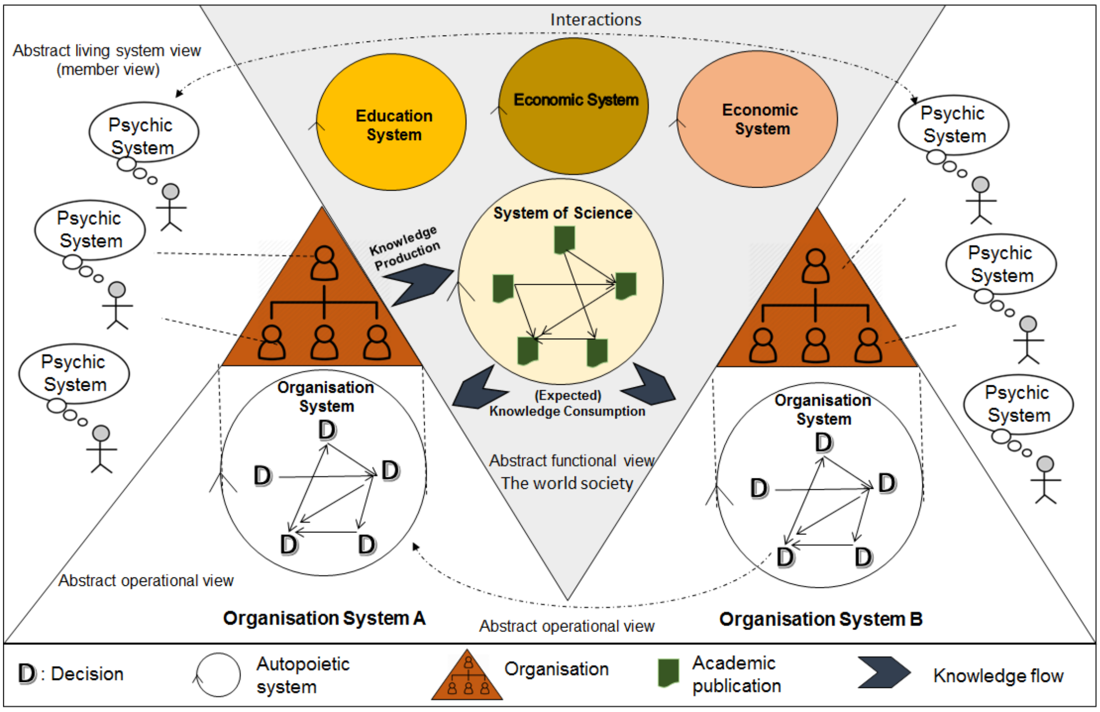


Figure 7-3 A conceptual model of systemic relationships among system of science and organisation systems

Source: Author

7.5.2. Retroductive analysis of barriers to adoption of ITO research

In addition to the factors related to knowledge production and transfer, the literature (§2.5) provided seven hypotheses as to the cause of limited research adoption related to the practitioners' side.

H9: Practitioners lack time to search for relevant academic research.

The findings of this study undermine the possibility of H9 as a substantial factor for poor research adoption. Although more than half of the participants (ITO practitioners) believed that H9 is one of the reasons for non-adoption of academic research, no significant correlation was found between H9 and use of academic research. Practitioners' perceptions of lack of time to locate relevant academic research can be due to their time-allocation practice. In other words, less time is left to locate relevant academic research because practitioners do not perceive academic research as a high priority source of knowledge acquisition, and subsequently, allocate time to other tasks. Prior studies (e.g. Carroll et al. 1997; Nilsson Kajermo et al. 2010) that reported practitioners' inadequate time as a hindrance to research adoption mainly relied on practitioners' self-reported data (i.e. survey of practitioners) and failed to further investigate the underlying causes of non-adoption of academic research. In other words, practitioners' declaration that 'we do not use academic research because we do not have sufficient time' is not sufficient to prove that H9 contributes to the non-adoption of academic research.

H10: Reading academic research publications demands too much time for practitioners.

H10 is an indicator of research *ease of use*. The findings support H10. Most participants believed that H10 is one of the reasons for non-adoption of academic research. Also, a significant correlation was found between H10 and use of academic research.

H11: The language of academic research publications is complex (e.g. uses jargon, mathematical formulae), thus is not easily understandable by practitioners.

No significant evidence was found to support H11. First, there was no significant agreement or disagreement on this hypothesis among the participants. Second, many practitioners have postgraduate degrees (more than 50% of participants in this study). Hence, they have been introduced to the academic language and read academic papers during their postgraduate education. Third, practitioners can employ specialists (such as consultants) to assist them with comprehension of the academic publications if they wish to use academic research that seems to them not understandable. The prerequisite seems to be practitioners' perception of the value of academic research to their business.

Hence this study does not support prior claims in the literature (e.g. DeNisi 1994; Parker 2012; Pearson, Pearson & Shim 2005; Sin 2008) about H11 as a cause of research non-adoption. It should be mentioned that the claim for support for H11 had been either personal opinion of the authors (e.g. DeNisi 1994; Parker 2012) or based on self-reported surveys of practitioners (e.g. Pearson, Pearson & Shim 2005). For instance, in a survey of IS practitioners, Pearson, Pearson and Shim (2005) found low awareness about IS research as well as practitioners' agreement that the language of academic research is complex and understandable. Consequently, the validity of practitioners' responses about the complexity of academic research papers could be questioned as they provided their opinion about something (academic research) that they were not aware of it.

H12: Practitioners do not have sufficient access to academic research publications.

The findings supported H12 as suggested by prior research (e.g. Darroch & Toleman 2005; Dobbins et al. 2007). The majority of participants agreed with the statement that 'if practitioners have sufficient access (e.g. free or through workplace subscription) to academic research, they will read more academic publications'. As acknowledged by diffusion of innovation theory (Rogers 2003) and knowledge transfer/utilisation models (Estabrooks et al. 2006; Gray et al. 2014) access to academic research is a prerequisite - *but not sufficient* - criterion for its adoption.

H13: Practitioners do not adopt academic research because they lack awareness of available academic research.

The findings supported H13. The majority of survey participants agreed with the statement that 'practitioners do not adopt academic research because they lack awareness of available academic research'. Also, lack of awareness was a frequent theme in the multiple case studies (§6.3). This finding aligns with prior empirical research (e.g. Pearson, Pearson & Shim 2005) that reported limited awareness of IS research among practitioners. Furthermore, the dominant role of non-academic media among practitioners creates a rival environment in which academic research has a low chance of being noticed by practitioners.

H14: Practitioners lack the skill/knowledge to implement academic research.

No significant evidence was found to support H14. Most practitioners disagreed with the statement that 'practitioners lack the skill/knowledge to implement academic research'. Moreover, the education profile of participants and possibility of employing specialists (as discussed in H12) undermines the likelihood that H14 is valid. The conclusion of this study is contrary to prior claims of some researchers (Carrion, Woods & Norman 2004; Carroll et al. 1997; Cohen 2007; Morago 2010). This disagreement could be because those prior studies were not empirical (Cohen 2007), or were based on self-reported surveys of practitioners without in-depth analysis (Carrion, Woods & Norman 2004; Carroll et al. 1997).

H15: Practitioners' perceptions are a barrier to adoption of academic research.

The findings of this study strongly supported H15. The majority of participants agreed with the statement that 'academic research is not a commonly used source for practitioners to acquire decision-making knowledge'. Moreover, the findings revealed an association between some of the perceptions of the practitioners about academic research and their adoption of academic ITO research. Perceptions about the relevance of academic research (applicability of academic research-based frameworks/models in the real world) and ease of use of academic research (not too much time to acquire and read) were associated with its adoption by practitioners. The findings showed that practitioners who were adopters of academic research perceived it more useful than non-adopters. Thus, it may be the negative perceptions about academic generated-knowledge, not the research rigour or relevance *per se* that prevents practitioners from seeking academic research-generated knowledge. Consequently, under such negative perceptions, even highly relevant and rigorous research-generated knowledge would have little chance of adoption in practice.

Further evidence to support H15 is practitioners' belief that *academic research is more suitable for leading organisations (early adopters) than followers.* Among the four case organisations this belief was prevalent.

Practitioners' perceptions about limited usefulness/practicality of academic research have been acknowledged by several studies (e.g. Fotache, Olaru & Iacoban 2015; Pearson, Pearson & Shim 2005; Westfall 1999). However, to the best of my knowledge, the empirical evidence on the effect of practitioners' perceptions about academic research on their research adoption is a new finding offered by this study.

In accordance with management fashion theory (Abrahamson 1991, 1996; Abrahamson & Fairchild 1999) and neo-institutional theory (Scott 1995), the findings raise the possibility that both *normative* and *mimetic mechanisms* (as outlined by neo-intuitional theory) hinder adoption of knowledge from academic sources. The belief that academic research is not a commonly used source for practitioners to acquire decision-making knowledge was significantly more frequent among non-adopters than adopters. In other words, perceptions of the credibility and usefulness of non-academic sources may have been institutionalised in the practice world by *normative* forces and consequently promoted further adoption from those sources. This seems particularly possible regarding consultants and vendors because they actively promote themselves as legitimate sources of knowledge e.g. as part of their marketing campaigns.

The dominance of the beliefs that academic research *is more suitable for leading organisations (early adopters) than followers,* and *is not a commonly used source for practitioners to acquire decision-making knowledge,* also reveals a possible underlying mimetic force (from neo-institutional theory perspective) or bandwagon effect (from management fashion theory perspective). As discussed in §2.4.5 and §2.4.6 individuals and organisations may take for granted the conventional ways of behaviour and attempt to imitate others whom they regard as superior.

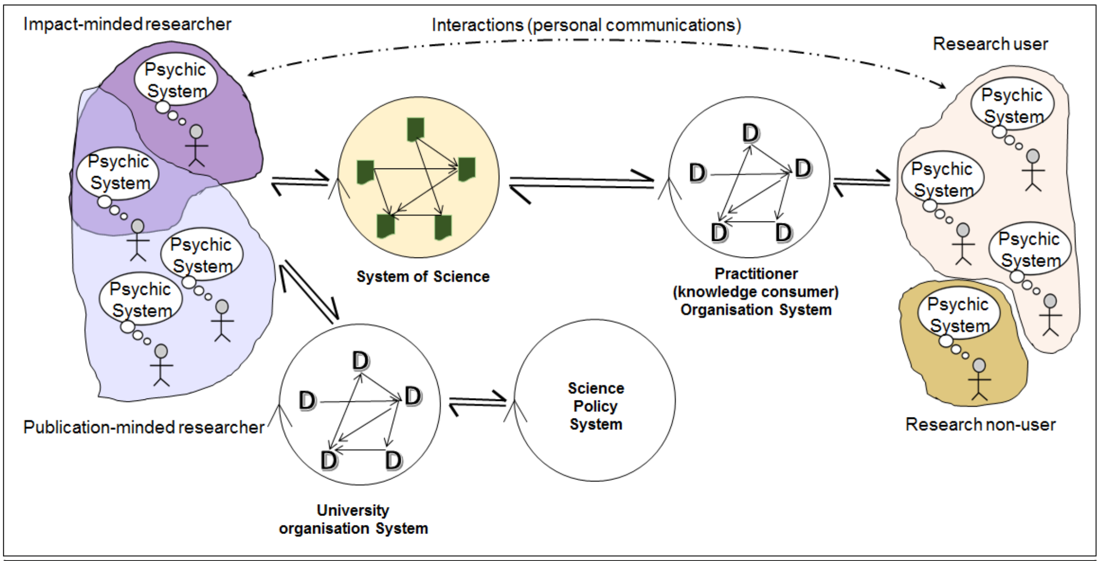
The implication of this finding (H15) in relation to social system theory is that the psychic systems of the practitioners influence their knowledge adoption behaviour as their perceptions are situated in their psychic system.

In the next section, I develop a systematic framework for the ITO research-practice gap and then discuss a potential structural coupling mechanism for improvement of research-practice communications.

7.5.3. A systemic framework for ITO research-practice gap

In this section, the main factors that contribute to the ITO research-practice gap throughout the process of knowledge production, transfer and adoption (discussed in §7.5.2) are integrated with the conceptual model of systemic relationships between organisations (presented in §7.5.1) to provide a comprehensive ITO research-practice gap framework (Figure 7-4). Also, this framework shows the underlying structures responsible for generating the forces that cause the various problems.

As shown in Figure 7-4 the psychic system of research users can be classified according to research users and research non-users. As described in §6.5, in line with the findings of Newman et al.'s (2016) research, this study finds that two communities of *user* and *non-user* of academic-generated knowledge exist within IT decision-makers.



Researchers' Psychic System	University Organisation System	System Of Science	Knowledge Transfer Domain	Practitioners' Organisation Systems	Practitioners' Psychic System
Events					
Limited motivation for conducting relevant research and engagement in knowledge transfer	Rewarding mainly publication-minded researchers	Research-generated knowledge with limited potential to inform practice	Knowledge transfer channels dominated by consultants, vendors	Academic research being the least used source of knowledge	Perceptions about limited usefulness of academic research Fashion-based or mimetic knowledge adoption behaviour
Mechanisms					
Self-interest goal seeking	Regulative mechanisms e.g. tenure & promotion rules	Peer review mechanism	Fashion setting & Normative mechanisms	Coercive mechanisms	Mimetic mechanisms
Structures					
Human motivation's structure	Academic reward schemes	Academic publishing structure	Management fashion market	Organisational decision making structure	Human perception's structure

Figure 7-4 A critical realism based autopoietic systemic framework for ITO research-practice gap

Source: Author

The rules and policies of the system of science for academic publication and reward act as regulative mechanisms that trigger responses in the researchers' psychic system. Consequently, the researcher perceives that the system of science tends to ignore relevance criteria in relation to the publication of research papers. Moreover, after the publication of a research paper, the main performance indicator is the number of citations (or measures that rely on the number of citations) to that paper by other academic papers, not the real-world use of the research. Hence, the researchers' systemic reactions would be to focus on publication, with little or no attention to research relevance. Of course, intrinsic motivations also exist and trigger some researchers to engage in production and transfer of relevant research to practice.

The findings of this study support the view that ITO researchers produced a body of knowledge that has limited power to irritate (trigger) the organisation system because most research in this field is not experience-based knowledge, i.e. does not report the result of deployment of suggested decision models/tools in real-world settings.

Additionally, knowledge transfer and consumption are under the influence of management fashion market and institutional forces. Thus, academic research is less likely to (passively) *diffuse* to organisational practice. Consequently, in the absence of proactive knowledge dissemination efforts, practitioners may not be aware of research-generated knowledge, as indicated by the findings of Phase C of this study.

Also, this study found that practitioners' perceptions of usefulness and ease of use of academic research influence research use. The negative perceptions may be caused by the institutional forces, such as consultants' self-promotion, that have led to a perceived alternative legitimate source of useful knowledge production.

Although the empirical data collected for this study was not specific to the science/research policy level, the role of the science policy system in knowledge production and transfer must be acknowledged. As shown in Figure 7-4, the science policy system affects the organisation system of academic institutions, such as universities, through the research fund allocation mechanism. In other words, the academic reward schemes within the university organisation systems interpret the science policy through research funding policies and rules and reflect this interpretation on their academic reward schemes.

7.5.4. In search of an effective structural coupling mechanism between systems of science and organisation

The consultants' model of knowledge dissemination can shed light to reveal a workable structural coupling mechanism between the system of science and organisation system. The findings of this study showed that consultants are one of the main sources of knowledge for ITO practitioners and the knowledge produced by consultants is the experienced-based knowledge that results from the implementation of organisational decisions. The findings are in line with management fashion theory highlighting the proactive dissemination and promotion of consultants' knowledge (e.g. reports, case studies) to practitioners (Abrahamson 1996; Abrahamson & Fairchild 1999; Bort & Kieser 2011). Moreover, consultants use practitioner media and events to reach out to practitioners.

Based on the above discussion, I argue that the structural coupling mechanism between the system of science and organisation system requires three criteria to be met. 1) Content: the research should report the knowledge/ experience gained as a result of a decision e.g. in the form of a case study. The justification for the potential usefulness of the research suggestions/prescriptions is essential because the prospective users need to know why and how the proposed approach would improve their practice. Specifically, in the case of ITO decision support research, validation and naturalistic evaluation of the decision support artefact can provide useful information to the decision-makers regarding *conceptual* and *instrumental* relevance (Drechsler 2014; Nicolai & Seidl 2010). 2) Dissemination channel: the research result must be disseminated through appropriate communication channels (e.g. practitioners' popular media and events) to reach its potential users (Gill & Hevner 2013). 3) Dissemination strategy: a proactive dissemination approach (e.g. marketing of academic research, academic entrepreneurship) is required to make the potential users aware of the research in an environment characterised by fashion setting and institutional forces. One promising strategy may be to target organisations that are perceived as the leaders in their market as a research partner or case organisation for pilot implementation of research. As the findings of Phase C showed, leading organisations perform as role models for some other organisations. Thus, it is expected that the research-based practices of leading organisations would diffuse among other organisations in the market. Figure 7-5 illustrates the outlined structural coupling between the system of science and organisation system.

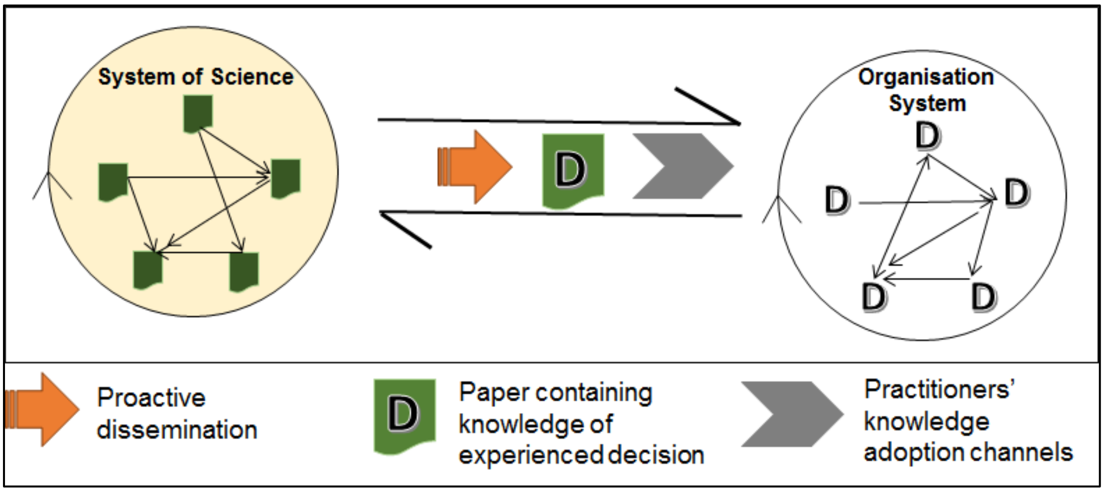


Figure 7-5 Possible structural coupling between system of science and organisation system

Source: Author

7.6. Chapter Summary

This chapter discussed the findings of the three phases of the study in the context of prior theories and literature. The discussion provided answers to the six research questions and highlighted the areas where the findings of this study confirm, reject or extend prior literature. A conceptual model based on social system theory was justified and presented to provide a basis for understanding the relationship between Management/IS research and practice. Next, the conceptual model was used to develop a comprehensive framework to understand the causes of the ITO DSS research-practice gap. Finally, a potential structural coupling mechanism to effectively relate the system of science and organisation system was suggested based on the discussion.

Adoption of the critical realism paradigm enabled a discussion on possible *causes* of the research-practice gap in various stages of knowledge production, transfer and adoption, beyond the positivist correlation-based causality. In other words, to identify the causality, empirical data about the events and correlation analysis together with qualitative findings were used as an *intermediary* means to reach causal explanations, not the sole and final sources for identification of cause and effect. In this CR-led discussion, correlations were considered as *descriptions* rather than mere *causal explanations* (Cruickshank 2003). Also, CR's retroductive approach placed the use of argumentation at the heart of causal analysis.

Furthermore, despite positivism's restriction to quantitative methods, CR allowed for methodological pluralism (i.e. a mixed-methods approach) that resulted in a deeper insight about the research problems. Moreover, CR allowed for "claiming to discover the truth" rather than postmodernist and social constructionist aim of "constructing a narrative about the reality of the group [being] studied" (Cruickshank 2003, p. 1).

Chapter 8. Conclusions and implications

8.1. Introduction

This chapter presents a summary and conclusion for this study based on the findings and discussions presented in previous chapters about ITO decision support research production, transfer and adoption. This chapter comprises seven sections as shown in Figure 8-1. Section 8.2 summarises the findings of this study and presents the conclusions about the research problems. Section 8.3 highlights the key contributions of this study to theory. In section §8.4 implications of the research findings for theory and practice are discussed. The main limitations of the study are acknowledged in §8.5. Section 8.6 presents suggested future research directions identified by this study. Section 8.7 provides a summary of the chapter.

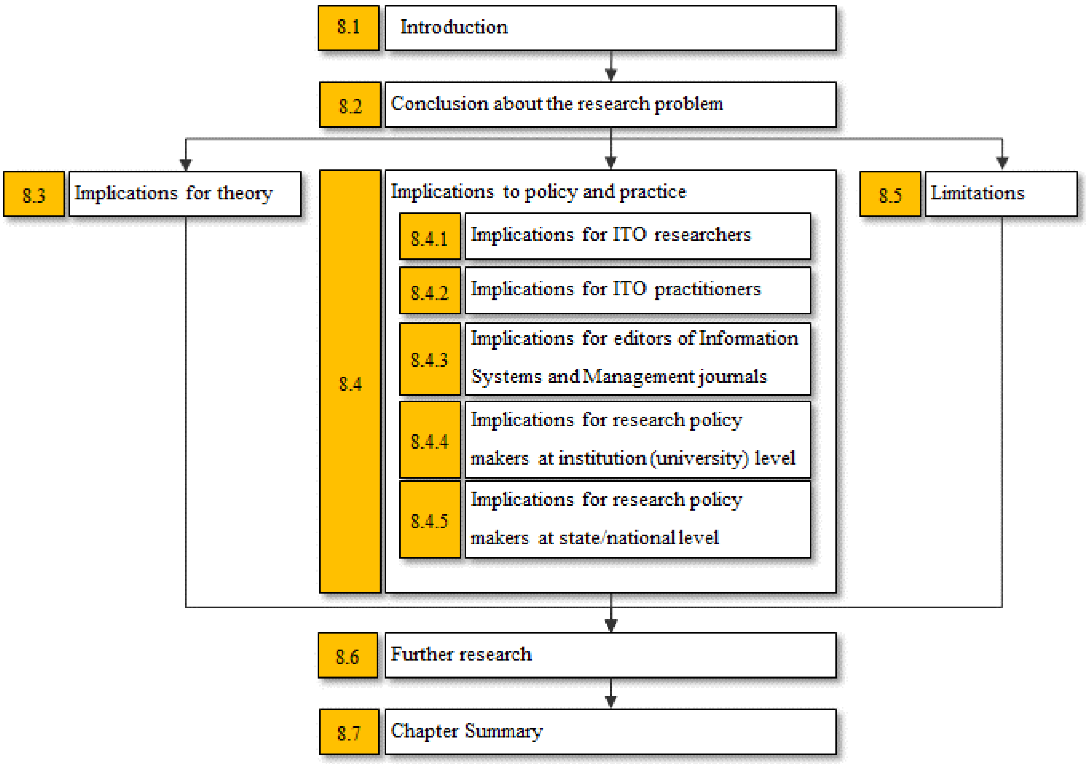


Figure 8-1 Structure of chapter 8

8.2. Conclusion about the research problems

The first research problem addressed in this study was the lack of knowledge about the scope, rigour and relevance of ITO decision support literature. To address this problem, a systematic literature review of a subset of normative ITO literature focusing on decision support artefacts (models/tools) was analysed. The analysis of this normative ITO literature provided answers to the two research questions (RQ1 and RQ2) that targeted the first research problem.

RQ1: What type of decision support artefacts have been suggested in the literature to support organisational IT outsourcing decisions?

A systematic literature review of model-driven ITO decision support literature provided an answer to RQ1. The systematic literature review identified 133 research papers that applied various decision analysis methods (e.g. MCDM methods, optimisation, system dynamics, real options and other mathematical models) to support different ITO decisions. Decision support artefacts identified in the surveyed literature for various ITO decisions including IT vendor or cloud service provider selection, ITO/Cloud adoption, what to outsource?, deciding the level of outsourcing or sourcing model, where to outsource (onshore or offshore)? and cloud deployment model selection.

RQ2: What level of rigour has been applied by researchers who developed model-driven artefacts for supporting organisational IT outsourcing decisions?

The answer to RQ2 was provided through a document analysis of the 133 ITO DSS papers identified in the study, guided by Hevner et al.'s (2004) Information System Research Framework and other related literature. The main weakness found in the majority of the ITO DSS papers was a lack of validation of the published decision support artefact. In most cases, the evaluation method reported in the articles was a simulation or execution of the model in an artificial setting to demonstrate the feasibility of the suggested model, not a naturalistic evaluation method. Furthermore, the extensive body of descriptive literature that applied numerous theories to ITO decisions, and could have been used as the knowledge base for developing rigorous ITO DSS artefacts, were barely used in the surveyed papers. In two-thirds of ITO DSS papers analysed, the fact that ITO initiatives are typically group decisions was neglected by the researchers.

In sum, the study found that ITO DSS literature is broad in scope but shallow in its rigour and relevance. Thus, the real-life application and utility of most of the published ITO decision artefacts is uncertain.

The second research problem was motivated by several concerns raised in the literature about ITO decision support literature. Scholars reported the need to support practitioners with their ITO decisions, the risks of unstructured approaches to ITO decision-making that had been found to be prevalent in practice, and non-use of academic-generated decision support artefact by practitioners. These issues prompted the possibility of a gap between ITO decision support research and practice. To address this research problem, this study investigated the three main phases of knowledge production, transfer and adoption. Four research questions were developed to address the different aspects of the second research problem.

RQ3: What knowledge-transfer activities are employed by academic researchers in the IT outsourcing decision support field?

Analysis of data collected (three interviews and 39 survey responses) from academic researchers who published ITO DSS papers showed that ITO researchers used multiple activities to transfer their research-generated knowledge to industry (practice). The knowledge-transfer activities that were used more frequently were traditional methods such as presenting research at events (e.g. seminars). Entrepreneurial knowledge transfer activities such as establishing spin-offs and developing software based on the research results (i.e. product development) were found to be the least used methods. The extent of engagement in knowledge-transfer activities was varied among the researchers.

RQ4: What factors may explain effective academic knowledge transfer from academic researchers to practitioners?

Analysis of researchers' survey data enabled the establishment of a profile of academic researchers who effectively disseminated their research-generated knowledge to industry, i.e. reported the implementation of the decision support model/framework they developed in an organisation. Effective academic engagement with practice was associated with researcher's motivation to support practitioners, personal communication with practitioners, active communication through practitioners' media (reading and writing), and proactive approaches to research dissemination (e.g. spin-off formation and software development). However, contrary to the claim that collaborative research will increase the adoption of research-generated knowledge, no significant effect was found in this study.

RQ5. To what extent are practitioners' IT sourcing decisions informed by academic research compared to rival external sources of decision-making knowledge?

In response to RQ5, the findings revealed that academic research was the least used source by practitioners for acquiring ITO decision-making knowledge. The most influential source was peer practitioners, followed by IT vendors/service providers and consultants.

RQ6. What factors may hinder the adoption of research-generated knowledge by ITO practitioners?

The findings from the survey of ITO practitioners who were mostly senior IT managers from a diverse range of industries/sectors and countries provided data to answer RQ6 from a practitioners' perspective. The findings revealed an association between some of the perceptions of the practitioners about academic research and their adoption of academic ITO research. Perceptions about the relevance of academic research (applicability of academic research-based frameworks/models in the real world) and ease of use of academic research (not too much time to acquire and read) were associated with its adoption by practitioners. The findings showed that practitioners who were adopters of academic research perceived it more useful than non-adopters. Thus, it may be the negative perceptions about academic generated-knowledge, not the research rigour or relevance *per se* that prevents practitioners from seeking academic research-generated knowledge.

To provide a comprehensive answer to RQ6, a systemic model of the relationship between a system of science (representing academic research) and organisational systems (representing organisational practice) was developed. Next, findings from the three phases of this study were integrated with multiple theories and prior research findings to develop a framework to understand the research-practice gap problem. The framework was applied to ITO DSS research and practice and underlying causes of the research problems were identified.

This study concludes that the current scientific publication enterprise together with academic reward schemes are the main structures that cause a knowledge production characterised by inadequate consideration of relevance criteria in academe, also demote engagement of academic researchers in the transfer of research-generated knowledge to industry (practice). Furthermore, the coercive, normative and mimetic forces operating in the knowledge consumption (practitioners') side has created an environment where academic research has little chance of being noticed and adopted by organisational decision makers. For instance, the belief that academic research is not a commonly used source for practitioners to acquire decision-making knowledge was significantly more frequent among non-adopters than adopters. In other words, perceptions of the credibility and usefulness of non-academic sources have been institutionalised in the practice world by normative forces and consequently promote further adoption from those sources. This seems particularly likely with consultants and vendors because they actively promote themselves as legitimate sources of knowledge, e.g. as part of their marketing campaigns.

8.3. Implications for theory

This study makes a distinctive contribution to the Information Systems and Management disciplines that have been found to lack attention to knowledge utilisation processes and adoption of academic research in practice. This study addresses the call for empirical studies of the research-practice gap in these disciplines (Bartunek & Rynes 2014; Jabagi et al. 2016; Kieser, Nicolai & Seidl 2015; Straub & Ang 2011).

This study makes an original contribution as the first to explore academic knowledge production, transfer and adoption in the area of IT outsourcing decision support. The findings of the study provide empirical evidence of a research-practice gap, responding to the call to investigate this issue.

This study is one of the few studies that addressed the call for a multi-theory approach for investigation of the research-practice gap problem. Integration of social system theory, management fashion theory, institutional theory, diffusion of innovation theory, and the literature on knowledge transfer and the research-practice gap provided a comprehensive lens to investigate the research problems. Also, the study identified the capacity and limitations of each of those theories in explaining the research problem.

The comprehensive approach of this study that included all phases of knowledge production, transfer, and adoption from the multi-perspectives (ITO researchers and practitioners) enabled the development of an integrated model of research-practice gap. This model extends previous attempts to understand the causes of the research-practice gap and sheds light on some unknown aspects of academic knowledge utilisation.

This study rejects the *two communities theory* (Caplan 1979) that considers culture and language as the barriers to adoption of academic research in practice. The naïve view of two communities theory that describes researchers and practitioners as two *distinct* group of people fails to consider the fact that some individuals work both as researcher and practitioner simultaneously or during their work life. Hence, two communities theory is not even useful as a *metaphor* as some scholars suggested.

This study showed that the *diffusion of innovation theory* (Rogers 1995, 2003) has limited use for the study of knowledge transfer from academe to industry for several reasons. First, DoI does not incorporate the innovation generation (e.g. knowledge production) domain and focuses only on transfer and adoption. Also, DoI is characterised by an innovation bias. Thus, it is problematic to be used for the study of academic knowledge adoption in which the very relevance of the research-generated knowledge (i.e. innovation) is uncertain. Second, DoI does not acknowledge possible structural boundaries between the domains of innovator and adopter. Nevertheless, a structural boundary between the system of science and organisational systems exists. While DoI assumes that the diffusion process occurs *naturally* over time such natural process is unlikely to occur when the structural boundary between systems exists. Nevertheless, DoI was found useful for investigation of practitioners' adoption of ITO decision-making knowledge. In line with DoI, this study found strong support for the role of *interpersonal communication channels* (or *interactions* in Luhmann's terminology) in the persuasion stage of knowledge adoption. As DoI asserts, practitioners were significantly reliant on their peers to know the advantages and disadvantages of ITO initiatives through personal communication channels. In sum, DoI is justified for the study of innovation adoption whenever the innovation and the potential adopters *inhabit the same autopoietic social system*. But DoI has little to offer for investigation of cross system boundaries as it does not recognise the difference between codes of communication of the two systems that prevent direct communication.

To the best of my knowledge, this study is the first that applies Luhmann's social system theory in an *empirical* investigation of the research-practice gap. While other studies discussed the implication of social system theory for investigation of the research-practice gap, no study was found that empirically applies this theory to the research-practice gap problem. All the Luhmann-based studies reviewed were essays containing normative opinion statements of the authors. This study showed that social system theory's conceptualisation of social systems can capture the complexities of interactions between the systems of science and organisations. Luhmann-based definition of social systems was found to be superior to conventional member-based definitions. Using Luhmann's theory enabled this study to offer a unique and detailed description of the relationship between the system of science and organisation systems (decision-making practice). In addition, this study identified a potential structural coupling mechanism that may lead to an increase in adoption of academic research in practice. The novel conceptualisation of the research-practice relationship provided in this study opens a new horizon for developing a new theory of academic research utilisation.

This study addressed the call for increased use of mixed-methods research and critical realist research in information systems (Mingers, Mutch & Willcocks 2013; Smith & Johnston 2014; Venkatesh, Brown & Bala 2013; Zachariadis, Scott & Barrett 2013). The use of a critical realist approach offered a valuable lens to analyse the findings of this study. This perspective facilitated a deeper exploration of underlying causal mechanisms and structures which often influence the research production, transfer and adoption processes. Also, this study addressed the call for increased systems science research in Information Systems (Demetis & Lee 2016).

8.4. Implications for policy and practice

The findings of this study have several implications for policy and practice as explained in this section.

8.4.1. Implications for ITO researchers

Academic researchers are practitioners of the system of science. This study targeted a multi-disciplinary research field that includes mainly IS and Management researchers. The findings of this study can guide the researchers in ITO decision support field to improve the rigour and relevance of their research. Some findings are generalisable to DSS research.

First, the systematic literature review conducted in this study is an output that can be used for future research because the review provided a comprehensive summary of prior ITO DSS research and discussed its rigour and relevance to practice.

Second, this study urges academic researchers to engage with practitioners, from the formulation of research problem stage through to the evaluation of final outputs of the research and seeking feedback on the research implications for practice. The mutual benefits of researchers' engagement with practitioners is discussed in chapter 2 (§2.4.4).

Third, this study provides 12 recommendations that can assist researchers to develop rigorous and possibly relevant ITO decision support artefacts to assist practitioners with their ITO initiatives. Table 8.1 provides a summary of recommendations for improvement of ITO DSS research. Next, each recommendation is explained and justified.

R1.1: According to the empirical ITO literature (summarised in §2.2) ITO decisions are normally group based and made by C-level managers, and are both technical and non-technical due to the sociotechnical nature of the decisions. Thus, the ITO DSS artefact (e.g. method or software) should be capable of group decision support, and consider the needs and requirements of both technical and non-technical C-level managers.

Table 8.1 Recommendations for improvements to ITO DSS research

1 Environment (Organization, Technology, People)		Underpinning source
R1.1	Artefact should be capable of group decision support and capable of supporting C-level managers	Empirical ITO literature (see §2.2)
R1.2	Organisational context and characteristics should be considered in the artefact design and development process and should be explicitly presented	
2 Theoretical Foundations		
R2.1	DSS artefacts should be grounded in organisational decision-making research	DSS literature (Arnott & Pervan 2008a)
R2.2	Decision variables incorporated in the designed artefact (ITO DSS) should be derived from ITO descriptive literature and grounded in ITO reference theories	IS research framework (Hevner et al. 2004)
R2.3	ITO decision support frameworks, instruments, models, constructs, methods and instantiations available in the literature should be reviewed and critically assessed	
3 Methodologies		
R3.1	Practice-oriented research methodologies that consider both rigour and relevance. Design science research, action research and case study should be used for development of ITO DSS	Rigour and Relevance requirement (Hevner et al. 2004)
4 Justify/Evaluate		
R4.1	Artefact should be validated	DSS literature (see §4.7) & IS research framework (Hevner et al. 2004)
R4.2	Artefact should be verified	
R4.3	Requirements for implementation of the artefact including usability, readiness for use should be addressed	
R4.4	Assumptions and limitations of the artefact, its appropriate use, and the logic of decision model should be presented	
R4.5	Naturalistic (field setting) evaluation should be used	Relevance requirement (Peffers et al. 2007; Venable 2006; Venable, Pries-Heje & Baskerville 2012)
R4.6	Appropriateness of the decision analysis method(s) selected for DSS should be justified	Rigour requirement according to IS research framework (Hevner et al. 2004)

R1.2: The ITO literature suggests that ITO decisions are contextual i.e. favourable ITO decisions depend on organisational context and characteristics (such as size, sector, overall business strategies, and structure). Therefore organisational context and characteristics should be considered in the artefact design and development process and explicitly presented. ITO decision support artefacts may also need to differentiate between various types of IT services/functions because the complexity and level of decision structure vary according to IT services/function. For instance, the decision to outsource PC maintenance is different from outsourcing software development in terms of complexity and structure. Such consideration was not apparent in the surveyed ITO DSS literature.

R2.1: Because the mission of DSS is to improve managerial decision-making, the DSS artefacts should be grounded in organisational decision-making research (Arnott & Pervan 2008a).

R2.2: Reference to, and discussion about organisational decision-making was almost absent in the majority of the articles analysed. As discussed in §2, an extensive body of ITO literature has been accumulated over three decades of research. This literature includes many reference theories and empirical findings (e.g. decision variables, benefits and risks of ITO) that form a knowledge base for ITO. This knowledge base should be used so that the designed ITO DSS will be rigorous and underpinned by scientific research.

R2.3: ITO decision support frameworks, instruments, models, methods and instantiations available in the literature should be reviewed and critically assessed to base the design effort on the accumulated scholarship of research and avoid reinvention of the wheel.

R3.1: Practice-oriented research methodologies such as design science research, case study and action research that consider both rigour and relevance should be adopted for the development of decision support artefacts. Evidence from the assessment of DSS literature has confirmed the higher chance of relevance for studies that used case study or design science research methodologies (Arnott & Pervan 2008a).

R4.1: There is a consensus in the literature on the need to validate the decision support artefacts (Borenstein 1998). Without validating the designed artefact, real world decision makers cannot rely on the results generated by the artefact (DSS).

R4.2: As part of evaluation, verification of the artefact (DSS) should be performed by careful examination of the artefact’s conception and by testing the extent to which the artefact has been faithful to its design.

R4.3: To justify the feasibility of implementation and to facilitate the adoption of the artefact by organisational practitioners, the requirements for implementation of the artefact including usability and readiness for use should be addressed.

R4.4: The assumptions and limitations of the artefact, its appropriate use, and the logic of its decision model should also be presented. Without considering the implementation requirement, the practical relevance of the artefact could be questionable, even if the artefact satisfies the criteria for rigour.

R4.5: Since the artefact is designed to be used in the practice world of organisations, its effectiveness needs to be evaluated using naturalistic evaluation methods.

R4.6: The appropriateness of the decision analysis method(s) selected for DSS should be justified, because each decision analysis method is suitable for a specific type of problem and is based on specific assumptions.

8.4.2. Implications for ITO practitioners (decision makers)

ITO practitioners should be informed that solely relying on consultants, vendors and peers as knowledge sources could result in poor decisions based on biased information. Alternatively, the independent knowledge from academic sources may provide valuable, evidence-based information to aid in decision-making. ITO practitioners should consider engagement with academic researchers e.g. through collaborative research as a knowledge exchange opportunity with mutual benefits to both parties. IT practitioners should also recognise their critical role as customers of academic research, and the fact that they deprive themselves of the benefits of academic research if they fail to engage with academics and provide feedback on academic research.

The result of this analysis is a comprehensive account as well as a critical review of various model-based approaches for support of IT outsourcing decisions. The output of analysis can help ITO practitioners who seek scientific approaches for ITO decision making to grasp the state of the art of research. The critical assessment approach undertaken in this study provides practitioners with a set of rigour and relevance criteria to use when deciding on the possible utility of an ITO decision support artefact.

8.4.3. Implications for editors of Information Systems and Management journals

The empirical findings support the claim that a research-practice gap exists in the IT outsourcing field that has engaged academic researchers from both IS and Management fields. The limited use of academic research by practitioners is an alarming symptom for ITO research in particular and the IS and Management research community in general. Both Information Systems and Management are applied disciplines, thus their research should produce useful knowledge to support practitioners. Knowledge is useful for practitioners if it can enable them to make better decisions. However, after three decades of ITO research, the practical relevance of ITO research is still unknown. In other words, ITO researchers have been (and still are) conducting research but rarely attempt to evaluate the practical relevance and impact of their research on practice, and have not established feedback loops for continuous improvement of ITO research. Such practice of research raises serious concerns about the rationale for conducting research and queries the possible waste of academic resources (e.g. research funds and researchers' time). The findings may prompt the research community to redefine publication standards with attention to research relevance. Enforcement of a set of relevance criteria as suggested by some scholars seems a promising approach. For example, the relevance criteria can prevent publication of papers that suggest a decision support artefact but do not provide adequate evidence of the utility of the suggested artefact e.g. through rigorous validation and naturalistic evaluation.

8.4.4. Implications for research policy makers at institution (university) level

University administrators and research policy-makers should employ a policy that promotes academic engagement as an integrated part of academic research. In other words, academic knowledge transfer to industry and impact on the practice world should not be merely a personal third mission of some researchers, but an organisational mission of academic institutions. Therefore, academic engagement should be rewarded at a comparable level to publishing in academic journals and conferences. This could redirect the attention of researchers from a single-minded focus on publishing articles to increase their academic engagement. The novel classification of academic researchers based on their motivation for conducting research and their achievement in academic knowledge transfer suggests the existence of different communities within the academic research world. Research team leaders and university administrators may find this classification useful in allocating research projects to academic researchers. For instance, for research projects that aim to have an impact on the industry and result in practical outcomes, being an impact-minded researcher (e.g. known from researcher's past performance) should be a major criterion.

Programs that provide the opportunity for interpersonal communication between academic researchers and practitioners can enhance both the volume and quality of academic engagement and benefit both parties. One example of such a program is a community of practice (CoP) that could bring together academic researchers and practitioners working in the same field. The term, *community of practice* is defined as: "Groups of people who share a concern ... and who deepen their knowledge and expertise in this area by interacting on an ongoing basis ... [As they] accumulate knowledge; they become informally bound by the value that they find in learning together. Over time ...[t]hey become a community of practice" (Wenger, McDermott & Snyder 2002, pp.4-5). The community of practice is underpinned by social learning theory (Bandura 1977) that highlights the importance of learning and knowledge exchange in a social environment. While communities of practice have been successfully implemented extensively both in industry and academia (Wenger, McDermott & Snyder 2002), joint academic-practitioner CoPs seems to be underutilised or receive less attention.

8.4.5. Implications for research policy makers at state/national level

Increasing the impact of academic research on practice has been an enduring concern for research (science) policy makers at state/national level across the world. The extensive literature on academic knowledge transfer, knowledge utilisation and the research-practice gap highlights the complexity of research utilisation. The systemic model presented in this thesis can provide valuable insight to understand the causes of the research-practice gap. This study raised the issue of the critical role of state/national research policies to trigger structural changes in the system of science. Policy makers need to ensure that such academic engagement activities are adequately valued in the allocation of research funds and academic reward schemes. This study provides insights for research policy makers by providing a better understanding of the criteria of potentially applicable (relevant) research. This study suggests that communication of research to practitioners should be perceived as a *proactive knowledge transfer* process rather than a *passive diffusion process*. However, the knowledge transfer process should not be perceived as a simple process of moving research results to practice. In contrary, the research result should be actively disseminated through appropriate channels to ensure awareness and trigger the structure of the targeted system (e.g. organisation, education, etc.) to restructure itself based on the scientific research findings.

Also, there is a need for policies and programs to improve practitioners' perceptions of academic research.

The retroductive analysis of possible barriers to adoption of academic research can help policy makers to realise which of the many notions available in the literature may likely be the root causes of the research-practice gap.

8.5. Limitations

The findings should be interpreted within the study limitations.

First, in Phase A although I selected the main research databases related to the topic, some ITO DSS articles may have been omitted due to the choice of research databases.

Second, the sample size and purposeful sampling strategy in Phase B and Phase C limit the statistical generalisability of the findings. The empirical data collected in this study was relatively limited. The study involved a small group of academic researchers (41) within a specific research field. In total 74 ITO practitioners participated in the interviews and the survey. Also, the distribution bias of the country of residence of the survey of ITO practitioners towards the USA should also be noted when interpreting the results of the practitioners' survey. Despite these limitations, use of the retroductive inference under the Critical Realism paradigm allowed for drawing analytical generalisable findings.

Third, similar to the majority of previous studies on academic knowledge transfer (e.g. Perkmann et al. 2013), this study relied on academic researchers self-reporting information that might affect the quality and reliability of the data. To provide triangulation of data, future studies could include practitioners who had been involved in collaborative research or have adopted the research-generated knowledge (the decision support models/frameworks in this case). Since some of the researchers who participated in this study reported adoption and implementation of the decision support models/frameworks generated through their research, in-depth case studies of these instances of adoption of academic knowledge may provide valuable insights to improve the effectiveness of academic knowledge transfer.

Fourth, due to the scarcity of the literature on the compatibility of Social System Theory with the CR paradigm, this study is limited to the justification of the overall compatibility of these two disciplines, and does not claim their full consistency in every aspect. Several scholars discussed and supported the compatibility of Social System Theory with CR paradigm. For instance, Mingers (2011, p. 303) argued that "systemic and holistic concepts such as totality, emergence, open systems, stratification, autopoiesis and holistic causality" are embodied at Bhaskar's CR. According to Mingers (2011), despite the lack of direct reference to Systems Science literature in Bhaskar's works, many of the fundamental ideas of critical realism have already been developed within the Systems Science discipline. Furthermore, Mingers (2011) asserted that CR and Systems Science (or system thinking) disciplines can be of mutual benefit to each other, and called for more "dialogue and debate between the two disciplines" (p. 327). Also, Hernes and Bakken (2003) noted the similarity of Luhmann's social system theory and Bhaskar's critical realism paradigm with respect to their common aim of establishing a relationship between social and natural sciences. They asserted that some aspects of Bhaskar's work "strike chords with Luhmann's work, notably in its treatment of recursivity, which would be worthy of study in relation to organization theory" (Hernes & Bakken 2003, p. 1525). In addition, Moussa (2007) examined the ontological feature of Luhmann's system theory and concluded that while Luhmann's system theory does not completely reject the idealist ontological premises, it is compatible with CR's ontological assumption, because it "presuppose the objective existence of natural powers and liabilities [(i.e. generative mechanisms)] in open systems of cause and effect" (Moussa 2007, p. 90). Hence, use of social system theory under the CR paradigm, as undertaken in this study, is justified. Nevertheless, the lack of a thorough and detailed investigation of possible unseen issues that may arise from the combination of social system theory should be noted as a limitation of this study.

Fifth, given that this was my first effort undertaking critical realist research and that CR is not the most widely adopted research paradigm in Information Systems and Management disciplines, I do not claim that all features of CR have been applied in this thesis. Moreover, while I believe that useful explanations for the research problems are presented in this thesis and are grounded on a justified research paradigm, empirical investigation and retroductive reasoning, the conclusions presented in this thesis are not claimed to be "definitive finished truth" (Cruickshank 2003, p. 2). On the contrary, taking a critical realist perspective, this study only claims an improvement in our interpretations of reality, because "the [CR] expectation is that knowledge claims will continue to be better interpretations of reality" (Cruickshank 2003, p. 2). Moreover, like other research paradigms, critical realism is open to critique. For instance, Alvesson and Sköldberg (2009) claimed that CR's concept of *generative mechanisms* cannot fully represent the complexity and variety of causality of social phenomena.

8.6. Further research

This study identified several topics that deserve further research. First, the influence of IT consultancy firms and IT vendors on sourcing decisions of IT decision-makers is a less explored area that demands further research. Second, because various MCDM methods have different characteristics and may lead to inconsistent results, future research is required to determine the most suitable MCDM method for each type of IT outsourcing decision. Future research should establish criteria to support ITO decision makers to select one or a hybrid of MCDM methods that are most appropriate to improve the quality of IT outsourcing decisions. Third, the boundary spanning theory in the context of university-industry engagement (Weerts & Sandmann 2010) is a theoretical approach that could provide a promising opportunity to enhance the academic knowledge transfer literature. Fourth, although the potential benefits of collaborative research to increase the practical relevance and real-world adoption of research is widely acknowledged, the natural realisation of such benefits cannot be taken for granted and characteristics of successful collaborative research deserve further investigation. Fifth, a thorough examination of the consistency between CR and Lehmann’s social system theory is sparse in the literature and deserves further investigation. In particular, the philosophical assumptions of CR and social system theory should be carefully compared and implications of possible variations for integration of them should be discussed in future research.

8.7. Chapter Summary

This chapter summarised the research findings and answers to the research questions. It presented the conclusion of the research about the research problems investigated in this PhD thesis. Also, the implications of the research findings to theory, practice and policy are discussed and recommendations offered to ITO researchers, ITO practitioners, editors of IS and Management journals, and research policy makers at national, state and university levels.

This study engaged two fields of research: ITO DSS and academic knowledge transfer/utilisation (including the research-practice gap). For ITO DSS, this study identified the scope, rigour and relevance of the field. The findings confirmed the existence of a research-practice gap in the ITO DSS field. The analyses conducted in the study based on scientific theories and frameworks enabled identification of improvement opportunities and consequently recommendations for improvement of ITO DSS research. Also, this study made a significant contribution to the highly complex and debated field of research utilisation and the research-practice gap. The main contributions were the formulation of the science-practice relationship based on autopoietic system theory, and use of a multi-theory, mixed-method research under the critical realism paradigm to discuss the much-debated causes of the research-practice gap problem.

While this study made one step forward in understanding the investigated research problems, the scientific inquiry is always open to further advances. This chapter suggested some future research directions.

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Appendices

Appendix A: Ethics documents

A.1 Ethics Approval for preliminary case study

OFFICE OF RESEARCH
Human Research Ethics Committee
PHONE +61 7 4631 2690| FAX +61 7 4631 5555
EMAIL ethics@usq.edu.au

UNIVERSITY OF SOUTHERN QUEENSLAND AUSTRALIA

23 May 2014

Mr Mohammad Mehdi Rajaeian
C/- Room T437
Faculty of Business, Education, Law and Arts
University of Southern Queensland
TOOWOOMBA QLD 4350

Dear Mohammad Mehdi

The USQ Human Research Ethics Committee has recently reviewed your responses to the conditions placed upon the ethical approval for the project outlined below. Your proposal is now deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethical approval has been granted.

Approval No.	**H14REA103**
Project Title	Information technology (IT) sourcing strategies in higher education: A case study of USQ
Approval date	23 May 2014
Expiry date	23 May 2017
HREC Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website:
http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

AJackson

Annmaree Jackson
Ethics Coordinator

Copies to: MohammadMehdi.Rajaeian@usq.edu.au

University of Southern Queensland
Toowoomba | Springfield | Fraser Coast

usq.edu.au
CRICOS QLD 00244B NSW 02225M
TEQSA PRV12081

A.2 Ethics Approval for the main study

OFFICE OF RESEARCH
Human Research Ethics Committee
PHONE +61 7 4631 2690| FAX +61 7 4631 5555
EMAIL ethics@usq.edu.au

UNIVERSITY OF SOUTHERN QUEENSLAND AUSTRALIA

22 July 2015

Mr Mohammad Mehdi Rajaeian
C/- Room T437
Faculty of Business, Education, Law and Arts
University of Southern Queensland
TOOWOOMBA QLD 4350

Dear Mohammad Mehdi

The USQ Human Research Ethics Committee has recently reviewed your responses to the conditions placed upon the ethical approval for the project outlined below. Your proposal is now deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethical approval has been granted.

Approval No.	**H15REA144**
Project Title	An investigation of the research practice gap in IT outsourcing decision making
Approval date	22 July 2015
Expiry date	22 July 2018
HREC Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website:
http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

Annmaree Jackson
Ethics Coordinator

Copies to: MohammadMehdi.Rajaeian@usq.edu.au, aileen.cater-steel@usq.edu.au

A.3 Sample participant information Sheet

University of Southern Queensland

UNIVERSITY OF SOUTHERN QUEENSLAND AUSTRALIA

Participant Information for USQ Research Project Interview

Project Details

Title of Project:	An investigation of the research-practice gap in IT outsourcing decision making
Human Research Ethics Approval Number:	H15REA144

Research Team Contact Details

Principal Investigator Details
Mr. Mohammad Mehdi Rajaeian
Email: MohammadMehdi.Rajaeian@usq.edu.au
Telephone: (07) 4631 5519
Mobile: 0450 052 814

Supervisor Details
Professor Aileen Cater-Steel
Email: aileen.cater-steel@usq.edu.au
Telephone: (07) 4631 1276

Description

This project is being undertaken as part of a PhD Project.

The purpose of this project is to study the IT outsourcing (ITO) decision-making process both in research and in practice; and investigate the factors contributing to the gap between research and practice in this domain.

The research team requests your assistance because you are involved in the field of IT outsourcing decision-making and your views will bring valuable insight into this research.

Participation

Your participation will involve participation in an interview that will take approximately one hour of your time.
The interview will take place at a time and venue that is convenient to you or
The interview will be undertaken by teleconference at a date and time that is convenient to you.
Questions will include: How do you evaluate ITO decisions in terms of degree of complexity, degree of structure and decision making process? Have you tried to disseminate the output of your research to the practice? How? What are the problems that constitute a research-practice gap?
The interview will be audio recorded.

Your participation in this project is entirely voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage before the project closure. In this case the audio file and notes taken at the interview will be deleted. If you do wish to withdraw from this project or withdraw data collected about you, please contact the Research Team (contact details at the top of this form).

Your decision whether you take part, do not take part, or to take part and then withdraw, will in no way impact your current or future relationship with the University of Southern Queensland or your affiliated organisation.

Expected Benefits

It is expected that this project will not directly benefit you. However, it may benefit you by receiving the summary report of this study that will shed light on various aspects of IT outsourcing decision making and ways of benefitting practitioners from academic research and vice versa.

Risks

There are no anticipated risks beyond normal day-to-day living associated with your participation in this project.

Privacy and Confidentiality

All comments and responses will be treated confidentially unless required by law.

- After the interview you will receive a copy of the transcribed interview and you will have the opportunity to verify your comments and responses prior to final inclusion.
- Audio recording will be stored on a secure data storage at USQ.
- The recording will not be used for any other purpose.
- The research team (investigator and his supervisors) will have access to the recording. Also professional transcribers from Pacific Transcription Institute may be involved in the transcribing of the recording. Pacific Transcription adheres to the Australian Privacy Principles and conforms to university contractor agreements. To protect your privacy and ensure confidentiality, interview audio and transcriptions will not be made available to others at any time.
  If you wish to participate in the study without voice recording, please advise the investigator. In this case the interview may take longer as the researcher will need more time to take notes during the interview.

Any data collected as a part of this project will be stored securely as per University of Southern Queensland's Research Data Management policy.

Consent to Participate

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate in this project. Please return your signed consent form to a member of the Research Team prior to participating in your interview.

Questions or Further Information about the Project

Please refer to the Research Team Contact Details at the top of the form to have any questions answered or to request further information about this project.

Concerns or Complaints Regarding the Conduct of the Project

If you have any concerns or complaints about the ethical conduct of the project you may contact the University of Southern Queensland Ethics Coordinator on (07) 4631 2690 or email ethics@usq.edu.au. The Ethics Coordinator is not connected with the research project and can facilitate a resolution to your concern in an unbiased manner.

Thank you for taking the time to help with this research project. Please keep this sheet for your information.

A.4 Sample consent form

University of Southern Queensland

Consent Form for USQ Research Project Interview

Project Details

Title of Project:	An investigation of the research-practice gap in IT outsourcing decision making
Human Research Ethics Approval Number:	H15REA144

Research Team Contact Details

Principal Investigator Details
Mr. Mohammad Mehdi Rajaeian
Email: MohammadMehdi.Rajaeian@usq.edu.au
Telephone: (07) 4631 5519
Mobile: 0450 052 814

Supervisor Details
Professor Aileen Cater-Steel
Email: aileen.cater-steel@usq.edu.au
Telephone: (07) 4631 1276

Statement of Consent

By signing below, you are indicating that you:

- Have read and understood the information document regarding this project.
- Have had any questions answered to your satisfaction.
- Understand that if you have any additional questions you can contact the research team.
- Understand that the interview will be audio recorded and transcribed.
- Understand that you are free to withdraw at any time, without comment or penalty.
- Understand that you can contact the University of Southern Queensland Ethics Coordinator on (07) 4631 2690 or email ethics@usq.edu.au if you do have any concern or complaint about the ethical conduct of this project.
- Are over 18 years of age.
- Agree to participate in the project.

Participant Name	
Participant Signature	
Date	

Please return this sheet to a Research Team member prior to undertaking the interview.

Page **1** of **1**

Appendix B: Interview questions

B.1 Interview questions- preliminary case study

1. Does USQ have an IT strategic planning process/ strategic plan?
2. Can you give me an idea of the annual ICT budget?
3. How much of ICT has been outsourced (in terms of budget …)?
4. When was the first Information Technology Outsourcing contract signed? How many IT suppliers? Local/other cities/other countries?
5. Which IT services are outsourced/how much? (Application development, IT helpdesk and support, Infrastructure and data centre service, Testing, Application management, Desktop and workplace management …)?
6. Who are key decision makers in information technology outsourcing?
7. What is the process of decision making? Is it formal (e.g. is there any documented instructions?)
8. Do you use external IT consultancy for making IT decisions, particularly Information Technology Outsourcing?
9. Do you conduct a cost/benefit analysis for each Information Technology Outsourcing decision/contract? How?
10. What are a key determinant of information technology outsourcing at USQ?
11. Have you ever experienced a shortfall of local IT Labour or high labour cost? If yes has it affected Information Technology Outsourcing decisions?
12. "Outsourcing is more cost effective than insourcing IT" to what extent do you agree based on USQ experience?
13. What are your criteria for choosing an IT service provider?
14. To what extent do you try to make Information Technology Outsourcing decisions based on what other universities are doing?
15. Are there any Federal/ State governmental rules/regulations affecting your Information Technology Outsourcing decisions (e.g. promoting or banning)
16. Is USQ using cloud services? Is there any plan to use/expand?
17. Do you consider environmental factors and sustainability criteria in purchasing hardware? How?
18. Any sociocultural issues (language/culture difference) if USQ offshores some of its ICT?

B.2. Interview questions – IT managers

Interviewee background

1. Interviewee Name:
2. Organisation Name:
3. Position:
4. Education and Graduation year:
5. How long have you been …
    - working at this institution/company?
    - working in ICT field?
    - involved with IT sourcing decisions?

Company ITO background

6. How many employees work in IT/IS department (Full-time equivalent)?
7. What's the approximate level of ITO at the organisation? (What percent of IT is outsourced in terms of budget?)
8. Which of the following has been outsourced (totally or partially)?

☐ Software development and maintenance ☐ Hardware maintenance and support

☐ Telecommunication and network ☐ IT/IS Planning and management

☐ Cloud services (infrastructure, application, and platform)

9. Are you dealing with one or more than on vendors/IT providers?
10. Please answer two following questions about **complexity** and **degree of structure** of IT outsourcing decisions:

10.1. How **complex** do you perceive the sourcing decisions (such as: to outsource or not? Which IT systems/services to outsource? To which vendor/provider? Where? Onshore/offshore? Cloud?) for following IT services/processes?

Note: Degree of **complexity** is related to the **<u>number of factors considered</u>** and **<u>their inter-relationships</u>**. High complexity is associated with **<u>unclear preferences and environmental (external) change.</u>**

		Not complex (a few decision factors and no environmental variables)	Low complexity	Average complexity	High Complexity	Very high complexity (many decision factors, also environmental variables with changing values)
Software development and maintenance		☐	☐	☐	☐	☐
Hardware maintenance and support		☐	☐	☐	☐	☐
IT Help Desk / end-user support		☐	☐	☐	☐	☐
Telecommunication and network		☐	☐	☐	☐	☐
IT/IS Planning and management		☐	☐	☐	☐	☐
Cloud services	Infrastructure as a service	☐	☐	☐	☐	☐
	Application as a service	☐	☐	☐	☐	☐
	Platform as a Service	☐	☐	☐	☐	☐

10.2. How structured do you perceive the sourcing decision for following IT services/processes?

Note: The degree of **structure** is defined as **<u>the degree of cause & effect knowledge</u>** and **<u>access to an established procedure for decision-making</u>**

		Fully Structured (high knowledge & established procedure)	Highly structured	Semi-structured	Less structured	Not structured (less knowledge & no established procedure)
Software development and maintenance		☐	☐	☐	☐	☐
Hardware maintenance and support		☐	☐	☐	☐	☐
IT Help Desk / end-user support		☐	☐	☐	☐	☐
Telecommunication and network		☐	☐	☐	☐	☐
IT/IS Planning and management		☐	☐	☐	☐	☐
Cloud services	Infrastructure as a service	☐	☐	☐	☐	☐
	Application as a service	☐	☐	☐	☐	☐
	Platform as a Service	☐	☐	☐	☐	☐

ITO decision-making process

11. Is there an established/formal procedure for the ITO decision-making process (steps) in the organisation?
12. Is the ITO decision-making process based on the organisation's own experience from previous outsourcing engagements? Or what other organisation have used (e.g. best practices)? academic/ industry(consultancy) research?
13. Does your organisation use external consultants' services to assist you in ITO decision-making? If yes, individual or consultancy firms? How do you perceive their usefulness?
14. Do you think the current decision-making model is comprehensive and accurate? Were there any instances of making wrong sourcing decisions earlier?
15. Do you feel any lack of knowledge and tools for supporting ITO decisions? Or do you think managers are in a position that they can make decisions based on their own knowledge and experience?
16. Do you see yourself as the audience for ITO academic research articles? Do you read ITO articles? (If yes which, how do you perceive them? Are they understandable? Useful? Have you tried to use them in practice? If no, why?)
17. What sources do you use to improve your ITO decision-making knowledge?

Research-practice gap determinant factors

18. Do you think academic researchers can help ITO practitioners in their decision making? If yes how? If no why?
19. To what extent can you rely on prescriptions of academic research particularly regarding ITO decision aids? Compare this to industry best practices and industry standards (e.g. ITIL, COBIT …)?
20. What helps or hinders ITO decision makers' use of academic research?
21. Do you think the collaboration between academic researchers and practitioners can result in better ITO decision aids?

B.3. Interview questions - IT consultants

1. Interviewee background

   Education: Graduation year:

How long have you been:

- working in ICT field?
- involved with IT sourcing decisions?

2. Do you use any specific documented/formal decision-making model/framework to assist organisations with their IT Outsourcing decisions?
3. Does your methodology contain any data manipulation e.g using algorithms for comparing different outsourcing decisions?
4. How do you assess current decision-making approaches of practitioners (e.g. CIOs) in their IT outsourcing decisions? (Are those approaches comprehensive? Evidenced base? Formal?)
5. Where does your “IT outsourcing decision-making knowledge” that you use to give advice to your clients come from?
6. Do you see yourself –as a consultant- as an audience of academic research (e.g. academic journal papers), Particularly IT outsourcing decision-making research? Do you read academic papers? If yes, how do you perceive their usefulness; if no, why?
7. Where the decision-making knowledge of IT consultancy firms comes from? Is it developed mainly internally? To what extent this decision-making knowledge relies on academic research?
8. What makes IT consultants a reliable source of giving advice to organisations in their IT outsourcing strategies/decisions?
9. Do you think the goal of developing a “comprehensive decision support system (including decision model, decision criteria, guideline…) for IT outsourcing decision making” is possible? If yes, what criteria should be met to ensure adoption of the DSS by practitioners (e.g. CIOs)?
10. While there is some research that has suggested/prescribed several decision models/tools for IT outsourcing decision making (e.g. using AHP, Fuzzy decision-making techniques), there is no evidence that practitioners use those research. What factors do you think contributed to this issue/gap?
11. How can the relevance and adoption of academic research can be improved?

B.4. Interview questions – ITO researchers

Interviewee background

1. Education and academic position?
2. How long have you conducted research in IT outsourcing field?
3. What's your motivator(s) for ITO research? What are the motivational factors for your engagement in ITO research?

IT Outsourcing decision support

4. How do you evaluate the practicability of current academic research-based ITO decision aids (particularly your research)? Do you believe that the proposed academic models/tools for ITO decision-making (including yours) can effectively improve the decision-making process in practice?
5. Where has been your source of information about ITO in practice? (E.g. practitioner seminars, magazines, secondary data such as research papers…)
6. Have you ever implemented any ITO decision aids in practice? Which/how?

Research-practice gap

7. In your view, who are the direct intended audience of your research? (Other researchers or practitioners or intermediates who transfer the knowledge e.g. consultants?) Can ITO decision-making research be used directly by practitioners? Is it understandable by them?
8. Do you think the collaborative research can produce decision support model/tools? Do you any negative effects of collaborating with practitioners? (e.g. negative perception on status from academic peers, weak rigour, lack of control over the research process by researcher…)
9. Do you see "producing relevant and practicable research" as part of the role/responsibilities of an academic researcher? What about trying to disseminate research results to practice? (e.g. through workshops, practitioner-oriented journals/magazines, seminars) ? If yes, is there any incentive that encourages academics to do so?
10. What are the main factors causing the gap between practice and research in this domain? What helps or hinders ITO decision makers' use of research?
11. How can the research-practice gap be bridged?

Appendix C: Survey questionnaires

C.1 Survey questions- ITO Practitioners

Section 1: Background information

1. Country of residence: ___ [Drop down list of countries]
2. The highest level of education completed:
   ☐ No higher education qualifications
   ☐ Diploma or equivalent 1 to 2 years higher education degree
   ☐ Bachelor degree or equivalent 3 to 5 years higher education degree
   ☐ Master degree or equivalent post graduate degree
   ☐ Doctorate (PhD/DBA…)

3. What industry do you primarily work in? …………

4. How long have you worked **in IT-related positions**?
   ☐Less than 5 years ☐ 5 to 10 years ☐more than 10 years

5. How long have you been involved in making **decisions about IT outsourcing?** (e.g. to outsource a particular IT system/process or not? To which IT service provider outsource, to adopt cloud computing or not? …)
   ☐Less than 5 years ☐ 5 to 10 years ☐more than 10 years

6. Please indicate your type of engagement with IT outsourcing decisions (multiple selections are possible):
   ☐ I am an IT practitioner; I have been involved in making IT outsourcing decisions at the organisations where I work
   ☐ I am an IT consultant; I provide consultancy services to organisations for their IT outsourcing decisions
   ☐ other: ……….

Section 2 – Level of structure of IT outsourcing decision-making process (for non-consultants)

7. How many people work in your organisation?
   ☐ 1 to 19
   ☐ 20 to 199
   ☐ 200 or more

8. Is there any established/pre-defined **decision criteria (e.g. list of factors to be considered)** for IT outsourcing strategy/decision-making process used by your organisation?
   ☐ Yes ☐ No

9. Is there any established/pre-defined **decision-making model that provides guidance on how to weight/prioritise different decision factors** in IT outsourcing strategy/decision-making process used by your organisation?
   ☐ Yes ☐ No

10. Is there any established/pre-defined **process/framework/methodology (e.g. a flowchart, workflow …)** for IT outsourcing strategy/decision-making process used by your organisation?
    ☐ Yes ☐ No

11. Is there any established/pre-defined **documentation** (e.g. forms, checklists, written procedures…) used for IT outsourcing strategy/decision-making by your organisation?
    ☐ Yes ☐ No

12. Is there any **software** (e.g. decision support system) used to support IT outsourcing strategy/decision-making in your organisation?
    ☐ Yes ☐ No

Section 3 – External sources of obtaining IT outsourcing decision-making knowledge

13. To what extent do you perceive the following entities have informed your knowledge of making IT outsourcing decision?

	No effect	Very low	Low	Average	High	Very high
Peer IT practitioners e.g. CIOs, IT Managers … (through formal or informal communications)	O	O	O	O	O	O
Academics (through reading their papers, blog posts, books … or seeking advice from them, etc.)	O	O	O	O	O	O
Consultants (through consultancy services, reading their publications or attending the events they organise such as summits, webinars and seminars)	O	O	O	O	O	O
IT vendors/Service providers (through collaboration with them, their consultancy services, reading their publications or attending the events they organise such as seminars)	O	O	O	O	O	O
Independent writers of mass media (e.g. those who write articles and reports in magazines and websites)	O	O	O	O	O	O

14. Have you received any **training** that helps you in making IT outsourcing decisions?
    ☐ Yes ☐ No
15. Have you ever read any **book(s)** with regard to IT outsourcing?
    ☐ Yes ☐ No
16. Do you (as a practitioner) see yourself as an **audience for academic research papers** (journal or conference papers)?
    ☐ Yes ☐ No
17. **How often** do you read **academic research papers** (journal or conference papers)?
    ☐ Frequently ☐ Regularly ☐ Occasionally ☐ Never
18. Have you ever used **academic research papers** to inform your IT sourcing decision-making?
    ☐ Yes ☐ No
19. Have you ever consulted an **academic/faculty member** to give you advice on IT outsourcing decision-making?
    ☐ Yes ☐ No
20. Please indicate how likely are you **to adopt** a decision support model/framework/methodology for making IT sourcing decisions, considering the **source of the model/framework** listed in the following table.

Model/framework source	Not likely	Very low	Low	Average	High	Very High
A leading organisation in your sector	O	O	O	O	O	O
An organisation with similar characteristics to your organisation	O	O	O	O	O	O
Academic(s) (published in a highly regarded academic journal)	O	O	O	O	O	O
A well-known IT consultancy firm (e.g. Gartner)	O	O	O	O	O	O

Section 4: Perceptions of barriers to adoption of academic research

21. Please indicate your level of agreement with each of the following statements.

Inhibiting factor/reason	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Academic research is **not experience-based and proven to be effective in practice**	O	O	O	O	O
The **language** of academic research publications is **complex** (e.g. use jargons, mathematical formulas), thus **not easily understandable** by practitioners	O	O	O	O	O
Academic research **lacks timeliness** and is **not up-to-date** enough to inform practice	O	O	O	O	O
Academic research-based frameworks/models are **far from real world** (e.g. too generalised, are based on too many presumptions …)	O	O	O	O	O
Academic research is **more suitable for leading organisations (early adopters)** than followers	O	O	O	O	O
Academic research is **theoretical not practical**	O	O	O	O	O
If practitioners **have sufficient access** (e.g. free or through workplace subscription) to academic research, they will read more academic publications	O	O	O	O	O
Practitioners do not adopt academic research because they **lack awareness of available** academic research	O	O	O	O	O
Practitioners do not adopt academic research because they **lack time to search** for relevant academic research	O	O	O	O	O
Practitioners do not adopt academic research because reading academic research publications **demands too much time** for practitioners	O	O	O	O	O
Practitioners **lack the skill/knowledge to implement** academic research	O	O	O	O	O
Academic research **is not a commonly used source for practitioners** to acquire decision-making knowledge	O	O	O	O	O

C.2 Survey questions- ITO Researchers

Section 1: Background information

22. What is your academic rank?
    ☐Professor ☐Associate Professor ☐Senior Lecturer/Assistant Professor ☐Lecturer
    ☐Other: ___
23. Country of residence: ___
24. How long have you worked in academia?
    ☐Less than 5 years ☐ 5 to 10 years ☐ More than 10 years

Section 2: Reflection on your IT outsourcing research (check all that apply)

25. What was your motivation to conduct research in IT outsourcing?
    ☐To achieve research publications ☐ To support practitioners ☐ Other: ___
26. What initiated your IT outsourcing research paper(s)?
    ☐ Journal or conference call for paper
    ☐ Finding the research idea while reading research papers
    ☐ Personal feeling for the need to research the topic of IT outsourcing
    ☐ Request from practitioners to do the research
    ☐ Request from co-author(s) to engage in the research
    ☐ Other: ___
27. Which sources did you use to obtain information about IT outsourcing in practice?
    ☐ Survey of practitioners
    ☐ Interviews with practitioners
    ☐ Personal contact/communications with practitioners
    ☐ Personal industry/work experience
    ☐ Secondary sources (industry surveys, publications …)
    ☐ Other: ___
28. How often do you **read IT practitioner's publications** (e.g. IT sections of newspapers, web/social media content…)?
    ☐ Frequently ☐ Regularly ☐ Occasionally ☐ Never
29. How often do you **write for practitioner's publications** (e.g. IT sections of newspapers, web/social media …)?
    ☐ Frequently ☐ Regularly ☐ Occasionally ☐ Never
30. To what extent do you attend non-academic events (e.g. seminars organised by Gartner or IT vendors)?
    ☐ Frequently ☐ Regularly ☐ Occasionally ☐ Never
31. To what extent do you have personal communication (formal or informal) with IT managers?
    ☐ Frequently ☐ Regularly ☐ Occasionally ☐ Never
32. Did you collaborate with practitioners in conducting your IT outsourcing research?
    ☐ Yes ☐ No
33. Did you evaluate the **effectiveness** of your proposed decision-making tool/model before publishing your paper?
    ☐ Yes
    ☐ No
34. What have you done to disseminate the research outputs from your IT outsourcing research to practice or to implement it?
    ☐ Presented to practitioners at events (e.g. seminars) or to specific organisations
    ☐ Offered consultancy for implementation

☐ Established a spin-off company to commercialise the research output

☐ Published the research output in a **book/book chapter**

☐ Published the research output in **practitioner media** (e.g. websites, blogs, social media such as Twitter or LinkedIn, magazines…)

☐ Developed software based on the research results

☐ Transmitted the research output through teaching

☐ Informally transferred the research output (e.g. through informal communications with practitioners)

☐ Other:______

35. Are you aware if your suggested decision-making support model/tool for IT outsourcing/Cloud sourcing has been implemented in any organisation?

    ☐ Yes

    ☐ No

36. What are the limitations/challenges of implementation of your suggested decision-making support model/tool for IT outsourcing in practice?

    ☐ No limitations/challenges

    ☐ Complexity of the tool

    ☐ Time and resources for implementation can be extensive

    ☐ Availability of data/information to be processed in the decision model

    ☐ The proposed decision method cannot cope with the high pace of change in the IT industry (e.g. frequent emergence of new sourcing models)

    ☐ The decision model cannot address the complexity of IT outsourcing decisions in practice adequately

    ☐ Other: ___

37. Which of the following initiatives do you think can increase the practicality (relevance) of research into ITO decision making?

☐ Collaborative research with practitioners

☐ Reform in academic promotion system in the way that encourages academic researchers to conduct more practical research

☐ Adopting practice-oriented methodologies such as design science research or action research

☐ Other: ___________________________

38. Which of the following initiatives do you think can increase the adoption of ITO decision-making research by practitioners?

☐ Collaborative research with practitioners

☐ Development of consulting relationships between academics and practitioners

☐ Dissemination of academic research results to practitioners through professional events (e.g. practitioner seminars)

☐ Dissemination of academic research outputs to practitioners through publishing in practitioner media (e.g. websites, blogs, magazines)

☐ Other: ___________________________

C.3 Sample invitation email (researchers survey)

Dear ……….,

My review of 'IT outsourcing (ITO)' and 'cloud sourcing' decision-making literature identified you as a leading researcher in this domain, since you have published the following article(s) that suggest a decision-making model/tool for ITO/Cloud sourcing:

[citations inserted here]

As a PhD student in Information Systems at the University of Southern Queensland (USQ), Australia, I am investigating the adoption of academic IT outsourcing decision-making research by practitioners. The evidence suggests that adoption of academic IT outsourcing decision-making models/methods by practitioners is limited and a research-practice gap exists in this domain. This motivated me to investigate 'why' such a gap exists and 'how' the gap can be reduced or bridged. I believe your thoughts/views can provide valuable insights into the problem and invite you to participate in a research survey.

The survey will take a **maximum of 7 minutes**. All comments and responses will be **anonymous** and **unidentifiable**. The research has been granted Ethics Approval (#H15REA144) from the USQ Ethics office.

Please follow the link and complete the questionnaire by 27 March 2016:

https://docs.google.com/forms/d/1J63Rw1O0Nyg8cQhOJ5qYTaPxCfLEqJw9D9P5XYbinbU/viewform

If you are interested in receiving the 'Summary of Results' report please email me.

Thank you in advance for your time.

Kind Regards,

Mohammad Mehdi Rajaeian
PhD Candidate

T: +61 7 46315519

Supervisor: Professor Aileen Cater-Steel

E: caterst@usq.edu.au
T: +61 7 46311276

UNIVERSITY OF SOUTHERN QUEENSLAND

School of Management & Enterprise | Faculty of Business, Education, Law and Arts
University of Southern Queensland | Toowoomba, Queensland | 4350 | Australia

C.4 Sample invitation email (ITO practitioners survey)

«GreetingLine»

As a PhD student in Information Systems at the University of Southern Queensland (USQ), Australia, I am investigating the adoption of IT outsourcing decision-making knowledge by practitioners. I believe your thoughts/views can provide valuable insights into the problem and invite you to participate in a research survey.

The survey will take a **maximum of 10 minutes**. All comments and responses will be **anonymous** and **unidentifiable**. The research has been granted Ethics Approval (#H15REA144) from the USQ Ethics office.

Please follow the link and complete the questionnaire by 23 March 2016:

https://docs.google.com/forms/d/1sh0VKNyS6wOcQUJaYrokgmFwU77uZm3vtiUioBiD-9g/viewform

If you are interested in receiving the 'Summary of Results' report please email me.

Thank you in advance for your time.

Kind Regards,

Mohammad Mehdi Rajaeian
PhD Candidate

T: +61 7 46315519

Supervisor: Professor Aileen Cater-Steel

E: caterst@usq.edu.au
T: +61 7 46311276

UNIVERSITY OF SOUTHERN QUEENSLAND

School of Management & Enterprise | Faculty of Business, Education, Law and Arts
University of Southern Queensland | Toowoomba, Queensland | 4350 | Australia

Appendix D: Coding protocol for systematic literature review

The following template was used to code and analyse the surveyed articles.

1. Article title:
2. Publication year:
3. Article Type: Journal / Conference
4. The designed artefact
   - 4.1. Type of artefact: a) Construct b) Model c) Method d) Instantiation
   - 4.2. What IT sourcing decisions are supported?
     - a) Adoption / Risk assessment
     - b) Deciding the level of ITO - sourcing model
     - c) What to outsource
     - d) IT Vendor/Service provider/location selection
5. Theoretical foundations:
   - 5.1. What theories/frameworks have been cited?
   - 5.2. What decision analysis method(s) is (are) used?
6. Research methodologies: What research methodology has been adopted?
7. Evaluation
   - 7.1. Type of evaluation according to Hevner et al.'s taxonomy

Category of Evaluation Method	Specific Evaluation Method
Observational	1. Case Study 2. Field Study
Analytical	3. Static 4. Architecture 5. Optimisation 6. Dynamic Testing
Experimental	7. Controlled Experiment 8. Simulation
Testing	9. Functional (Black Box) 10. Structural (White Box)
Descriptive	11. Informed Argument 12. Scenarios
No evaluation	13. None

   - 7.2. Type of evaluation according to Venable et al.'s quadrant
     - 7.2.1. Evaluation timeline: a) Ex ante b) Ex post
     - 7.2.2. Evaluation nature: a) Naturalistic b) Artificial
8. Did the article report validation of the artefact?
9. What organisational factors are considered in the design of the artefact?
   - 9.1. Sector/Industry
   - 9.2. Size (e.g. small, medium, large)
10. Which ITO technology is supported? a) General ITO b) Cloud sourcing c) ASP d) Net-sourcing
11. Is support for group decision-making mentioned in the article? a) Yes b) No.

Appendix E: IT DSS papers identified through systematic literature review

Author(s)	Year	Paper title	Journal/Conference
A. Chaudhury, K. Nam and H. R. Rao	1995	Management of information systems outsourcing: a bidding perspective	Journal of Management Information Systems
O. J. Akomode, B. Lees and C. Irgens	1998	Constructing customised models and providing information to support IT outsourcing decisions	Logistics Information Management
O. K. Ngwenyama and N. Bryson	1999	Making the information systems outsourcing decision: A transaction cost approach to analysing outsourcing decision problems	European Journal of Operational Research
S. T. Roehling, J. S. Collofello, B. G. Hermann and D. E. Smith-Daniels	2000	System dynamics modelling applied to software outsourcing decision support	Software Process: Improvement and Practice
G. G. Udo	2000	Using analytic hierarchy process to analyse the information technology outsourcing decision	Industrial Management & Data Systems
C. Yang and J.-B. Huang	2000	A decision model for IS outsourcing	International Journal of Information Management
P. S. Lokachari and M. Mohanarangan	2002	Outsourcing of information technology services: A decision-making framework	Portland International Conference on Management of Engineering and Technology
M. Benaroch	2002	Managing information technology investment risk: a Real Options perspective	Journal of Management Information Systems
V. Pandey and V. Bansal	2004	A decision-making framework for IT outsourcing using the analytic hierarchy process	International Conference on Systemics, Cybernetics and Informatics
C.-I. Hsu, C. Chiu and P.-L. Hsu	2004	Predicting information systems outsourcing success using a hierarchical design of case-based reasoning	Expert Systems with Applications
C. Singh, R. Shelor, J. Jiang and G. Klein	2004	Rental software valuation in IT investment decisions	Decision Support Systems
B. Corbitt and I. Tho	2005	Towards an economic analysis of IT outsourcing risks	Association for Information Systems (ACIS 2005)
J. B. Davis	2005	Insights from a real options approach to evaluate IT sourcing decisions	Americas Conference on Information Systems (AMCIS 2005)
G. Xie, J. Zhang and K. K. Lai	2005	A group decision-making model of risk evasion in software project bidding based on VPRS	10th International Conference Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing

G. Büyüközkan and O. Feyzioğlu	2006	An intelligent decision support system for IT outsourcing	Third international conference on Fuzzy Systems and Knowledge Discovery
H. Li, J. Wang and D. Yang	2006	Where to outsource: Using a hybrid multi-criteria decision aid method for selecting an offshore outsourcing location	Americas Conference on Information Systems (AMCIS 2006)
X. Xiang and G. Zhong-liang	2006	Study on a decision model of IT outsourcing prioritization	International Conference on Systems, Computing Sciences and Software Engineering (SCSS 05)
J. Zhang, G. Cong, Y. Yu and Y. Gong	2006	A fuzzy rough group decision-making model for rating and ranking IT outsourcing aggressive risk	International Conference on Service Systems and Service Management
C.-H. Cheng, J. Balakrishnan and W.-C. Wong	2006	A Quantitative model for analysing IS outsourcing decisions	International Journal of Services Operations and Informatics
S. K. Mathew	2006	Understanding risk in IT outsourcing: A fuzzy framework	Journal of Information Technology Case & Application Research
K.-M. Osei-Bryson and O. K. Ngwenyama	2006	Managing risks in information systems outsourcing: An approach to analysing outsourcing risks and structuring incentive contracts	European Journal of Operational Research
S. Paisittanand and D. L. Olson	2006	A simulation study of IT outsourcing in the credit card business	European Journal of Operational Research
G. Hodosi and L. Rusu	2007	A software tool that supports decisions for companies to outsource information technology or not	Mediterranean Conference on Information Systems (MCIS)
J.-J. Wang, H.-F. Li, X.-J. Diao and D.-l. Yang	2007	Developing a decision support model for information systems outsourcing	Second International Conference on Innovative Computing, Information and Control, 2007 (ICICIC '07)
J.-R. Chen, T.-C. Chou and Y.-C. Lin	2007	Design and implementation of an ontology-based information technology outsourcing evaluation system using AHP	International Journal of Innovation and Learning
D. L. Olson	2007	Evaluation of ERP outsourcing	Computers & Operations Research
J.-J. Wang and D. L. Yang	2007	Using a hybrid multi-criteria decision aid method for information systems outsourcing	Computers & Operations Research
Z. Tang, G. Liang and R. Wu	2008	A game analysis of outsourcing strategy for enterprise informatization	IFIP International Conference on Research and Practical Issues of Enterprise Information Systems

J.-J. Wang, Z.-k. Lin and G.-Q. Zhang	2008	A decision model for IS outsourcing based on AHP and ELECTREIII	4th International Conference on Wireless Communications, Networking and Mobile Computing
T.-C. Wang, L. Y. Chen and Y.-H. Chen	2008	Applying fuzzy PROMETHEE method for evaluating is outsourcing suppliers	Fifth International Conference on Fuzzy Systems and Knowledge Discovery
L. Xiu-Wu, W. Tao and L. Yuan	2008	A Bayesian network model under group decision making for evaluating IT outsourcing risk	International Conference on Risk Management and Engineering Management (ICRMEM)
G. Cong, J. Zhang, T. Chen and K. K. Lai	2008	A variable precision fuzzy rough group decision-making model for IT offshore outsourcing risk evaluation	Journal of Global Information Management
P.-F. Hsu and M.-G. Hsu	2008	Optimizing the information outsourcing practices of primary care medical organizations using entropy and TOPSIS	Quality & Quantity
L. B. Liu, P. Berger, A. Zeng and A. Gerstenfeld	2008	Applying the analytic hierarchy process to the offshore outsourcing location decision	Supply Chain Management: An International Journal
F.-J. Chen and P. Cao	2009	Ant colony optimization algorithm for vendor selection in information systems outsourcing	International Conference on Business Intelligence and Financial Engineering
M. Godse and S. Mulik	2009	An approach for selecting Software-as-a-Service (SaaS) product	IEEE International Conference on Cloud Computing
C. Ping, C. Fu-ji and Z. Jian	2009	A multi-objective model of information system outsourcing decision for suppliers selection	International Conference on Computational Intelligence and Natural Computing (CINC)
B. Xinyi and X. Jingjing	2009	Developing a decision model for IT outsourcing using analytic hierarchy process	International Conference on Management and Service Science (MASS)
L. Y. Chen and T.-C. Wang	2009	Optimizing partners' choice in IS/IT outsourcing projects: The strategic decision of fuzzy VIKOR	International Journal of Production Economics
J. Dasgupta and R. P. Mohanty	2009	Towards evaluating the risks of software services outsourcing industry	XIMB Journal of Management
M. N. Faisal and D. K. Banwet	2009	Analysing alternatives for information technology outsourcing decision: An analytic network process approach	International Journal of Business Information Systems
C. Kahraman, O. Engin, O. Kabak and I. Kaya	2009	Information systems outsourcing decisions using a group decision-making approach	Engineering Applications of Artificial Intelligence
C. Loebbecke and C. Huyskens	2009	Development of a model-based netsourcing decision support system using a five-stage methodology	European Journal of Operational Research

C. Andresen, G. Hodosi, I. Saprykina and L. Rusu	2010	User acceptance of a software tool for decision making in IT outsourcing: A qualitative study in large companies from Sweden	3rd World Summit on the Knowledge Society (WSKS 2010)
C.-T. Chen and K.-H. Lin	2010	A decision-making method based on interval-valued fuzzy sets for cloud service evaluation	International Conference on New Trends in Information Science and Service Science (NISS)
L. Hatami-Shirkouhi, K. Rezaie, S. Nazari-Shirkouhi, A. Ansarinejad and S. Miri-Nargesi	2010	A practical framework for IS outsourcing using the integrated fuzzy group decision making approach	Computational Intelligence, Modelling and Simulation (CIMSiM)
Y. Jiang, L. Chen, X. Zhou and Y. Liu	2010	Process-oriented software outsourcing decision based on genetic algorithm	International Conference on Service Operations and Logistics, and Informatics (SOLI)
Z. A. Fekete and L.-V. Hancu	2010	A supplier selection model for software development outsourcing	Annals of the University of Oradea, Economic Science Series
C. Kahraman, A. Beskese and I. Kaya	2010	Selection among ERP outsourcing alternatives using a fuzzy multi-criteria decision making methodology	International Journal of Production Research
W. H. Tsai, J. D. Leu, J. Y. Liu, S. J. Lin and M. J. Shaw	2010	A MCDM approach for sourcing strategy mix decision in IT projects	Expert Systems with Applications
E. Walker, W. Brisken and J. Romney	2010	To lease or not to lease from storage clouds	Computer
X. Chen and J. Han	2011	A novel IS/IT outsourcing service vendor selection method based on fuzzy axiomatic design	IEEE 18th International Conference on Industrial Engineering and Engineering Management, IE and EM 2011
G. Fridgen and H.-V. Müller	2011	An approach for portfolio selection in multi-vendor IT outsourcing	Thirty Second International Conference on Information Systems
L. Mastroeni and M. Naldi	2011	Storage Buy-or-Lease decisions in cloud computing under price uncertainty	7th EURO-NGI Conference on Next Generation Internet (NGI)
S. Miri-Nargesi, A. Keramati, A. Ansarinejad and S. Nazari-Shirkouhi	2011	A structured methodology for information systems outsourcing decisions using fuzzy MCDM	2011 international conference on industrial engineering and operations management
Z. Rehman, F. K. Hussain and O. K. Hussain	2011	Towards multi-criteria cloud service selection	International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS)
P. Saripalli and G. Pingali	2011	MADMAC: multiple attribute decision methodology for adoption of clouds	IEEE International Conference on Cloud Computing
G. Xie and S. Mei	2011	The strategic decision of fuzzy TOPSIS on partner' choice in IT outsourcing projects	2011 International Conference on Computer Science and Service System (CSSS)

C.-Y. Yam, A. Baldwin, S. Shiu and C. Ioannidis	2011	Migration to cloud as real option: Investment decision under uncertainty	IEEE International Conference on Trust, Security and Privacy in Computing and Communications
C. Yiming and Z. Yiwei	2011	SaaS vendor selection basing on Analytic Hierarchy Process	Fourth International Joint Conference on Computational Sciences and Optimization (CSO)
Y. H. Chen, T. C. Wang and C. Y. Wu	2011	Strategic decisions using the fuzzy PROMETHEE for IS outsourcing	Expert Systems with Applications
U. Gulla and M. Gupta	2011	Deciding the level of information systems outsourcing: Proposing a framework and validation with three Indian banks	Journal of Enterprise Information Management
S. Nazari-Shirkouhi, A. Ansarinejad, S. Miri-Nargesi, V. M. Dalfard and K. Rezaie	2011	Information systems outsourcing decisions under fuzzy group decision making approach	International Journal of Information Technology and Decision Making
G. Nie, Q. She and D. Chen	2011	The evaluation and selection of cloud service by fuzzy MCDM	Journal of Systems Science & Information
D. L. Olson and D. D. WU	2011	Multiple criteria analysis for evaluation of information system risk	Asia-Pacific Journal of Operational Research
C.-W. Chang, P. Liu and J.-J. Wu	2012	Probability-based cloud storage providers selection algorithms with maximum availability	41st International Conference on Parallel Processing (ICPP)
B. Johnson and Y. Qu	2012	A holistic model for making cloud migration decision: a consideration of security, architecture and business economics	IEEE 10th International Symposium on Parallel and Distributed Processing with Applications (ISPA)
A. Karami and Z. Guo	2012	A fuzzy logic multi-criteria decision framework for selecting IT service providers	45th Hawaii International Conference on System Science (HICSS)
J. Keung and F. Kwok	2012	Cloud deployment model selection assessment for SMEs: renting or buying a cloud	IEEE Fifth International Conference onUtility and Cloud Computing (UCC)
K. K. F. Yuen	2012	Software-as-a-Service evaluation in cloud paradigm: Primitive cognitive network process approach	IEEE International Conference on Signal Processing, Communications and Computing (ICSPCC)
J. Cao, G. Cao and W. Wang	2012	A hybrid model using analytic network process and gray relational analysis for bank's IT outsourcing vendor selection	Kybernetes
S.-I. Chang, D. C. Yen, C. S.-P. Ng and W.-T. Chang	2012	An analysis of IT/IS outsourcing provider selection for small- and medium-sized enterprises in Taiwan	Information & Management
Z.-P. Fan, W.-L. Suo and B. Feng	2012	Identifying risk factors of IT outsourcing using interdependent information: An extended DEMATEL method	Expert Systems with Applications

A. Khajeh-Hosseini, D. Greenwood, J. W. Smith and I. Sommerville	2012	The cloud adoption toolkit: supporting cloud adoption decisions in the enterprise	Software: Practice & Experience
C. Low and Y. Hsueh Chen	2012	Criteria for the evaluation of a cloud-based hospital information system outsourcing provider	Journal of Medical Systems
B. Martens and F. Teuteberg	2012	Decision-making in cloud computing environments: A cost and risk based approach	Information Systems Frontiers
S. Silas, E. B. Rajsingh and K. Ezra	2012	Efficient service selection middleware using ELECTRE methodology for cloud environments	Information Technology Journal
S. Tajdini and M. Nazari	2012	IS outsourcing decision: A quantitative approach	International Journal of Business & Management
Q. Zhang, L. Jiang and Y. Huang	2012	An interval intuitionistic fuzzy decision approach for supplier selection in information technology service outsourcing	Journal of Information and Computational Science
V. Andrikopoulos, Z. Song and F. Leymann	2013	Supporting the migration of applications to the cloud through a decision support system	Sixth International Conference on Cloud Computing
K. Chatterjee, M. B. Kar and S. Kar	2013	Strategic decisions using intuitionistic Fuzzy Vikor method for information system (IS) outsourcing	International Symposium on Computational and Business Intelligence (ISCBI)
B. Hanus and J. Windsor	2013	Multidimensional decision model for investment in cloud computing	Americas Conference on Information Systems (AMCIS)
A. Juan-Verdejo and H. Baars	2013	Decision support for partially moving applications to the cloud - The example of business intelligence	2013 International Workshop on Hot Topics in Cloud Services
C. König, P. Mette and H.-V. Müller	2013	Multivendor portfolio strategies in cloud computing	21st European Conference on Information Systems (ECIS)
T. Kramer and M. Eschweiler	2013	Outsourcing location selection with soda: A requirements based decision support methodology and tool	25th international conference on Advanced Information Systems Engineering
W. Liu and Q. Li	2013	A multi-criteria decision making method based on linguistic preference information for IT outsourcing vendor selection in hospitals	International Conference on Information, Business and Education Technology
C. P. Muir	2013	A decision making model for the adoption of cloud computing in Jamaican organizations	Americas Conference on Information Systems (AMCIS)
L. Qu, Y. Wang and M. A. Orgun	2013	Cloud service selection based on the aggregation of user feedback and quantitative performance assessment	IEEE International Conference on Services Computing (SCC)
N. Roedder, P. Karaenke and R. Knapper	2013	A risk-aware decision model for service sourcing	IEEE 6th International Conference on Service-

			Oriented Computing and Applications
U. Shivakumar, V. Ravi and G. R. Gangadharan	2013	Ranking cloud services using fuzzy multi-attribute decision making	IEEE International Conference on Fuzzy Systems
M. Sun, T. Zang, X. Xu and R. Wang	2013	Consumer-centered cloud services selection using AHP	International Conference on Service Sciences (ICSS)
H. U. Buhl, G. Fridgen and C. König	2013	Using financial derivatives to hedge against market risks in IT outsourcing projects - a quantitative decision model	Journal of Decision Systems
S. K. Garg, S. Versteeg and R. Buyya	2013	A framework for ranking of cloud computing services	Future Generation Computer Systems
M. Lilienthal	2013	A decision support model for cloud bursting	Business & Information Systems Engineering
M. Menzel, M. Schönherr and S. Tai	2013	(MC2)2: criteria, requirements and a software prototype for Cloud infrastructure decisions	Software: Practice and Experience
G. Baranwal and D. P. Vidyarthi	2014	A framework for selection of best cloud service provider using ranked voting method	IEEE International Advance Computing Conference (IACC)
T. R. Bezerra, A. Moura and A. S. Lima	2014	A system dynamics model to support strategic decision making on IT outsourcing: A case study at a state revenue agency in Brazil	Network Operations and Management Symposium (NOMS)
E. Cayirci, A. Garaga, A. Santana de Oliveira and Y. Roudier	2014	A cloud adoption risk assessment model	IEEE/ACM 7th International Conference on Utility and Cloud Computing (UCC)
A. Juan-Verdejo, S. Zschaler, B. Surajbali, H. Baars and H. G. Kemper	2014	InCLOUDer: a formalised decision support modelling approach to migrate applications to cloud environments	40th EUROMICRO Conference on Software Engineering and Advanced Applications (SEAA)
S. Le, H. Dong, F. K. Hussain, O. K. Hussain, J. Ma and Y. Zhang	2014	Multicriteria decision making with fuzziness and criteria interdependence in cloud service selection	IEEE International Conference on Fuzzy Systems
S. Le, H. Dong, F. K. Hussain, O. K. Hussain, J. Ma and Y. Zhang	2014	A hybrid fuzzy framework for cloud service selection	IEEE International Conference on Web Services (ICWS)
F. Moyano, K. Beckers and C. Fernandez-Gago	2014	Trust-aware decision-making methodology for cloud sourcing	26th International Conference on Advanced Information Systems Engineering (CAiSE 2014)
M. K. Naseer, S. Jabbar and I. Zafar	2014	A novel trust model for selection of cloud service provider	World Symposium on Computer Applications & Research (WSCAR 2014)
Y.-F. Zheng and J. Xu	2014	Multiple attribute decision making with triangular intuitionistic fuzzy numbers and application to cloud service provider selection	2nd International Conference on Information Technology and Electronic Commerce（ICITEC 2014)

S. Ding, C.-Y. Xia, K.-L. Zhou, S.-L. Yang and J. S. Shang	2014	Decision support for personalized cloud service selection through multi-attribute trustworthiness evaluation	PLoS ONE
W. Fan, S. Yang and J. Pei	2014	A novel two-stage model for cloud service trustworthiness evaluation	Expert Systems
H.-K. Kwon and K.-K. Seo	2014	A Fuzzy AHP based multi-criteria decision-making model to select a cloud service	International Journal of Smart Home
D.-F. Li and S.-P. Wan	2014	Fuzzy heterogeneous multiattribute decision making method for outsourcing provider selection	Expert Systems with Applications
D. C. Morais, A. P. C. Costa and A. T. de Almeida	2014	Group Decision Model for Outsourcing IT Services	Procedia Technology
B. Oztaysi	2014	A decision model for information technology selection using AHP integrated TOPSIS-Grey: The case of content management systems	Knowledge-Based Systems
N. Ramachandran, P. Sivaprakasam, G. Thangamani and G. Anand	2014	Selecting a suitable cloud computing technology deployment model for an academic institute	Campus-Wide Information Systems
J. Repschlaeger, T. Proehl and R. Zarnekow	2014	Cloud service management decision support: An application of AHP for provider selection of a cloud-based IT service management system	Intelligent Decision Technologies
C. Samantra, S. Datta and S. S. Mahapatra	2014	Risk assessment in IT outsourcing using fuzzy decision-making approach: An Indian perspective	Expert Systems with Applications
Y. Tjader, J. H. May, J. Shang, L. G. Vargas and N. Gao	2014	Firm-level outsourcing decision making: A balanced scorecard-based analytic network process model	International Journal of Production Economics
B. Watjatrakul	2014	Vendor selection strategy for IT outsourcing: The weighted-criteria evaluation technique	Journal of Enterprise Information Management
F. Zandi	2014	A bi-level constraint-oriented outsourcing framework for orchestration of an ERP system	International Journal of Production Research
A. Christoforou and A. S. Andreou	2015	A multilayer fuzzy cognitive maps approach to the cloud adoption decision support problem	IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)
S. Grandhi and S. Wibowo	2015	Performance evaluation of cloud computing providers using fuzzy multi-attribute group decision making model	12th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)
S. V. Razumnikov and M. S. Kremneva	2015	Decision support system of transition IT-applications in the cloud environment	2015 International Siberian Conference on Control and Communications (SIBCON)

M. A. Atkinson, O. Bayazit and B. Karpak	2015	A case study using the Analytic Hierarchy Process for IT outsourcing decision making	International Journal of Information Systems and Supply Chain Management (IJISSCM)
G. Cong and T. Chen	2015	A novel dynamic algorithm for IT outsourcing risk assessment based on transaction cost theory	Discrete Dynamics in Nature and Society
B. Do Chung and S. Kwang-Kyu	2015	A cloud service selection model based on Analytic Network Process	Indian Journal of Science and Technology
E. Furuncu and I. Sogukpinar	2015	Scalable risk assessment method for cloud computing using game theory (CCRAM)	Computer Standards & Interfaces
N. Ghosh, S. K. Ghosh and S. K. Das	2015	SelCSP: a framework to facilitate selection of cloud service providers	IEEE Transactions on Cloud Computing
P. Nduwimfura and J. Zheng	2015	A model for offshore information systems outsourcing provider selection in developing countries	International Business Research
R. Qiang and D. Li	2015	An inhomogeneous multi-attribute decision making method and application to IT/IS outsourcing provider selection	International Journal of Industrial Engineering: Theory, Applications and Practice
Z. Rehman, O. K. Hussain and F. K. Hussain	2015	User-side cloud service management: State-of-the-art and future directions	Journal of Network and Computer Applications
M. Ribas, C. G. Furtado, N. Souza, G. Barroso, A. Moura, A. S. Lima and F. R. C. Sousa	2015	A Petri net-based decision-making framework for assessing cloud services adoption: The use of spot instances for cost reduction	Journal of Network and Computer Applications
H. Singh and R. Randhawa	2015	CPSEL: Cloud Provider Selection Framework For Ranking and Selection of Cloud Provider	International Journal of Applied Engineering Research
H. Tang-Nguyen and Y. C. Lee	2015	The SWOT-ANP decision framework for the enterprise's cloud computing strategy	Information
M. Walterbusch, B. Martens and F. Teuteberg	2015	A decision model for the evaluation and selection of cloud computing services: a first step towards a more sustainable perspective	International Journal of Information Technology & Decision Making
Q. Yu	2015	CloudRec: a framework for personalized service recommendation in the cloud	Knowledge and Information Systems
M. N. Faisal and R. S. Asif	2016	IT outsourcing intent in academic institutions in GCC countries: An empirical investigation and multi-criteria decision model for vendor selection	Journal of Enterprise Information Management
S.-W. Lin	2016	The critical success factors for a travel application service provider evaluation and	Tourism Management

	selection by travel intermediaries	